



# Department of Defense Legacy Resource Management Program

16-518b

## **Vietnam War: Logistics Support on U.S. Military Installations Vietnam Historic Context Subtheme**

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## **EXECUTIVE SUMMARY**

Buildings, structures, and sites related to the buildup for and sustained fighting in the Vietnam War are turning 50 years old. Recently, an overarching historic context was developed that provides a broad historic overview from 1962 through 1975, highlighting the Vietnam War-influenced construction that created facilities on many military installations (Hartman et al. 2014).

The overarching historic context provides common ground for understanding the need for construction on military installations in support of the conflict in Vietnam. It also identified several thematic areas related to stateside construction in support of the war effort under which significance can be defined. This report is tiered from the overarching historic context, addresses the role of logistics in the Vietnam War, identifies specific installations and resource types associated with logistics during the Vietnam War, and provides a context to evaluate the historical significance of these resources.

The National Historic Preservation Act of 1966, as amended, requires federal agencies to inventory and evaluate their cultural resources, usually as they near 50 years of age. This report provides context and typology for Vietnam War (1962–1975) logistics-related resources on Department of Defense (DoD) installations in the United States. This report can be used to develop detailed research that will lead to identification and evaluation of Vietnam War facilities that supported materiel production, storage and shipping, and training of logistics personnel at DoD military installations in the United States. This report’s historic context provides military cultural resources professionals with a common understanding for determining the historical significance of Vietnam War logistics-related facilities, greatly increasing efficiency and cost-savings for this necessary effort.

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## **1.0 INTRODUCTION**

The Department of Defense Legacy Resource Management Program (DoD Legacy Program) was created in 1990 to assist the military branches in their cultural and natural resource protection and enhancement efforts with as little impact as possible to the agency's mission of military preparedness. The DoD Legacy Program is guided by the principles of stewardship or protection of irreplaceable resources, leadership of the Department of Defense (DoD) as the leader in resource protection, and partnership with outside DoD entities to access the knowledge and skill sets of others. The DoD Legacy Program's general areas of emphasis are:

- Implementing an interdisciplinary approach to resource stewardship that takes advantage of the similarities among DoD's natural and cultural resource plans. Often, the same person is responsible for managing both natural and cultural resource plans on an installation. The DoD Legacy program strives to take advantage of this by sharing management methodologies and techniques across natural and cultural resource initiatives.
- Promoting understanding and appreciation for natural and cultural resources by encouraging greater awareness and involvement by both the U.S. military agencies and the public.
- Incorporating an ecosystem approach that assists the DoD in maintaining biological diversity and the sustainable use of land and water resources for missions and other uses.
- Working to achieve common goals and objectives by applying resource management initiatives in broad regional areas.
- Pursuing the identification of innovative new technologies that enable more efficient and effective management (<https://www.dodlegacy.org/Legacy/intro/about.aspx>).

Each year, the DoD Legacy Program develops a more specific list of areas of interest, which is usually derived from ongoing or anticipated natural and cultural resource management challenges within the DoD. These specific areas of emphasis; however, reflect the DoD Legacy Program's broad areas of interest. To be funded, a project must produce a product that can be useful across DoD branches and/or in a large geographic region. This project can be used by all the DoD Services and for military installations throughout the country.

### **1.1 OVERARCHING VIETNAM WAR CONTEXT**

The DoD and its individual services must comply with the National Historic Preservation Act of 1966, as amended (NHPA), by identifying and managing historic properties that are part of their assets. In an effort to help with this requirement, the U.S. Army Construction Engineering Research Laboratories (USACERL) directed a study of DoD Vietnam War resources, many of which are about to turn 50 years old. The resulting report, which was approved in December 2014, is an overview study of construction on DoD military installations in the United States from 1962 through 1975.

The report was developed as an overview document from which more detailed historic contexts and other documents can be developed. This programmatic approach will ultimately lead to the

efficient and cost-effective identification and evaluation of Vietnam War facilities at DoD military installations in the United States.

The report identifies several significant thematic areas (subthemes) related to construction in support of the war. These include ground training, air training, special operation forces and warfare, schools, housing, medical facilities, and logistics facilities.

This project contributes to the broad Vietnam War context by providing a historic context for identifying and evaluating logistics-related historic properties at DoD installations. This context addresses material research, development, and production; storage, maintenance, and shipping; and personnel training.

This historic context focuses on logistical support for the Vietnam War, and is intended to be a companion to other contexts that address Vietnam War history in the military in a holistic sense. Specific Vietnam War subcontexts will include ground training, air training, housing, special operation forces and warfare training, medical facilities, and logistical facilities. Currently, the subcontext for ground combat training and helicopter training and use have been developed; other subcontext are either in process or have yet to be written. Vietnam War subcontexts will be posted to <http://www.denix.osd.mil/references/DoD.cfm> as they become final.

This report is intended to provide a basis from which to evaluate DoD resources required to provide logistical support for the Vietnam War. When evaluating logistic-related resources, the information contained in this document should be augmented with specific installation historic contexts to make an accurate and justified argument regarding historic significance. Appendix A, B, and C provide examples from specific installations for this subcontext, including Defense Logistics Agency, Aberdeen Proving Ground, and Fort Lee, respectively.

Appendix D includes a list of the primary logistic installation and units; however, it should not be considered exhaustive. Some units were active during the period of the Vietnam War, but did not serve in the Vietnam War, while other units may have served in supporting roles or were trained and did not deploy.

## **1.2 PURPOSE AND METHODOLOGY**

The purpose of this effort was to research and develop a Vietnam War logistical support historic context. The report also provides context and typology of Vietnam War (1962–1975) logistics resources on DoD installations in the United States. This report is not a detailed history of military engagements and important battles. Military action is only addressed in somewhat general terms to fortify the overall logistics context and how increased deployment of troops affected DoD installations in the United States.

Research and site visits were pivotal to the development of the historic context for the use and development of Vietnam War helicopter operations in the DoD. Researchers accessed primary and secondary sources and, where applicable, visited sites with helicopters-related properties at several locations. The National Archives and Records Administration (NARA) Archives I (Military Reference Branch); NARA, Archives II (Cartography and Architectural Records Branch); USACERL Technical Library; University of Colorado libraries; Fort Lee; Aberdeen

Proving Ground (APG), Eglin Air Force Base (AFB), and Quantico Base Library were visited. Online sources of information were also consulted.

The development of the Vietnam War historic context was supported and facilitated through the assistance of several individuals. A number of individuals provided additional support to the project by assisting with data requests, site visits, and providing reports and resources related to Vietnam War special operation forces and warfare training in the DoD. They also provided general guidance and installation-specific information.

- Jason Huggan, Registered Professional Archeologist (RPA), Cultural Resource Manager, Environmental Affairs Division, Directorate of Public Works, Picatinny Arsenal, New Jersey
- Patty J. Conte, Cultural Resources Manager, Army Logistics University, Fort Lee, Virginia
- Mark Gallihue, Cultural Resources Manager, APG, Maryland
- Benjamin J. Hoksbergen, Cultural Resource Manager, Archaeologist Redstone Arsenal, Alabama
- Katie Stamps, Architectural Historian, Redstone Arsenal, Alabama
- Ellen R. Hartman, Engineer Research and Development Center (ERDC)/Construction Engineering Research Laboratories (CERL)
- Susan I. Enscore, ERDC/CERL
- Adam D. Smith, ERDC/CERL
- Ilaria Harrach Basnett, Air Force Civil Engineer Center (AFCEC)/Environmental Operations Division (CZO), Cultural Resources Manager, Eglin AFB
- Dr. Paul Green, RPA, Department of Air Force Civilian, AFCEC/CZO-East Division
- Karl Kleinbach, U.S. Army Environmental Command, San Antonio, Texas
- William Manley, Naval Facilities Engineering Command Headquarters Cultural Resources, Program Lead, Navy Department Federal Preservation Officer

### **1.3 HOW THIS REPORT IS ORGANIZED**

This report is presented in five chapters. Chapter 1 provides the introduction and methodology used to prepare this report. Chapter 2 provides a summary of the Vietnam War, and a summary of logistics by each of the military service installations during the beginning, middle, and end of the Vietnam War. Chapter 3 provides a context for logistical support during the Vietnam War at U.S. installations. Chapter 4 provides a description of the types of resources that would be associated with logistics during the war on U.S. installations and an overview of evaluating resources under the NHPA with descriptions of evaluation criteria and integrity. Chapter 5 contains selected references. The appendixes comprise a few previously prepared surveys for reference, a list of logistics units deployed to Vietnam, report contributors, and acronyms.

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## **2.0 SHORT HISTORY OF THE VIETNAM WAR**

[Portions of this summary are adapted from Ellen R. Hartman, Susan I. Enscore, and Adam D. Smith, “Vietnam on the Homefront: How DoD Installations Adapted, 1962–1975,” DoD Legacy Resource Management Program, Report ERDC/CERL TR-14-7, December 2014.]

The Vietnam War was a conflict that played a significant role in American foreign policy during much of the Cold War. However, the foundations of the unrest in Vietnam (a French possession since the 1800s) were laid during World War II and driven by a legacy of European colonialism and the exigencies of Cold War politics.

Indochina (Vietnam, Laos, Cambodia) was not a major stage during World War II, but the region fell to the German-sympathizing Vichy French government during World War II. A local resistance movement known as the Viet Minh quickly rose in defiance of the Vichy. The group, led by a Vietnamese nationalist named Ho Chi Minh, gained the support of China, the Soviet Union, and the United States. The Viet Minh defied the French in Indochina until the Vichy government in France fell to the Allies in 1944. Japan filled the void left by the French and briefly occupied Vietnam between 1944 and August 1945.

The defeat of Japan and the end of World War II resulted in a power vacuum in Vietnam. Ho Chi Minh subsequently declared Vietnamese independence and established the Democratic Republic of Vietnam. Ho Chi Minh asked the United States to recognize the newly independent country, but American leaders were uncomfortable with Ho Chi Minh’s nationalism and his political ideology, which was largely influenced by Communism. Even though the Soviet Union was an American ally during World War II, the specter of Communism, real or imagined, came to dominate Cold War foreign policy in the late 1940s.

Meanwhile, leaders from the United States, Britain, and the Soviet Union met in Potsdam, Germany to shape the post-war world. The Potsdam Conference did not serve Ho Chi Minh’s interests. Instead of acknowledging a Vietnam free of colonial control, the world leaders decided that Indochina still belonged to France, a country that was not strong enough to regain control of the region on its own. Instead, China and Britain removed the Japanese from southern and northern Vietnam, respectively.

A French colonial government took control of Vietnam by 1946, but prior to their arrival, the Viet Minh held elections in which they won several seats in northern and central Vietnam. In an effort to consolidate their rule, the French drove the Viet Minh out of the urbanized areas of Vietnam. This action triggered the First Indochina War, a guerilla campaign against French occupation. The war pivoted on a north/south axis, with the Viet Minh, who had a solid foothold in the north, maintaining control of the central and northern portions of the country and the French holding on to power in the southern part of the country.

The Cold War stakes of the First Indochina War became considerably more significant when the newly established Communist government in China recognized the Viet Minh as the legitimate government of Vietnam. American policymakers looked gravely upon these developments. They believed that U.S. foreign policy and aid should strive to prevent and contain the spread of Communism, a policy termed “Containment.” As a result, the United States began assisting the

French in their fight against the Viet Minh. Pragmatically, President Eisenhower chose to send military supplies but not combat troops. The First Indochina War continued for another four years until the French suffered a final defeat at the battle of Dien Bien Phu, which ended colonial rule in Vietnam.

The 1954 Geneva Accords codified France's withdrawal from Indochina but did not mark the end of Western influence in Vietnam's governance. The treaty was negotiated among the United States, the Soviet Union, China, France, and Britain. There were no Vietnamese representatives. The accords created three countries in Indochina: Vietnam, Cambodia, and Laos. Vietnam was temporarily divided along the 17<sup>th</sup> parallel. The Viet Minh were placed in control of the north while an Anti-Communist government under Prime Minister Ngo Dinh Diem was installed in the south until nationwide elections could be held, as stipulated.<sup>1</sup>

Subsequently, the Viet Minh held elections in the north and won by significant margins. The situation in the south was markedly different; Prime Minister Diem cancelled elections in 1955 because he was afraid the Viet Minh would win convincingly and the United States also agreed that this would happen.<sup>2</sup> To make matters worse, Diem became increasingly authoritarian. He proclaimed himself president of the Republic of Vietnam in October 1955. While he had little influence in the north, Diem's regime was oppressive and anti-democratic in the south.

Nonetheless, the United States Military Assistance Advisory Group began training South Vietnamese soldiers in 1955. The U.S. Air Force (USAF) advisory role began even earlier. Beginning in 1951, the USAF provided a small number of advisors to support the South Vietnamese Air Force. No doubt, training played a major role in the American advisory era in Vietnam. Most training occurred in Vietnam, but by 1961, 1,000 South Vietnamese soldiers received training in the United States each year.<sup>3</sup>

By 1956, a Communist-influenced insurgency escalated in the countryside and these rebels, known as the Viet Cong, complicated U.S. policy in the region. In addition to Containment, U.S. policymakers also espoused the Domino Theory which argued that if the West did not take a stand, Communism would spread from country to country like toppling dominoes. South Vietnam was ground zero in this scenario. If South Vietnam fell to Communism then Laos would be next, then Cambodia, followed by Thailand, Malaysia, Indonesia, Burma, and so forth. The United States, while not comfortable with Diem's anti-democratic rule, considered him an ally in their fight against Communism.

By 1958, a full-scale civil war was raging in South Vietnam. The opposition to Diem received encouragement and support from North Vietnam, which, by 1959, was providing supplies and troop support to the Viet Cong. Meanwhile, the U.S. support of South Vietnam continued. There were 900 advisors in Indochina at the end of the 1950s. The U.S. financial and material commitments to Vietnam ran into the billions of dollars.

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<sup>1</sup> "Final Declaration of the Geneva Conference on Restoring Peace in Indochina, July 12, 1954," in *The Department of State Bulletin*, Vol. XXXI, No. 788 (August 2, 1954): 164.

<sup>2</sup> Walter LaFeber, *America, Russia, and the Cold War, 1945–2002* (New York, New York: McGraw Hill, 2002): 170.

<sup>3</sup> Ronald H. Spector. *Advice and Support: The Early Years of the United States Army in Vietnam 1941–1960* (Washington, DC: United States Army Center for Military History, 1983): 239.

John Fitzgerald Kennedy became President of the United States in 1961. While he did not want to commit the United States to a full-scale war in Vietnam, President Kennedy was steadfast in his opposition to Communism. As a result, the American advisory and support role grew dramatically under his administration. President Kennedy initially increased support for Diem's regime and sent additional troops to Vietnam, including U.S. Army and Marine Corps units. The USAF role also increased, with the first permanent units arriving in the fall of 1961. The U.S. Navy provided critical troop transport and increased their presence in the Gulf of Tonkin.

There were over 11,000 U.S. troops in Vietnam by the end of 1962.<sup>4</sup> While ostensibly there to train local troops and protect villages, the soldiers found themselves involved in border surveillance, control measures, and guerilla incursions. They also supported Central Intelligence Agency (CIA) operations in the region.

The U.S. involvement in Vietnam increased perceptibly in the first two years of President Kennedy's administration, but did not ameliorate the crisis as events grew increasingly out of control in the south. The intractability and oppression of President Diem's administration had become untenable by 1963. He rebuffed U.S. demands that he hold elections. Worse, he lost any support he previously had in South Vietnam. This was graphically displayed to the world on 11 June 1963 when Thich Quang Duc, a Buddhist monk, set himself on fire at a busy Saigon intersection. The self-immolation, which attracted the attention of the world, was a direct protest to Diem's anti-democratic policies and the war that was raging in the countryside.

By the fall of 1963, President Kennedy realized that as long as Diem was in power, South Vietnam could not put down the insurgency. Kennedy and other top U.S. officials discussed ousting Diem through diplomatic approaches or if resorting to a coup was necessary. Plans were discussed to have the CIA overthrow the South Vietnamese government. An actual coup occurred on 1 November 1963, when the ARVN launched a siege on the palace in Saigon. Diem and his brother were later arrested and assassinated by the ARVN.<sup>5</sup>

The fall of Diem resulted in considerable instability. From November 1963 to June 1965 the South Vietnamese government was a revolving door. Five administrations came and went until Lt. Gen. Nguyen Van Thieu and Air Vice Marshal Nguyen Cao Ky came to power. Thieu remained president until the fall of Saigon in 1975. The years of instability, however, undermined South Vietnam's ability to counteract the Communist insurgency. The Viet Cong attracted substantial support and assistance from the Viet Minh in South Vietnam who saw the instability as an opportunity to overthrow the South Vietnamese government.

Upon President Kennedy's assassination on 22 November 1963, Lyndon Baines Johnson was immediately sworn in as president of the United States. Initially, President Johnson was not interested in expanding U.S. involvement in Vietnam. In fact, the crisis in Southeast Asia took a

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<sup>4</sup> Joel D. Meyerson, *Images of a Lengthy War: The United States Army in Vietnam*, (Washington, DC: United States Army Center for Military History, 1986): 69.

<sup>5</sup> Prados, John, editor. The Diem Coup After 50 Years, John F. Kennedy And South Vietnam, National Security Archive Electronic Briefing Book No. 444, Posted – November 1, 2013, <https://nsarchive.gwu.edu/search/node/president%20John%20F%20Kennedy>

backseat to his domestic agenda that included civil rights legislation and an ambitious package of domestic policies and laws known as the “Great Society.”

At the same time, President Johnson did not want U.S. policy and actions in Vietnam to fail. After all, the United States had spent nearly a decade supporting the South Vietnamese government in the fight against the Viet Cong and, by proxy, the Viet Minh. More importantly, he did not want the 14,000 Americans who were in the region to lose their stand against the spread of Communism.

Military leadership, foreshadowing increased U.S. involvement in Southeast Asia, expanded personnel strength and further integrated the technology and equipment needed to fight a war in Vietnam. For example, the U.S. Marine Corps improved their amphibious lift capacity with the commission of new amphibious transport and assault ships. The ships were designed specifically for vertical (helicopter) assault.

President Johnson increased the number of advisors and other military personnel in Vietnam to 16,000 by early summer 1964, but domestic matters occupied most of his energy until August when the war in Southeast Asia forcefully became the priority.

On 2 August 1964, three North Vietnamese patrol boats fired on the U.S. destroyer *Maddox* in the Gulf of Tonkin. The U.S. Navy retaliated and fended off the attack. The details of the confrontation are debated; at the time, the United States claimed the U.S. Navy vessel was on routine patrols in international waters, but other sources have since suggested that the USS *Maddox* was supporting South Vietnamese troops who were raiding North Vietnamese ports.<sup>6</sup> Regardless of the details, the event, which came to be known as the “Gulf of Tonkin Incident,” marked a significant shift in the Vietnam War.

President Johnson ordered air strikes on North Vietnamese bases and critical infrastructure. The retaliation strikes ordered by President Johnson destroyed or damaged 25 patrol boats and 90% of the Viet Minh’s oil storage facilities. This strategy eventually became a cornerstone of the air war in Vietnam.

The most important outcome of the Gulf of Tonkin Incident, however, was the 7 August passage of the Gulf of Tonkin Resolution by the U.S. Congress. The resolution gave the president broad authority to prosecute the war in Vietnam by allowing him to take “all necessary measures” to defend U.S. and allied forces and to “prevent further aggression.”<sup>7</sup>

President Johnson did not immediately use his new war-making powers in any comprehensive or aggressive way. He was, after all, running for reelection as the peace candidate in opposition to Barry Goldwater. President Johnson was re-elected in November 1964, and the war in Vietnam took precedence. President Johnson and his advisors began to initiate a forceful military response. President Johnson removed all restrictions on U.S. military involvement, allowing U.S. personnel to directly engage in combat without the guise of training or advising the South Vietnamese.

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<sup>6</sup> LaFeber, *America, Russia, and the Cold War 1945–2002*, 252–253.

<sup>7</sup> “Gulf of Tonkin Resolution,” Public Law 88-408, 88<sup>th</sup> Congress, August 7, 1964.

In February 1965, President Johnson approved a sustained aerial bombing of North Vietnam. The campaign was known as OPERATION ROLLING THUNDER. U.S. Air Force, Navy, and Marine Corps aircraft dropped hundreds of tons of bombs on North Vietnam nearly every day from early March 1965 to early November 1968. President Johnson hoped the bombings would bring North Vietnam to the negotiating table.

President Johnson began committing combat troops to Vietnam in the spring of 1965 when he deployed U.S. Marine Corps and Army combat troops to Da Nang and Saigon, respectively. Helicopter units accompanied both the U.S. Army and Marine Corps deployments. U.S. Navy vessels transported the troops, who were tasked with the defense of airbases. The deployments brought the U.S. presence in Vietnam to over 50,000. The United States' first major ground offensive occurred in August 1965 when the U.S. Marine Corps, in cooperation with the South Vietnamese Army, launched an airmobile and amphibious assault on Viet Cong forces near Chu Lai.

President Johnson continued increasing troop strength in Vietnam throughout the summer and fall of 1965. By the end of the year, U.S. military presence had increased to 175,000. This included major Army divisions and units such as the 1<sup>st</sup> Cavalry Division, 1<sup>st</sup> Brigade, 101<sup>st</sup> Airborne Division, and 1<sup>st</sup> Infantry Division. The U.S. Marine Corps Expeditionary Force accounted for nearly 20,000 troops in Vietnam by the end of 1965. Large deployments continued through the peak years of the war (1965–1968).

It became clear to military leadership that the Vietnam War required more aggressive enlistment than the existing annual average of just over 55,000; it necessitated an annual enlistment of nearly one million. Initially, military planners attempted to meet the shortfall through recruitment. Recruitment was successful for all branches except the U.S. Army, which was not able to fill the personnel gap and resorted to the draft in 1966. Draft calls continued until 1973.

No doubt, 1966 was an active year in Vietnam—the U.S. military was now committed to defeating the enemy in direct action. There were no longer any illusions about the United States merely providing training and logistical and material support to the South Vietnamese. U.S. ground forces participated in more than 550 battalion-size or larger operations during 1966. U.S. military aircraft flew almost 300,000 sorties in 1966. Ground forces also participated in more than 160 joint operations with allies. As the war in Vietnam intensified in 1966, U.S. Marine units were conducting several hundred small unit actions during each 24-hour period. These operations, which were designed to find and isolate the Viet Cong, were successful. Within a year, the U.S. Marine Corps was able to gain control of almost 1,200 square miles of Vietnamese territory. Active campaigns continued through 1967. There were nearly 490,000 U.S. troops in Vietnam at the end of the year, over 260,000 of whom were Marines and 28,000 of whom were Navy seamen.

Early 1968 brought two major battles. First, the Khe Sanh Combat Base, a garrison of 6,000 U.S. Marines and South Vietnamese Rangers, which came under attack from North Vietnamese forces in late 1967, was completely isolated by the beginning of 1968. President Johnson and General William Westmoreland were determined to hold the base at all costs. This precipitated one of the longest and bloodiest battles of the war. The base remained under siege for 77 days until mid-April 1968. Khe Sanh eventually fell to the North Vietnamese in July 1968.

The other major engagement, known as the Tet Offensive, was a surprise attack on South Vietnamese targets by North Vietnamese troops. The operation, which occurred on 30 January 1968, was a simultaneous assault on more than 100 South Vietnamese cities and military installations. The U.S., South Vietnamese, and other allied troops eventually repelled the attacks, but the offensive was a public relations disaster. President Johnson and other leaders had been telling the American public that the end of the war was in sight and that the North Vietnamese were on the defensive. The Tet Offensive appeared to belie this contention. Support for the war, which was already unpopular, eroded further.

The military reaction to the Tet Offensive was to deploy more soldiers to Vietnam. General Earle Wheeler traveled to Vietnam after the Offensive to assess conditions in the country. He was convinced that there were not enough troops in Vietnam to effectively fight the war. Therefore, the general requested deployment of 206,000 additional U.S. troops. There were already nearly 500,000 soldiers in Vietnam and the American public was not supportive of increasing that number by nearly 50%. President Johnson denied General Wheeler's request. Instead, he authorized a comparatively small increase of about 13,000 troops. The president also began scaling back OPERATION ROLLING THUNDER.

Khe Sanh and the Tet Offensive captured the public's attention and convinced many that Vietnam was a never-ending quagmire. Military leaders, however, were planning for the U.S. exit from Vietnam. Their most pressing concern was still preservation of an independent South Vietnam and they knew that the only way this could occur was if they provided modern equipment and professional training to the South Vietnamese military. A defined withdrawal plan, however, was elusive.

Meanwhile, President Johnson decided not to run for reelection in 1968. His successor, President Richard Milhous Nixon, announced a new plan called "Vietnamization" in the spring of 1969. Essentially, the plan consisted of a concomitant rapid withdrawal from Vietnam and strengthening of South Vietnamese defense capabilities. The latter would be achieved through training and the provision of military equipment. Some U.S. units literally left Vietnam without their vehicles and aircraft, which was donated to the South Vietnamese military.

The military was at peak troop strength of 543,482 when President Nixon implemented Vietnamization. Drawdowns were rapid and troop levels were down to 250,000 by 1970. Stand-downs continued over the next couple of years, reducing U.S. forces to only 24,000 U.S. soldiers in Vietnam at the end of 1972.

Vietnamization coincided with increased hostilities in Vietnam and a widening of the war. Citing their support for North Vietnamese troops, President Nixon approved secret bombings of Cambodia and Laos in 1970. The United States also took part in a ground incursion in Cambodia in the summer of 1970 and supported a South Vietnamese incursion in Laos in February 1971. President Nixon ordered the mining of North Vietnam's Haiphong Harbor in 1972 to prevent the arrival of supplies from the Soviets and Chinese.

The United States and North Vietnam agreed to a ceasefire in January 1973. U.S. minesweepers cleared Haiphong Harbor of mines in February 1973 and the last U.S. combat troops left Vietnamese soil in March. The U.S. military remained in the region but reverted to its training

and advisory role.<sup>8</sup> The U.S. exit from Vietnam resulted in greater instability. President Nixon warned the North Vietnamese that the U.S. military would return if the Viet Minh broke the ceasefire. However, in June 1973, the Senate passed the Case-Church amendment prohibiting further intervention in Vietnam.

President Nixon was soon consumed by his own downfall as the Watergate scandal broke. Richard Nixon resigned in August 1974. His replacement, Gerald Ford, was greeted with continued crisis in Cambodia and Vietnam.

Cambodia's long-running civil war was at a critical point in early 1975. The U.S.-supported Khmer Republic was on the verge of collapse as the Communist Khmer Rouge solidified control over most of the country. The Khmer Republic only held Phnom Penh and its fall was imminent. The U.S. military, therefore, conducted a helicopter-based evacuation of U.S. citizens and refugees from Phnom Penh on 12 April 1975.

Meanwhile, the North Vietnamese and Viet Cong had launched an offensive in early 1975. Just as they had done in Cambodia, the United States implemented an existing evacuation plan on 29 and 30 April 1975. Much larger than the Cambodian evacuation, the Vietnamese operation provided transport for over 1,300 Americans and nearly 6,000 Vietnamese (and other foreign) evacuees from the country. The evacuation provided a graphic end to the Vietnam War as U.S. helicopters lifted civilians off the roof of the U.S. embassy in Vietnam. Saigon fell to North Vietnamese forces on 30 April 1975, effectively marking the end of the Vietnam War.

One final clash occurred in May 1975 when the Khmer Rouge Navy seized a U.S. container ship (the SS *Mayaguez*). U.S. Navy, Marine Corps, and Air Force units launched a rescue operation. They met heavy resistance from the Khmer Rouge who damaged or destroyed most of the helicopters used in the rescue. The U.S. Marine Corps suffered significant casualties during the operation, which ultimately resulted in the release of the SS *Mayaguez* and crew.

The Vietnam War and related military actions finally ended in the summer of 1975—over two decades since the United States began providing support to the French colonial government in their fight against a nationalist indigenous uprising. The war was a turning point for Americans and the U.S. military. It was a conflict that occurred on a complicated stage that pushed technological change and forced the military to continually innovate. It was also an increasingly unpopular war that reshaped the manner in which U.S. civilians viewed warfare. Many became increasingly distrustful of their government and military leadership.

The war was also a quintessential cold war conflict in which U.S. policymakers viewed anything branded as Communist, whether real or imagined, as a fundamental threat. While some threats were grave and others were illusory, there is no doubt that Communism shaped the war in Vietnam. Vietnam was finally unified as a single country in the spring of 1975 under a generally popular Communist regime. The country was also finally free of the divisions established by foreign governments. Vietnam, which had been colonized by Europeans since the 19<sup>th</sup> century, was finally independent, albeit not on the terms the United States would have liked.

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<sup>8</sup> Meyerson, *Images of a Lengthy War*, 183.

## **2.1 SUMMARY OF UNITED STATES MILITARY LOGISTICS TO 1960**

Histories of warfare often focus on dynamics. They are narratives shaped in varying degrees by strategy, operations, combat, training, technology, tragedy, and drama. The chronicles of war, however, are built upon a foundation of a, perhaps, more mundane aspect of military conflict: logistics. No war can be effectively fought without the ability to get materials and soldiers where they need to be when they need to be there. The importance of logistics is a constant through history since the appearance of organized armies in the 7<sup>th</sup> century B.C.E. No doubt, ancient logistical operations lacked the complexity and breadth of modern logistical efforts, but the goals were fundamentally the same and equally important to the success of any campaign from the ancient to the modern.

The DoD simply defines logistics as “planning and executing the movement and support of troops.”<sup>9</sup> The effective performance of logistics during a military conflict is considerably more complex than the definition implies. Modern logistics is not limited to the movement of materials and soldiers, but also includes the warehousing of supplies, the maintenance of equipment, and the management of the transport/supply chain.

The Spanish American War triggered the United States’ transition into modern military logistics as, indeed, the war marked a low point in the history of American logistics. When the time came to actively participate in the war, the military was woefully unprepared to meet even the most basic of logistic needs. Troop carriers assigned to bring troops to Cuba were too few and too small to transport the soldiers, much less their equipment. Moreover, the military provided the soldiers with uniforms that resulted in greater burden; the men embarking for the tropical island were equipped with heavy wool winter uniforms. Lighter weight uniforms did not arrive until after the fighting in Cuba ended.

The logistical trials of the Spanish American War and military expeditions associated with the Mexican Revolution precipitated changes in troop supply and support operations that matured into the modern era of military logistics in World War I. The United States entered the war in 1917 still suffering from the inadequacies of the Spanish American War. Due to miscommunication among the Allies, soldiers arrived in Europe without appropriate supplies. While there were plenty of soldiers, they did not have enough draught horses to transport their artillery. Not only was the shortage of horses a problem, but the animals themselves were an impediment in trench warfare because the immobile armies used up feed before it could be replenished. In an effort to overcome the limitations of the horses, the British began employing new technology, vehicles with internal combustion engines, in their logistical operations. The vehicles also freed logistical operations from a heavy reliance on railroads, which were easy targets. The effective use of technology became a cornerstone of modern logistics.

World War I also represented a change from earlier eras in that the nations were able to produce plenty of material. Although, World War I armies expended vast amounts of ammunition and other war materiel, the industrial output of the warring nations allowed them to produce plenty of supplies. Transporting such large quantities of material to moving armies proved exceedingly

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<sup>9</sup> DOD Joint Publication 1-02, 102.

difficult. Therefore, immobility characterized by trench warfare became more common than armies on the march. This was partly due to the fact that they were easier to supply<sup>10</sup>.

The trends that began during World War I continued during World War II. Industrial production remained adequate, but transport required innovation. However, by the 1940s, technological advancements such as the development of transport aircraft and ships, the improvement of wheeled and tracked vehicles, and advancements in supply chain management, meant that combat zones could be equipped more effectively than ever before. The war also resulted in the development of an administrative structure dedicated to the increasingly complex logistical operations of the war. The advancements, however, did not mean that the United States had mastered logistical operations in the modern era. The Korean War made this clear.

While asserting that the outbreak of Korean War took military planners by surprise may be overblown; it would be accurate to state that the war caught planners, including logisticians, unprepared. The Eighth Army, based in Japan, arrived in South Korea in 1950. Their supplies, however, were insufficient. The troops had only 21 of 226 anti-tank guns in their arsenal. Most of their jeeps and trucks remained in Japan because they were in need of repair. Similar shortages were noted for a wide range of supplies and equipment. To make matters worse, the subsequent arrival of equipment only reached troops “at a trickle.” The anemic response was the result of a miscalculation among military leadership that, like World War II, modern wars would build slowly. In a practical sense, military planners determined that there would typically be a two-year window between mobilization and deployment. The Korean War belied this concept. Military leaders initially viewed the Korea conflict as a minor skirmish that did not require a concerted logistical effort.

The Korean War also presented new challenges. Unlike Europe, for example, Korea had few roads over which materials and soldiers could effectively travel. The enemy was also different. Masters of camouflage, they fought a guerrilla war in which they attacked in waves, usually at night.<sup>11</sup>

The first engagement in which U.S. Army soldiers participated revealed the limitations of the United States’ logistical preparations. Four hundred forty soldiers with 2 days’ worth of c-rations and 120 rounds of ammunition engaged the enemy near Osan, Korea in early July 1950. Unprepared and under armed for the waves of tanks that trundled toward them, the soldiers retreated from their position in broad daylight. The battle made clear that a more concerted logistical effort based in Japan was required for the Korean War. The responsibility for managing logistics initially fell to the Eighth Army, but was eventually assumed by the Logistical Command Japan.

The first step in starting an effective logistical mission in Korea was the July 1950 establishment of a logistical base in the port city of Pusan. Major railroads terminated in Pusan and the city had a deep-water port that accommodated Navy Ships. These provided efficient transport of equipment and soldiers. Ammunition began arriving in abundance. The same, however, could

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<sup>10</sup> Julian Thompson, *The Lifeblood of War: Logistics in Armed Conflict* (Exeter, GB.: BPC Wheatons, Ltd., 1994) 45-50

<sup>11</sup> Thompson, *The Lifeblood of War*, 107, 109.

not be said for other equipment, such as cots, bedding, food, and mosquito netting, which remained scarce.<sup>12</sup>

The Japan Logistical Command was established in August 1950 in the hopes of bringing more efficient logistical management to the war. The command was authorized to keep 60-days of supplies on hand in Japan for shipping to Korea as needed. The logistical command also had a 120-day order and shipping schedule with the San Francisco Port Oversea Supply Division. The Japan Logistical Command did not just manage the storage and delivery of equipment, but they also managed the repair of Army equipment in Japan.<sup>13</sup> The USAF and Navy supported the Army's logistical efforts by providing airlift and transport support out of bases in Japan. The efficiency of the system was pivotal in the Allies' ability to prevent the loss of Pusan to North Korean troops in August 1950. While supplies may have been limited, an effective transport system was finally in place.<sup>14</sup>

Most Air Force operations in Korea were also based out of Japan. The East Air Materiel Command located outside Tokyo handled Air Force logistics. Unlike the Army and Air Force, Naval logistics were administered by the Commander in Chief, U.S. Pacific Fleet, Pearl Harbor, Hawaii. While the Navy and Air Force had their logistical challenges, they were in much better shape than the Army.

Army leaders continued to convince themselves that the Korean War would be short. In late October 1950, they began preparing for an imminent withdrawal. All ammunition orders were cancelled which further affected their logistical problems.<sup>15</sup> The war continued into the summer of 1951 and logistical problems persisted until the United States and their allies finally stabilized their positions in Korea. At the same time, the logistical limitations finally ameliorated as leadership realized that the war was not going to be a months-long affair. This resulted in a more coherent logistical system that allowed supplies to flow into Japan more freely and subsequently arrive in Korea where they could be transported to soldiers. The improvement of logistic support did not win the Korean War, but it certainly helped prevent the North Korean troops from overtaking the entire Korean peninsula over the next two years as the armies fought to a stalemate.

Korea was not the only Asian nation receiving the logistical attention of the U.S. military. Nascent American logistical efforts began in Vietnam in the early 1950s when the United States provided material support to the French who were in a protracted war with the Viet Minh. The French received over 130,000 pounds of American equipment over five months in 1951 and 1952. The shipments included 53 million rounds of ammunition, 8,650 vehicles, 200 aircraft, 3,500 radio sets, and 14,000 automatic weapons.<sup>16</sup> The effort was impressive considering that

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<sup>12</sup> Max Hermansen, "Chapter Four: Korea And Pusan The Battle For A Logistical Bridgehead," in *United States Military Logistics in the First Part of the Korean War*, PhD Diss.; Univeristy of Oslo, 2000. Available at [http://vlib.iue.it/carrie/texts/carrie\\_books/hermansen/4.html](http://vlib.iue.it/carrie/texts/carrie_books/hermansen/4.html).

<sup>13</sup> Max Hermansen, "Chapter Three: Pipeline I Japan as a Flexible Logistical Base," in *United States Military Logistics in the First Part of the Korean War*, PhD Diss.; Univeristy of Oslo, 2000. Available at [http://vlib.iue.it/carrie/texts/carrie\\_books/hermansen/3.html](http://vlib.iue.it/carrie/texts/carrie_books/hermansen/3.html)

<sup>14</sup> Thompson, *The Lifeblood of War*, 130.

<sup>15</sup> Thompson, *The Lifeblood of War*, 121.

<sup>16</sup> Thompson, *The Lifeblood of War*, 153-154.

there were substantial difficulties with inadequate communication between the United States and French Indochina and that the United States was still fighting a war in Korea.

The equipment, viewed as a loan by the United States, was to be returned at the end of the war in 1954. This, however, never occurred. The United States lost track of the equipment and the French, determined to keep the best of it, did not readily turn the material over. Moreover, most of the equipment, which had been damaged in some way, was turned over to the Army of the Republic of Vietnam (ARVN). The ARVN had no spare parts, nor did they have the logistical experience to manage such large quantities of equipment. The United States, fearing the total loss of a \$500 million investment, became logistical advisors to the South Vietnamese.<sup>17</sup> These efforts were streamlined in 1962 with the establishment of the Military Assistance Command, Vietnam (MACV). MACV provided broad oversight of all logistic operations in Vietnam until 1975. Each branch of the military eventually established their own logistics commands under the MACV umbrella.

By the end of 1962, the advisory logistical support included 130,000 small arms, machine guns, mortars, and recoilless rifles provided directly to South Vietnamese Civil Guards and Self Defense Corps. This figure grew considerably over the next six months, by which time the United States had provided the combatants with 250,000 weapons that were provided to hamlets and villages in strategic locations. The idea was that the South Vietnamese citizens would take arms against the Viet Cong. The reality was quite different. The Viet Cong, whose strength grew dramatically between 1960 and 1963, quickly acquired the American weapons.<sup>18</sup>

The increased logistical support of the South Vietnamese in the early 1960s was coupled with the deployment of selected military units to Vietnam. American military obligations continually increased throughout the 1960s, before scaling back and finally ceasing in the first half of the 1970s. The military obligations had concomitant logistical requirements. The history of logistical operations of each military branch is discussed below.

## **2.2 LOGISTICS DURING THE VIETNAM WAR**

### **2.2.1 ARMY**

#### **2.2.1.1 Early War**

In the early part of the Vietnam War, the U.S. Army Counterinsurgency Support Office located in Okinawa, Japan logistically supported U.S. Army Special Operations Units who were training Vietnamese counterinsurgency forces.<sup>19</sup>

The Army's first coherent logistical operations in Vietnam began in 1961 and relied on helicopters. The 8<sup>th</sup> and 57<sup>th</sup> Transportation Companies (Light) were deployed to South Vietnam in November 1961 to assist in the American support and advisory functions.<sup>20</sup> The deployment was the result of a realization that the terrain and infrastructure of Vietnam severely impeded

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<sup>17</sup> Thompson, *The Lifeblood of War*, 187.

<sup>18</sup> Thompson, *The Lifeblood of War*, 192.

<sup>19</sup> Francis J. Kelly, *US Army Special Forces: 1961 – 1971*, (Washington D.C., Department of the Army, 1973), 58.

<sup>20</sup> Simon Dunstan, *Vietnam Choppers: Helicopters in Battle, 1950–1975* (Osceola WI: Osprey Publishing Ltd., 2003), 18.

traditional means of transportation and that American piloted transport helicopters could provide decisive logistical assistance to South Vietnamese soldiers fighting the Viet Cong.<sup>21</sup>

Based at Fort Lewis, Washington and Fort Bragg, North Carolina, the soldiers of the 8<sup>th</sup> and 57<sup>th</sup> Transportation Companies (Light) transported their helicopters and equipment from their home bases to Stockton, California and departed for South Vietnam aboard the U.S. Naval Ship (USNS) *Core* on 21 November 1961. The Navy was the foundation of logistical support throughout the war and naval logistics are discussed in greater detail below.

The transportation companies arrived in Saigon in mid-December 1961, where they reported for duty at Saigon International Airport. The units flew their first mission on 23 December when 30 H-21s helicopters departed the airport to deliver South Vietnamese soldiers to strategic locations in the countryside.<sup>22</sup> In the first six months of deployment, the 57<sup>th</sup> and 8<sup>th</sup> Transportation Companies transported 133,464 ton-miles of cargo and 51,353 Vietnamese troops to strategic areas.<sup>23</sup>

The utility of the helicopter was clear and additional helicopter units deployed to Vietnam in 1962 and 1963. The 93<sup>rd</sup> Transportation Company (Light Helicopter) arrived in Da Nang on 25 January 1962 and was operational with its H-21s on 1 February. Based at Fort Devens, Massachusetts when in the United States, the 93<sup>rd</sup> provided transportation for South Vietnamese troops and equipment in the mountainous northern portion of the Republic of South Vietnam. They also provided logistical support for U.S. Army Special Forces operating in South Vietnam.<sup>24</sup>

The 81<sup>st</sup> and 33<sup>rd</sup> Transportation Company arrived in Vietnam in the fall of 1962. The Companies were based at Fort Sill, Texas and Fort Ord, California when in the United States.<sup>25</sup> Finally, the 114<sup>th</sup> Air Mobile Company, based at Fort Knox, Kentucky, arrived in Vinh Long, Republic of South Vietnam on 10 May 1963.<sup>26</sup> By 1964, the Army had 325 aircraft in Vietnam, most of which were transport helicopters.<sup>27</sup> The Navy and Air Force managed most other logistical operations in the early phase of the war.

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<sup>21</sup> David Tyler, "The Leverage of Technology: The Evolution of Armed Helicopters in Vietnam," *Military Review* (July-August 2003) 32.

<sup>22</sup> Battalion History - 57<sup>th</sup> Transportation Company, No Date, Folder 13, Box 01, Vietnam Helicopter Pilots Association (VHPA) Collection: Unit Histories - Transportation and Maintenance Units, The Vietnam Center and Archive, Texas Tech University.

<sup>23</sup> Battalion History - 57<sup>th</sup> Transportation Company.

<sup>24</sup> Unit History, Delta Aviation Battalion (Provisional) U.S. Army Support Command - History of the 121<sup>st</sup> Aviation Company Formerly the 93<sup>rd</sup> Transportation Company for 1963, No Date, Folder 05, Box 01, U.S. Army Aviation Museum Volunteer Archivists Collection, The Vietnam Center and Archive, Texas Tech University.

<sup>25</sup> 118<sup>th</sup> Assault Helicopter Company - Thunderbirds, No Date, Folder 13, Box 06, Vietnam Helicopter Pilots Association (VHPA) Collection: Unit Histories - 1<sup>st</sup> Aviation Brigade, The Vietnam Center and Archive, Texas Tech University; History of the 119<sup>th</sup> Assault Helicopter Company, No Date, Folder 16, Box 06, Vietnam Helicopter Pilots Association (VHPA) Collection: Unit Histories - 1<sup>st</sup> Aviation Brigade, The Vietnam Center and Archive, Texas Tech University. The 81<sup>st</sup> was designated the 119<sup>th</sup> Aviation Company (Air Mobile Light) in June 1963.

<sup>26</sup> Publication, U.S. Army - History of the 114<sup>th</sup> Assault Helicopter Company and Attached Units, 1966, Undated, Folder 01, Bud Harton Collection, The Vietnam Center and Archive, Texas Tech University.

<sup>27</sup> Van Staaveren, "USAF Plans and Policies," 104.

### 2.2.1.2 Middle of the War

Troop escalations and combat operations in the middle of the war required significant material support. Over 22 million short tons of dry cargo, over 14 million short tons of bulk petroleum, and 2.2 million people were transported to Vietnam between 1965 and 1969.<sup>28</sup>

As force levels climbed, it became clear that the Army would need additional ground transport units. Some of these needs were met by civilian commercial trucking companies contracted by the United States. Additional transportation requirements were met by the arrival of Army transportation units. The 48<sup>th</sup> Transportation Group (Motor Transport) arrived in Saigon from Fort Eustis, Virginia in May 1966. The 48<sup>th</sup> commanded 5 truck companies. The 8<sup>th</sup> Transportation Group (Motor Transport) arrived at Qui Nhon from Fort Eustis in October 1966 and assumed command and control of the locally stationed motor transport units. Finally, the 500<sup>th</sup> Transportation Group (Motor Transport) arrived in Cam Ranh Bay a few weeks later. The 500<sup>th</sup> had responsibility for motor transport operations in the southern portion of II Corps.<sup>29</sup> The 500<sup>th</sup> was also based at Fort Eustis when in the United States.

A specialized unit, the 1<sup>st</sup> Transportation Company arrived in Vietnam in August 1966. The 1<sup>st</sup> was equipped with special “Go-ability with Overall Economy and Reliability” (GOER) vehicles designed by the Caterpillar Tractor Company. The GOERs were all terrain amphibious cargo vehicles (figure 2-1). The Company had three configurations of the vehicle, an 8-ton cargo carrier, a 2,500-gallon tanker, and a 10-ton wrecker.<sup>30</sup> The GOER vehicles proved indispensable in Vietnam’s rugged, often muddy and saturated, terrain.

The troop surge alone was enough to challenge logistical support operations, but Vietnam also presented unique problems. The nation did not have the infrastructure to support the large surges of troops that arrived after 1965. Moreover, there were very few obviously-advantageous places for logistical posts to be located. This was a function of both the terrain and the fact that the Vietnam War did not have an easily identifiable front or rear. Finally, because the war was often fought from remote camps, the traditional structure of logistic planning in which materials and troops flowed along linear axes was further diluted.



Source: [https://en.wikipedia.org/wiki/M520\\_Goer](https://en.wikipedia.org/wiki/M520_Goer)

**Figure 2-1: M-520 GOER.**

<sup>28</sup> Joseph M. Heiser, Jr., *Logistic Support*, (Washington DC.: Department of the Army, 1991)157.

<sup>29</sup> I Corps encompassed the five northernmost provinces in South Vietnam, along with two major cities of Hue and Da Nang. II Corps was in the Central Highlands area in South Vietnam, and consisted of 12 provinces. It was the largest of the four corps in size. III Corps was the densely-populated area between Saigon and the Highlands, with 90% of its industry, 7 million people (38% of the population) and the capital city. IV Corps comprised the 16 southern provinces in the Mekong River Delta area.

<sup>30</sup> Heiser, Jr., *Logistic Support*,162-3.

The clear commitment of American combat forces in 1965 marked a transition of logistical operations in Vietnam. No longer in an advisory role, the United States Army moved to develop their own logistical operations in the country.

The Navy had established a central logistics command and support facility in Saigon in 1962 (Headquarters Support Activity [HSAS] Saigon), but with the increased number of Army ground forces arriving in Vietnam in 1965 it was determined that the bulk of logistics in support of ground troops would be handled by the Army. To this end, the Navy relinquished much of its command of logistical operations in the southern two-thirds of South Vietnam and transferred them to a newly established Army 1<sup>st</sup> Logistical Command (1<sup>st</sup> LOG), which was created in April 1965. The transition from Navy to Army administration was measured. HSAS Saigon continued to support ground troops in some capacity until May 1966.<sup>31</sup>

Meanwhile, Army logistics units subsequently arrived to assume Navy logistics operations. The 4<sup>th</sup> Transportation Command (Terminal Command), based at Fort Eustis, Virginia, arrived in Vietnam in August 1965, was assigned to the 1<sup>st</sup> LOG, and was placed in charge of the operation of the Saigon port, the water terminals at Cam Ranh Bay, Qui Nhon, Phan Rang, Nha Trang and Vung Tau, and operation of the Army Air Terminal at Tan Son Nhut. Two battalions also arrived in August. The 11<sup>th</sup> Transportation Battalion (Terminal) and 394<sup>th</sup> Transportation Battalion (Terminal) arrived in Saigon and Qui Nhon, respectively. These battalions were also based at Fort Eustis when in the United States. The 11<sup>th</sup> took control of the Saigon military port. The 394<sup>th</sup> managed transportation units in the Qui Nhon area. The 10<sup>th</sup> Transportation Battalion (Terminal) arrived at Cam Ranh Bay, from Fort Eustis in September to assume responsibility for the Cam Ranh Bay terminal.<sup>32</sup>

The 1<sup>st</sup> LOG operations were centralized in Saigon, with a second depot at Cam Ranh Bay. Smaller logistics support commands were located at Vung Tau, Nha Trang, and Qui Nhon, and Da Nang. The depots were expected to hold 45 days' worth of supplies and the support commands held a 15-day stockage. In addition to the support commands and depots, the Army established Forward Support Areas (FSA) in various locations to serve specific operations. The FSA were located in places where C-130 transports could land and offload supplies. Army Helicopters airlifted supplies to troops in the field.<sup>33</sup>

Army logistics operations were confronted with personnel problems in 1966. According to Lieutenant General Joseph M. Heiser, Jr., logistics support personnel were undertrained and unprepared for operations in Vietnam. Moreover, the one-year tours of duty were too short to allow soldiers to become adept at running the complicated logistics mission in Vietnam. To make matters worse, there was a shortage of trained officers to supervise or train these soldiers.<sup>34</sup>

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<sup>31</sup> Marolda and G. Wesley Pryce III, *A Short History of the United States Navy and the Southeast Asian Conflict: 1950–1975* (Washington, DC: Navy Historical Center Department of the Navy 1984), 72; Heiser, Jr., *Logistic Support*, 9-10, 33; Thompson, *The Lifeblood of War*, 193.

<sup>32</sup> 1<sup>st</sup> Logistical Command booklet, 01 February 1967, pg 3, Folder 13, Box 01, James Ridgeway Collection, The Vietnam Center and Archive, Texas Tech University; Heiser, Jr., *Logistic Support*, 158;

<sup>33</sup> Thompson, *The Lifeblood of War*, 193, Heiser, Jr., *Logistic Support*, 11, Army 1st Logistical Command booklet, 01 February 1967, pgs 5, 9.

<sup>34</sup> Heiser, Jr., *Logistic Support*, 31, 32.

Efforts to address these problems resulted in a contingent of Army Materiel Command organizations traveling to Vietnam on temporary duty in early 1967 to provide formal instruction in supply procedures and assist personnel in performing location surveys, conducting inventories, identifying and classifying materiel, and reviewing and improving procedures. The program lasted into 1968 when the 1<sup>st</sup> LOG finally had the staff to initiate training courses in South Vietnam.<sup>35</sup>

The Army also developed training programs in the United States. The first logistics training program was established at Atlanta Army Depot in 1967. The depot provided on-the-job training for enlisted personnel prior to their deployment to Vietnam. The program trained nearly 5,000 soldiers from 1967 through 1970. Similar programs were developed at Defense Supply Agency Depot, Richmond, Virginia and U.S. Army Electronics Command, Fort Monmouth, New Jersey.<sup>36</sup>

After May 1966, the 1<sup>st</sup> LOG encompassed all aspects of direct logistics including procurement, medical, construction, engineering, finance and accounting for most American forces in South Vietnam. Army staff in Okinawa handled indirect support. The medical function was transferred from the 1<sup>st</sup> LOG to the 44<sup>th</sup> Medical Brigade in 1966. The 44<sup>th</sup> operated 17 hospitals and a malaria treatment center in South Vietnam.<sup>37</sup>

Aviation logistical support was not part of the 1<sup>st</sup> LOG's operations. Deployed to Vietnam in mid-1965, the 34<sup>th</sup> General Support Group, which was composed of 2 depot companies, 5 general support companies, 11 direct support companies, 4 aviation electronics companies, and the Aviation Materiel Management Center was responsible for aviation logistics. The 34<sup>th</sup> was based in Yongson, Korea prior to deployment. By January 1966, the 34<sup>th</sup> General Support Group was providing support for all Army aviation activities in Vietnam. The Aviation Materiel Management Center served as a central clearinghouse for aviation logistical support. The 58<sup>th</sup> Transportation Battalion was deployed to Vietnam from Fort Benning, Georgia in 1966 to support aviation logistics and oversee the centralized inventory of all Army aviation-related material in Vietnam. Later in the war, they began incorporating repair capabilities into their operations and eventually also supported Marine Corps aviation.<sup>38</sup>

The 1<sup>st</sup> LOG was continually confronted with a shortage of storage space. The command found itself constantly playing catch-up as troop numbers and movements outpaced the logistic buildup. To make matters worse, construction crews were occupied with other projects. Therefore, the United States acquired 13 Japanese warehouses located in the Fishmarket area of Saigon for equipment storage. The warehouses, which housed the 506<sup>th</sup> Field Depot, were modified to support Army activities. The field depot used the warehouses until they moved into newly constructed buildings at Long Binh in 1969.<sup>39</sup>

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<sup>35</sup> Heiser, Jr., *Logistic Support*, 61.

<sup>36</sup> Heiser, Jr., *Logistic Support*, 32.

<sup>37</sup> Heiser, Jr., *Logistic Support*, 10; 1<sup>st</sup> Logistical Command booklet, 01 February 1967, pgs. 3-4, 18.

<sup>38</sup> 58<sup>th</sup> Transportation Battalion "Vikings", No Date, Folder 07, Box 01, Vietnam Helicopter Pilots Association (VHPA) Collection: Unit Histories - Transportation and Maintenance Units, The Vietnam Center and Archive, Texas Tech University; Heiser, Jr., *Logistic Support*, 138.

<sup>39</sup> Heiser, Jr., *Logistic Support*, 26; Thompson, *The Lifeblood of War*, 193.

The Long Binh facility was much larger than the Fishmarket site. Long Binh consisted of nearly 2,000,000 square feet of paved storage and 1,500,00 square feet of covered storage compared to the Fishmarket location that had a total of 670,000 square feet of storage.<sup>40</sup>

The United States also constructed a major storage area at Cam Ranh Bay. The depot and port complex, which was completed in 1968, had 1,400,000 square feet of covered storage, 1,200,000 square feet of ammunition storage, and a storage area for 775,000 barrels of petroleum products.<sup>41</sup>

Finally, the Army lacked a deep-water port. To ameliorate this limitation, the 1<sup>st</sup> LOG pushed for the construction of a new deep-water port and storage facility, known as Newport Terminal, in early 1966. Located on a 100-acre tract up the Saigon River from existing facilities, Newport was constructed by private contractors RMK-BRJ. The facility included 192,000 square feet of storage sheds and extensive uncovered storage. In addition to port and storage facilities, Newport incorporated a waterway system that allowed for a procedure in which equipment was offloaded to barges that transported their cargo upstream to about a dozen different river discharge stations. The Newport facility was operational by April 1967.<sup>42</sup>

The shortages of storage space and personnel was compounded by a lack of standardization, both in supplies and in procurement. Lieutenant General Joseph M. Heiser, Jr. writes that “every unit [was] independently [ordered] from supply catalogs as if they were Sears and Roebuck catalogs.” He also notes that the lack of standardization quickly became a problem as “the numbers of makes and models [of equipment] proliferated [to the point that logisticians] were unable to keep up with the rapidly increasing demands.” Moreover, “as the quantities of equipment increased, so did the requirements for repair parts and qualified maintenance personnel,” neither of which were available. The General notes that this placed extreme burden on an already overburdened staff, both in Vietnam and the United States.<sup>43</sup>

Ammunition shortages were particularly vexing in the beginning of the buildup. The ammunition supply situation was certainly challenging in March 1965. The U.S. Army only had the 5<sup>th</sup> Special Forces ammunition stocks in Vietnam. Ammunition consisted of a mixture of modern, World War II, and foreign munitions, all of which was in short supply. There were also limited helicopter munitions including 7.62-mm, 40-mm Grenades, 2.75" Rockets, signal flares and smoke grenades.<sup>44</sup>

Ammunition logistics followed a model developed in World War II. Initially, ammunition and other supplies were provided in Push Packages, predetermined quantities of equipment designed to meet a particular unit's anticipated needs. Push Packages were designed to arrive in a given location before the troops. The problem with this system was that, in its effort to be efficient, it resulted in shortages of supplies when use outstripped predictions and resulted in an oversupply

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<sup>40</sup> Heiser, Jr., *Logistic Support*, 26.

<sup>41</sup> Heiser, Jr., *Logistic Support*, 26.

<sup>42</sup> General 1968 Command History Vol. 2, 1968, pg 683, Folder 01, Bud Harton Collection, The Vietnam Center and Archive, Texas Tech University; 1<sup>st</sup> Logistical Command booklet, 01 February 1967, pg 7, Folder 13, Box 01, James Ridgeway Collection, The Vietnam Center and Archive, Texas Tech University; Heiser, Jr., *Logistic Support*, 25.

<sup>43</sup> Heiser, Jr., *Logistic Support*, 18.

<sup>44</sup> Heiser, Jr., *Logistic Support*, 106.

of underused equipment. The ammunition Push Packages, which had been previously assembled, did not meet troop requirements. Moreover, some packages contained obsolete ammunition. The Push Package strategy, which was a force-focused provisioning system, was subsequently replaced by an equipment-oriented system, which helped to overcome the problems with obsolete materiel and, to a lesser extent, over- and undersupply.<sup>45</sup>

The ammunition effort was disordered from April through June 1965. Push Packages arrived before units and were piled up on the beach at Cam Ranh Bay and on barges on the Saigon River. There were no ammunition transport companies available to move the material.<sup>46</sup> An ammunition stock control detachment arrived in July and the situation ameliorated slightly, but problems continued. The 3<sup>rd</sup> Ordnance Battalion (Ammo) arrived in Vietnam from Fort Lewis, Washington in October 1965 to support ammunition logistics in the hope that a dedicated unit would increase the efficiency of ammunition logistics.

The 3<sup>rd</sup> was confronted with vexing problems. Consumption rates and the number of weapons required were higher than planners predicted. Authorized ammunition supply rates at the onset of the troop buildup were based on World War II and Korean War experience.<sup>47</sup> It quickly became clear that warfare in Vietnam was different. Ammunition was used at an alarming rate. This forced military planners to modify ammunition use rates regularly throughout the war in an attempt to meet the soldiers' needs. Ammunition shortages were also the product of shortages in offshore reserves in Okinawa.

The 3<sup>rd</sup> Ordnance Battalion was augmented by additional ammunition support battalions that arrived between 1966 and 1968. At least one, the 336<sup>th</sup> Ordnance Battalion (Ammo) Headquarters and Headquarters Company, was an Arkansas National Guard unit that was activated in 1968 to provide ammunition support for Army units in the northern portion of South Vietnam.

Ammunition problems partly stemmed from the fact that U.S. and allied forces were equipped with either the M14 or M1 rifle. Rifle issue was not standardized until 1967 when all forces in Southeast Asia were equipped with the M16A1 rifle. The conversion, however, had its own problems. Initial stocks were limited and deliveries were delayed. The Army established a central point of contact in the Department of the Army in December 1967 to counter these problems. The point of contact monitored and controlled funding, procurement, modification, distribution, and maintenance of this rifle until December 1970.<sup>48</sup>

The M107 Self-Propelled Gun presented a more significant challenge in the early escalation of the war. The weapon was provided to artillery units arriving in late 1965, but the tubes suffered from limited durability. Soldiers used up the weapons far quicker than the Army could provide new ones. The Army Materiel Command tried to modify the weapons to provide for greater durability. All was for naught when in July 1966 a catastrophic failure of a 175-mm gun occurred and the Commanding Generals of U.S. Army Materiel Command directed that no tubes

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<sup>45</sup> Thompson, *The Lifeblood of War*, 193; Heiser, Jr., *Logistic Support*, 39, 42.

<sup>46</sup> Heiser, Jr., *Logistic Support*, 107-8.

<sup>47</sup> Heiser, Jr., *Logistic Support*, 110.

<sup>48</sup> Heiser, Jr., *Logistic Support*, 44-5.

would be fired beyond 400 rounds. The decision exacerbated shortages and required that the weapons be delivered from the United States via airlift. Ground (sea) transport was finally initiated in the fall of 1967 and consumption and supply stabilized itself just as the war began to wind down.<sup>49</sup>

The United States transported almost 40,000 short tons of ammunition to Vietnam per month in 1966. The figure rose dramatically over the next few years to about 75,000 short tons per month in 1967, and up to 100,000 short tons per month in 1968. Ammunition was offloaded at Da Nang, Cam Ranh Bay, and Saigon. The materiel was then distributed among seven Ammunition Supply Points. This number increased to eight by mid-1968 and nine in late 1969. Ammunition Supply Points were located at Da Nang, Dong Ha, Pleiku, Long Binh, Qui Nhon, Phu Tai, An Khe, Cam Ranh Bay, and Chu Lai.<sup>50</sup>

Environmental conditions in Vietnam were hard on all equipment, including munitions. By 1966, the Army provided each ammunition battalion with a renovation detachment of approximately 70 men. Renovation detachments repackaged munitions out of the wooden boxes, pallets, and containers in which they arrived and performed limited renovations. They also inspected, repainted, and remarked munitions equipment as needed.<sup>51</sup> All depots and forward support bases also had ordnance disposal personnel.



Source: Photo CC-77062, NARA RG 111: Records of the Office of Chief Signal Officer, 1860-1985

**Figure 2-2: Aerial View of the Qui Nhon Depot. 1966.**

The first year of buildup was wrought with challenges and lessons, however, some supplies were adequate, or even abundant. One observer noted that soldiers ate well, even in the field. Indeed,

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<sup>49</sup> Heiser, Jr., *Logistic Support*, 46.

<sup>50</sup> Heiser, Jr., *Logistic Support*, 124, 128-9.

<sup>51</sup> Heiser, Jr., *Logistic Support*, 132.

he noted that even perishable items like “[i]ce cream and eggs to order were not uncommon.” This was largely the result of the extensive use of helicopters, refrigerated storage, and refrigerated vans.<sup>52</sup>

Perishables, like eggs and ice cream, were initially shipped by air from the United States every 2 to 3 days. Once in Vietnam they were stored in refrigerators and refrigerated warehouses. Nonperishables were shipped by Landing Ship Tank (LST) monthly.

The Sea Land Corporation began providing refrigerator cargo service to South Vietnam in 1967. Four ships arrived in Cam Ranh Bay every 15 days. Each vessel held 120 refrigerated vans and 530 general dry cargo vans. The refrigerated vans transported cargo directly from the ships to Saigon, Qui Nhon and Cam Ranh Bay.<sup>53</sup>

Some food products were made in Vietnam. The 1<sup>st</sup> LOG, for example, established 10 field bakeries to provide the 2 million pounds of bread soldiers ate per month. Ice cream and milk were also eventually produced locally. Foremost Dairy and Meadowgold Dairies constructed three milk recombining plants in South Vietnam to support the military’s dairy needs. They also constructed smaller ice cream plants.<sup>54</sup> The Army also purchased produce from local farmers.



Source: Photo CC-80394, NARA RG 111: Records of the Office of Chief Signal Officer, 1860-1985

**Figure 2-3: Aerial View of the Cam Ranh Bay. 1976.**

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<sup>52</sup> Quoted in Thompson, *The Lifeblood of War*, 195.

<sup>53</sup> Heiser, Jr., *Logistic Support*, 199.

<sup>54</sup> Heiser, Jr., *Logistic Support*, 199; 1<sup>st</sup> Logistical Command booklet, 01 February 1967, pg. 13.

U.S. Army logistics vehicle and armament maintenance capabilities consisted of one three-bay shop in downtown Saigon in 1965. The shop was manned by ten personnel. It quickly became apparent that additional maintenance support was critical during the troop buildups in March 1965. Fifteen maintenance companies arrived in South Vietnam between April and September 1965. Another 20 companies arrived over the next three years. The maintenance companies were managed by four support commands with elements located at all logistics outposts.<sup>55</sup>

The demand for armored personnel carriers in Vietnam became a pressing problem in 1967 and continued until the troop drawdowns in 1969. There were just not enough vehicles to meet the needs of the troops. This required the careful management of vehicles at the Army's disposal. Logistics planners routed Armored Personnel Carriers from worldwide locations to Vietnam. They also increased the vehicles' routine maintenance schedules and placed them in a closed-loop support program in which vehicles needing repair were shipped to a repair facility and returned to troops on a tightly regimented schedule. A similar closed-loop program was implemented for the maintenance of Army aircraft. The closed-loop support system was also pivotal in keeping ground surveillance radars in operation. The radars were a no-longer-produced tool that became indispensable to ground operations by 1968. The radar units were placed on a logistics schedule that integrated transportation, supply management, and maintenance of the radars.<sup>56</sup>

The Army logistics challenges in Vietnam were compounded by the fact that the Army's industrial production base in the United States was functioning at a fairly low level in 1965. For example, only 11 of 25 Army-owned munition plants were operational. The Army established the Office of Special Assistant for Munitions in 1965 to coordinate the process of quickly bringing all the plants online. Six plants were activated in 1967 and another six were activated the next year. One final munitions plant was operable by 1968.<sup>57</sup>

The Army was not going to replay the uniform logistics disaster that befell them nearly 70 years earlier during the Spanish American War. The soldiers would get appropriate uniforms. In fact, a program codenamed FLAGPOLE was initiated in the summer of 1965 to secure the acquisition and provision of tropical combat uniforms and boots for soldiers in Vietnam. The Joint Materiel Command provided month production requests to manufacturers. The completed uniforms and boots were airlifted directly from the producer to Vietnam, eliminating the time consumed in transferring the items to the Army before shipment. Also, uniform shipments to Vietnam were prioritized over deliveries in the Continental United States.<sup>58</sup>

A similar direct supply strategy was used for the complex Hawk missile system that was used by the 97<sup>th</sup> Artillery Group (Air Defense). Deployed in September 1965, the 97<sup>th</sup> was the first group in Vietnam with complex weaponry and there was no logistic support system in place for their needs. Therefore, logistics were organized directly from the United States supplier to the 97<sup>th</sup> who delivered the missiles to the 79<sup>th</sup> General Support Unit located at Travis AFB. The 79<sup>th</sup> was eventually also stocked with all repair parts required for support of the Hawk missile system. The

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<sup>55</sup> Heiser, Jr., *Logistic Support*, 178, 180.

<sup>56</sup> Heiser, Jr., *Logistic Support*, 42-3, 44.

<sup>57</sup> Heiser, Jr., *Logistic Support*, 29-30.

<sup>58</sup> Heiser, Jr., *Logistic Support*, 46-7.

missiles and associated support items were shipped from Travis AFB to the Tan Son Nhut Air Base in Vietnam.<sup>59</sup>

The management of petroleum products was a major component of logistics operations in Vietnam. As one might expect, petroleum consumption increased dramatically after 1965. Annual usage went from 6,785,000 barrels in 1965 to 21,850,000 barrels in 1966. This trend of significant petroleum use continued, peaking in 1968 at 43,650,000 barrels, until the end of the war. To meet these needs, the Army and Navy constructed approximately 1.6 million barrels of fixed storage facilities at Cam Ranh Bay, Qui Nhon and Da Nang. The Air Force had about 350,000 barrels of storage at air bases. Moreover, Shell, Esso, and Caltex had their own facilities totaling approximately one million barrels of commercial storage. These commercial facilities provided the bulk of petroleum product storage prior to 1965.<sup>60</sup>

Industry and Military operators worked cooperatively on the delivery of petroleum in Vietnam. The non-fuel products (oil, lubricants) were offloaded from Navy ships to industry- or military-controlled barges or tankers for water delivery. They were then transferred to tanker trucks operated by the United States military, industry, and South Vietnamese military. The aviation fuel, gasoline, and diesel was offloaded onto military craft and transported to a pipeline that delivered the fuel to storage tanks. The fuel was then transferred to Army and commercial tanker trucks for final transport. Fuel was also airlifted in 55-gallon drums and 500-gallon collapsible bags.<sup>61</sup>



Source: Photo CC-74607, NARA RG 111: Records of the Office of Chief Signal Officer, 1860-1985

**Figure 2-4: Fuels storage, Qui Nhon. 1966.**

<sup>59</sup> Heiser, Jr., *Logistic Support*, 49.

<sup>60</sup> Heiser, Jr., *Logistic Support*, 72-3.

<sup>61</sup> Heiser, Jr., *Logistic Support*, 79.

Aircraft, especially helicopters, proved indispensable for logistical support in Vietnam. The rotary wing aircraft allowed the Army to overcome one of its most vexing challenges: terrain and environmental conditions that hampered effective ground-based transport. Logistics missions were carried out by several helicopter models. The UH-1 was, by far, the most common Vietnam-era helicopter, but the Army also used the CH-47, and CH-54 for logistics operations. The UH-1s and CH-47s typically supported forward areas and delivered a wide variety of supplies including food, medical supplies, ammunition, consumable supplies, and repair parts. The CH-54 lifted larger equipment, such as vehicles and weaponry, to and from otherwise inaccessible locations. The helicopters were also used for recovery and salvage.<sup>62</sup>

The helicopter transport was augmented until 1966 by the large tactical transport aircraft that the Army flew. The Army's CV-2, which was the largest Army fixed wing aircraft, filled a void between the Air Force's large C-130 and the Army's small organic aircraft. The CV-2 was particularly capable in Vietnam's jungle and beachhead environment because it could use very short runways. The aircraft were particularly useful for the resupply of small Special Operations and CIA camps. The Army transferred their fixed wing aircraft operations to the Air Force in 1966 and the Army CV-2 was designated the Air Force C-7A Caribou. The venerable aircraft remained an important transport tool in Vietnam.

Aircraft and helicopters required their own logistics support system. In general, aviation parts supply was similar to other logistical operations. Aviation related items were requisitioned from Okinawa. If items were not available at Okinawa, the orders were transferred to the Continental U.S. National Inventory Control Points. Items were then shipped from the Control Points to depots and sent overseas to Vietnam. Minor modifications to the system occurred throughout the war, but the general order and delivery system remained unchanged.

Aviation logistics presented another challenge. Army Aircraft use (especially rotary wing), surged from an inventory of 5,528 aircraft in 1960 to over 12,000 aircraft in 1970. The 765<sup>th</sup> Transportation Battalion was the only aircraft maintenance and supply battalion in Vietnam when the 1965 buildup began. Located at Vung Tau, the battalion provided direct logistics support for small aviation detachments that did not have their own support units. They also provided secondary support for aviation companies that had integrated support units.<sup>63</sup>

Helicopter maintenance was extremely taxing. While the stated maintenance goal was one hour maintenance for every hour of flight time, the reality was much different. In 1966, mechanics spent approximately 10 hours maintaining helicopters for every hour of flight time. These conditions were only expected to worsen as more helicopters arrived in Vietnam. Army leadership explored various options, but initially only addressed the maintenance problems at the headquarters level, leaving the day-to-day maintenance burdens unchanged.

Some relief did come in the form of the 1<sup>st</sup> Transportation Corps (TC) Battalion, a component of the 34<sup>th</sup> General Support Group. The 1<sup>st</sup> TC Battalion, the Army's only ship-based maintenance unit, arrived in Cam Ranh Bay aboard the Corpus Christi Bay in April 1966 before relocating to Qui Nhon to be nearer to the 1<sup>st</sup> Cavalry, the unit they primarily supported. The maintenance ship

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<sup>62</sup> Helicopter operations are addressed in greater detail in DoD Legacy Report 14-739, Vietnam War: Helicopter Training and Use on US Military Installations Vietnam Historic Context Subtheme, February 2016.

<sup>63</sup> Heiser, Jr., *Logistic Support*, 137-8.

had 370 Army maintenance personnel and 130 civilian sailors onboard. The Corpus Christi Bay crew could perform all levels of helicopter maintenance and repair while on the ship. They also had an extensive library of engineering drawings and images on microfilm that they could transmit to U.S. bases in Vietnam via closed-circuit television.<sup>64</sup> Still, the bulk of maintenance was undertaken by small crews at various outposts in South Vietnam.

Logistics also included construction activities. To this end, an engineer brigade was deployed to Vietnam in July 1965 and placed under the command of the 1<sup>st</sup> LOG.

Initial Army logistics base development plans were sparse. In 1965, Army planners proposed an in-country force of only 64,000 troops. The soldiers were expected to be based out of tents while in Vietnam. Clearly, the reality of the war made such limited troop numbers and base development unworkable. The Army constructed nearly \$1 billion worth of facilities and infrastructure between 1965 and 1971, including the Newport facility described above. Much of the construction was undertaken in support of combat operations. Pacific Architects and Engineers, a contractor, provided engineering support.<sup>65</sup> Projects included roads, airfields, ports, emergency facilities, and repairs to battle-damaged facilities.

The care and disposition of remains fell under the purview of logistical operations. Mortuary operations were handled by the Air Force until September 1966 when they were transferred to the Army. The Army initially used the mortuary facilities established as Tan Son Nhut Airfield by the Air force, but had to construct a new facility at the base to support the increasing demands placed upon the mortuary unit as the war escalated in 1967.<sup>66</sup>

### 2.2.1.3 End of the War

By the end of 1968, Army logistics operations were transforming from build-up and direct combat support to the facilitation of troop drawdowns and the transfer of most military operations to the South Vietnamese. This was in conformance with President Nixon's "Vietnamization" program.

Troop drawdowns began in June 1969. Redeployments were initially unit-based with plans to redeploy 25,000 personnel by the end of August. A second withdrawal of 40,500 personnel was announced in late September 1969. The redeployment was completed before the end of the year. Another 100,000 soldiers were redeployed in two waves in 1970. Units were instructed to redeploy with their equipment, less that which was critical for continued U.S. operations in Vietnam.<sup>67</sup> Some equipment remained in Vietnam and was transferred to the South Vietnamese military.

The troop drawdowns that began in 1969 triggered the shifting of logistics operations from bringing supplies into the combat zone to transferring equipment to the South Vietnamese

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<sup>64</sup> John J. Tolson, *Airmobility: 1961–1971* (Washington, DC: Department of the Army 1999) 89.

<sup>65</sup> Heiser, Jr., *Logistic Support*, 189, 192.

<sup>66</sup> Heiser, Jr., *Logistic Support*, 204.

<sup>67</sup> Heiser, Jr., *Logistic Support*, 67, 69, 70, 71.

government and facilitating the return of other equipment to the United States. The program required the inspection, repair, and disposition of equipment.<sup>68</sup>

This was an extremely complex process, for example, between 1969 and 1972, \$306 million worth of material was redistributed in the Pacific Area and other overseas commands and \$710.3 million was returned to the Continental U.S. The 79<sup>th</sup> Maintenance Battalion was tasked with retrieving and repairing equipment from redeploying units so it could be transferred to the Republic of Vietnam. The 604<sup>th</sup> Composite Service Company, and 402<sup>nd</sup> Transportation Corps Detachment, were organized in the Continental U.S. at Fort Eustis and Fort Lee, Virginia to assist with the redeployments. They were deployed to South Vietnam to support the inspection, packaging, and preparing equipment for redeployment and assist with required documentation.<sup>69</sup>

Army construction programs also shifted in 1969 with the adoption of “Vietnamization.” Construction and engineering units undertook projects that were similar to those they completed earlier in the war. They included maintenance depots, storage facilities, training centers, and communication stations.<sup>70</sup> However, the projects were specifically designed to improve the long-term defensive capabilities of the Republic of Vietnam.

Army logistic support personnel ratios to combat personnel dropped to about 1:3 in 1969 from a high of 1:2 three years earlier. Logistics staff remained fairly steady compared to combat troops during the subsequent drawdowns.<sup>71</sup> This was largely due to the fact that logistics operations remained complex at the end of the war, even though combat was winding down. The Army troop and logistics drawdowns eventually resulted in the exit of the last logistics units from Vietnam in the fall of 1972.

## **2.2.2 MARINE CORPS**

### **2.2.2.1 Early War**

The Marine Corps first logistical exercise in Vietnam occurred in 1962 when the Marine Medium Helicopter Squadron (HMM) 362 arrived in Vietnam as part of OPERATION SHUFLY. Preparations began at Marine Corps Air Station (MCAS) Tustin on 1 April 1962. Within 10 days, the pilots, mechanics, and other personnel of HMM-362 were onboard the USS *Princeton* with their arsenal of 24 UH-34s and a few fixed-wing aircraft. The squadron’s ultimate destination was a location at sea off the mouth of the Mekong River from which the squadron would transport supplies to a World War II-era airfield called Soc Trang. They remained there for several months before relocating to Da Nanag in the north, where they remained until the end of the SHUFLY in 1965. Most logistic support for the Marine Corps

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<sup>68</sup> Heiser, Jr., *Logistic Support*, 57.

<sup>69</sup> Heiser, Jr., *Logistic Support*, 59, 68, 71.

<sup>70</sup> Heiser, Jr., *Logistic Support*, 190.

<sup>71</sup> Heiser, Jr., *Logistic Support*, 33.

Helicopter squadrons was facilitated through established Navy supply chains, some of which had been operating in Vietnam since 1958.<sup>72</sup>

OPERATION SHUFLY supported U.S. Military and Intelligence personnel already in Vietnam who were providing advisory and logistical support to the South Vietnamese. Marine aviators offered reconnaissance, assault support, medical evacuation, offensive air support, troop lift, and resupply for the advisors and Vietnamese combat troops.

For example, U.S. Marine Corps, U.S. Army, and South Vietnamese pilots participated in an airlift on 18 July 1962 that was the largest operation of its kind to date. Forty-one helicopters (18 Marine Corps, 12 Army, and 11 Vietnamese Air Force) transported a large contingent of Vietnamese troops to an area north of Saigon.<sup>73</sup>

While combat support missions were typical during OPERATION SHUFLY, the Marines also delivered humanitarian aid. Marine Corps helicopters flew supplies to isolated Vietnamese villages, such as Binh Hung, that were inaccessible by roads. The Marine Corps airmen also participated in rescue operations after Typhoon Kate devastated the Vietnamese coast. Marine Corps helicopters from Da Nang and a carrier-based helicopter squadron rescued thousands of Vietnamese villagers threatened by flooding rivers and inundated rice paddies.<sup>74</sup>

#### 2.2.2.2 Middle of the War

The dramatic increase in American combat troops in Vietnam beginning in March 1965 resulted in significant challenges for all branches of the military. The Marine Corps were among the first combat troops to arrive in Vietnam and even though commanding officers claimed that their logistical and supply chain resources were more advanced than those of other branches of the military at the time, they suffered significant setbacks.<sup>75</sup>

Technology, infrastructure, and procedures all undermined the effectiveness of force logistics in 1965. First, the Marine Corps developed and attempted to implement a computerized supply and record keeping system in Vietnam. At the time, computer programs and data were stored on paper punch cards. Once in Vietnam's humid environment, the paper became so moist that it swelled to the point that the cards could not be inserted into the computers. Therefore, the Marine Corps had to revert to recording information manually. The computer problems were eventually worked out and the Marine Corps could boast that they had a largely automated logistics system by 1970. Second, the roads in Vietnam were initially trafficable, but quickly deteriorated to "deep powder or mud" with intensive use. This led to two challenges; some roads became impassible and those roads that were still usable took an incredible toll on vehicles and equipment. Third, supply procedures resulted in widespread shortages in everything from salt and pepper shakers to forklifts. The Marine Corps, like the Army, relied on supply estimates

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<sup>72</sup> William R. Fails, *Marines and Helicopters, 1962–1973* (Washington, DC: History and Museums Division, US Marine Corps 1978) 31, 32; Robert H. Whitlow, *U.S. Marines in Vietnam: The Advisory & Combat Assistance Era, 1954-1964* (Washington D.C.: U.S. Government Printing Office, 1977): 60.

<sup>73</sup> Chet Decker, "Operation Shufly," *Leatherneck* (April 2002), 39.

<sup>74</sup> Fails, *Marines and Helicopters*, 80.

<sup>75</sup> Jack Shulimson and Charles M. Jones, *U.S. Marines in Vietnam: The Landing and the Buildup, 1965* (Washington D.C.: History and Museums Division, U.S. Marine Corps, 1978): 181.

from World War II and Korea to determine the requirements for combat in Vietnam. This system did not take into account the unique nature of Vietnam, both in topography and environment and in the nature of combat. Moreover, the transport of material from depots in Barstow and Oakland, California and Albany, Georgia, to Pearl Harbor, Hawaii, then to Okinawa, Japan, and finally to Vietnam, resulted in significant delays.<sup>76</sup>

These were all challenges confronted by the Marine Corps Force Logistics Support Group (FLSG), which arrived in Vietnam from Camp Pendleton, California in August 1965. The FLSG instituted two programs in an effort to overcome the logistical problems they found themselves confronting in Southeast Asia. First, the RED BALL program, which was put into effect in September 1965, identified items in short supply and placed them into a specific logistical category that facilitated rush shipment from the United States or other supply depots. Once an item shortage ameliorated, the RED BALL designation was removed. The second logistical program, which was established in November 1965, was known as CRITIPAC. Under CRITIPAC, the Marine Corps supply depot at Barstow, California automatically furnished each Marine Corps battalion or squadron a shipment of critical supplies on a regular schedule. The units did not need to request the supplies. They were shipped automatically. Both programs continued to operate throughout the war with modifications. Finally, simple operations adjustments that took advantage of the cooperative capabilities of the Marine Corps and Navy made the unloading of ships and the transport of materials inland considerably more efficient. Indeed, by February 1966, there were no ships in Da Nang harbor waiting to be unloaded. This was a significant improvement from December 1965 when for the entire month there were more than 10 ships waiting to be unloaded at any given time.<sup>77</sup>

The FSLG was deployed with 700 officers and enlisted men, but grew steadily until it was composed of more than 3,000 personnel in early 1966. As a result, the Marine Corps established a Force Logistics Command (FLC) at Da Nang and organized additional units at Chi Lai and Phu Bai. The general logistics operations of the FLC remained essentially unchanged, but the Marine Corps was confronted with a new logistics problem; they did not have enough covered storage space.

FLC began an aggressive construction program to rectify the shortage of storage space. Navy Seabees, Naval Mobile Construction battalions, and civilian construction companies erected 40 million dollars of semi-permanent buildings at Da Nang and Chu Lai in 1966. The FLC was able to take on additional responsibilities as construction proceeded. For example, the logistics unit began performing maintenance on equipment that had previously been sent to Okinawa for service. The FLC also began providing a number of other services in Vietnam, from reloading ammunition to baking bread for the troops. Finally, Marine Corps engineer battalions arrived in Vietnam by the end of 1966. The engineer battalions assisted Navy Seabees and constructed

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<sup>76</sup> Gary L. Telfer, Lane Rodgers, and V. Keith Fleming, Jr., *U.S. Marines in Vietnam: Fighting the north Vietnamese, 1967* (Washington D.C.: History and Museums Division, U.S. Marine Corps, 1984): 226, 227; Graham A. Cosmas and Terrence P. Murray, *U.S. Marines in Vietnam: Vietnamization and Redeployment 1970–1971* (Washington, DC: History and Museum Division Headquarters, U.S. Marine Corps, 1986): 316; Shulimson and Jones, *U.S. Marines in Vietnam*: 181.

<sup>77</sup> Shulimson and Jones, *U.S. Marines in Vietnam*: 185; Jack Shulimson, *U.S. Marines in Vietnam: An Expanding War, 1966* (Washington D.C.: History and Museums Division, U.S. Marine Corps, 1982): 285-287. There was a second Marine Corps supply depot in Albany Georgia.

infrastructure, especially roads and bridges. These activities continued in some capacity until the end of the war.<sup>78</sup>

The nature of the war and topography of the region encouraged the Marine Corps to develop novel supply techniques. For example, by 1967, the 33-member Air Delivery Platoon of the FLC was active in Vietnam. The platoon consisted of paratroopers trained at the parachute rigger school at Fort Lee, Virginia and the parachute school at Fort Benning, Georgia. The Air Delivery Platoon provided the aerial delivery of supplies in the rugged northern region of South Vietnam. Their services proved indispensable for remote outposts, such as Khe San, where the airstrip was dangerous and often unusable by aircraft. Also, by 1968 the Marine Corps helicopter squadrons had developed a unique system of logistical resupply to hilltop outposts. Known as SUPER GAGGLE, the resupply missions usually consisted of 12 CH-46 helicopters with about 4,000



*Source: Photo A25874 NARA RG 127: Records of the Marine Corps*

**Figure 2-5: Aerial View, Marine Corps Force Logistics Command, Da Nang. 1968.**

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<sup>78</sup> Shulimson, *U.S. Marines in Vietnam . . . 1966*: 288-9; Charles R. Smith, *U.S. Marines in Vietnam: High Mobility and Standdown, 1969* (Washington D.C.: History and Museums Division, U.S. Marine Corps, 1988): 260.



Source: Photo K-59311, NARA RG 428: General Records of the Navy, 1941-2004, J.D. Engle

**Figure 2-6: Construction Activity at Phu Bai. 1968.**

pounds of cargo. The transport helicopters were supported by 12 A-4 Skyhawk jets that provided suppression fire, 4 UH-1E gunships and a TA-4 that provided reconnaissance and control.<sup>79</sup> The formation significantly increased security to the vulnerable resupply missions.

### 2.2.2.3 End of the War

By the beginning of 1969, the FLC had grown to an organization of nearly 10,000 officers and enlisted men headquartered at Red Beach, just north of Da Nang. Smaller logistics units were located at Hill 55 (southwest of Da Nang), An Hoa, Phu Bai, and Chu Lai. The FLC also included three service regiment battalions, a transport battalion, maintenance battalion, military police battalion, communications battalion, and a Headquarters and Service battalion.<sup>80</sup>

While there was little question that providing logistical support for the troops was a complex exercise wrought with opportunities for inefficiency, ground troops in 1969 marveled at how simple the process was from their perspective. For example, individual battalions merely radioed in their requests to the service regiments each day before 1500. The supplies were then requisitioned from FLC (or other sources) and loaded on trucks or helicopters that delivered supplies and passengers to the battalion the next day. The trucks and helicopters took troops and retrograde equipment back to Da Nang on the return trip.<sup>81</sup> While temporary shortages did occur, Marine Corps logistics operations were running smoothly by 1969.

A year later, Marine Corps involvement in Vietnam began reducing as part of President Nixon's Vietnamization policy. These changes altered FLC operations. FLC redeployments began in February 1970 when 2,000 men were redeployed out of Vietnam. A truck battalion and large

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<sup>79</sup> Telfer, Rodgers, and Fleming, *U.S. Marines in Vietnam*. . . 1967: 229; Thompson, *The Lifeblood of War*, 204.

<sup>80</sup> Smith, *U.S. Marines in Vietnam*. . . 1969: 260.

<sup>81</sup> Smith, *U.S. Marines in Vietnam*. . . 1969: 262.

portions of the Maintenance and Service Regiment battalions were redeployed or deactivated by the end of the summer. Many returned to Camp Pendleton. The entire FLC phased down operations over the next year until the shore units were at zero strength and deactivated in late June 1971. Any future logistics needs were met by Army or Navy logistics support.<sup>82</sup>

## 2.2.3 AIR FORCE

### 2.2.3.1 Early War

Direct United States Air Force participation in the Vietnam region began in October 1961 when the 4400<sup>th</sup> Combat Crew Training Squadron (The Jungle Jim Squadron) arrived under the pretense of providing aid to flooded villages in the Mekong Delta. They were actually there to covertly train South Vietnamese aviators.<sup>83</sup> The squadron's aircraft were painted to match the insignia of the South Vietnamese Air Force and the airmen wore simple uniforms and carried nothing that might identify them as Americans. Once in Vietnam, they were expressly ordered to keep a low profile and avoid the press.

Known as OPERATION FARM GATE, the Jungle Jim squadron's activities in South Vietnam had no logistical support as no support base existed in Vietnam at the time. The airmen arrived with 30 days' worth of supplies and spare parts. Air Force involvement in Vietnam quickly increased over the next two years. The expansion of Air Force Operations in Vietnam is evident in the fact that the number of USAF aircraft deployed to South Vietnam increased from 35 in 1961 to 117 by the end of 1963.<sup>84</sup>

Air Force logistics in Vietnam began in January 1962 when a new squadron arrived at Tan San Nhut Airbase. Nicknamed Mule Train, the squadron consisted of 16 C - 123 Tactical Air Command transport aircraft and 123 men who performed airlift operations for U.S. Special Forces, airdropped supplies, and trained South Vietnamese airmen. The logistics operation at the airbase was supported directly from the Continental U.S., usually via surface (Navy) transport.<sup>85</sup>

Most Air Force activity and infrastructure was concentrated at Tan San Nhu Air Field, but facilities were established in other parts of South Vietnam to support the Vietnamese military and other branches of the United States military as the Air Force commitment in Vietnam expanded. For example, the Air Force had established Air Support Operations facilities at Da Nang, Pleiku, Can Tho, and Saigon by 1963.<sup>86</sup>

Beginning in 1961, Air Force mortuary personnel based at Clark AFB in the Philippines provided mortuary support for the transport of deceased military advisors. As American

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<sup>82</sup> Cosmas and Murray, *U.S. Marines in Vietnam . . . 1970–1971*: 317, 319; Charles D Melson and Curtis G. Arnold, *U.S. Marines in Vietnam: The War That Would Not End 1971–1973* (Washington, DC: History and Museum Division Headquarters, U.S. Marine Corps 1991): 191-2.

<sup>83</sup> Jacob Van Staaveren, "USAF Plans and Policies in South Vietnam, 1961-1963," (USAF Historical Division Liaison Office, 1965) 11, 14, 34. Accessed 16 July 2016, available at <http://www2.gwu.edu/~nsarchiv/NSAEBB/NSAEBB248/>.

<sup>84</sup> Van Staaveren, "USAF Plans and Policies," 104.

<sup>85</sup> Kenneth B. Hobson, "Logistics in the Lifeline," *Air University Review* (July-August 1967) n.p. Available at <http://www.au.af.mil/au/afri/aspj/airchronicles/aureview/1967/jul-aug/hobson.html>; Van Staaveren, "USAF Plans and Policies," 18-19.

<sup>86</sup> Van Staaveren, "USAF Plans and Policies," 20-21.

involvement in Vietnam increased in 1963, the Air Force established a mortuary at Tan Son Nhut Air Base. Three years later mortuary operations were transferred to the U.S Army.<sup>87</sup>

The expansion of logistics requirements in Vietnam resulted in the establishment of the Logistics Activation Task Force (LATAF) at Wright Patterson Air Base, Ohio. LATAF's role was to ensure that newly established bases in Vietnam were constructed and properly supplied prior to the arrival of Air Force combat or Search and Rescue units, so there was little to no down time for the tactical units. In this capacity, LATAF determined what supplies were needed, handled the requisition and timing of delivery of the equipment and supplies, and undertook the tasks that a base logistics officer would perform if the base had one.<sup>88</sup>

The Air Force leadership quickly realized that a more streamlined weapons logistical system was necessary. This led to the establishment of the Weapon System Control Points. Under this system an Air Materiel Area was designated as the control point for each aircraft in Vietnam. Each control point received weapons related requisitions associated with the aircraft, conducted research as needed, and sourced and expedited requested material. The idea behind the system was that the fewer logistical details field units had to deal with the better. These were roles, according to the Air Force, that were better suited to bases outside Southeast Asia.<sup>89</sup>

The Weapon System Control Points proved successful and the Air Force expanded the system by establishing 13 Commodity Control Points at Air Materiel Areas (AMA). The Commodity Control Points handled certain durable equipment requests from Southeast Asia. Items covered by the control points included vehicle parts, photo equipment, generators, and similar equipment.<sup>90</sup>

Logistic support efforts in Vietnam were mostly focused on the transport of materiel, usually for other branches of the military. Early in the war, the Air Force established special teams that supported Air Force logistic operations in Vietnam in a novel manner. The concept was institutionalized in early 1965 with the establishment of the Rapid Area Maintenance (RAM) teams. RAM teams, which were composed of both civilians and military personnel, were headquartered at the Sacramento AMA in California, but were deployed, on an as needed basis, from all AMAs [Sacramento, San Antonio, Oklahoma City, Ogden, Warner Robins (Georgia), and Mobile], Griffiss AFB, New York, and Wright Patterson AFB, Ohio.<sup>91</sup> The teams were organized to expedite the removal of crashed and battle-damaged aircraft. Engineers and maintenance specialists on the team made on-site repairs to damaged aircraft to allow them to fly to Air Force facilities for more extensive repair. RAM teams also assisted tactical units with the modification and maintenance of aircraft.<sup>92</sup>

There were also the Rapid Area Supply Support (RASS) teams. Beginning in 1965, the RASS teams, which were recruited and trained at the AMAs, were deployed to locations in South

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<sup>87</sup> Heiser, Jr., *Logistic Support*, 204

<sup>88</sup> Hobson, "Logistics in the Lifeline," n.p.

<sup>89</sup> Hobson, "Logistics in the Lifeline," n.p.

<sup>90</sup> Hobson, "Logistics in the Lifeline," n.p.

<sup>91</sup> The AMAs also served as clearinghouses for all logistics operations during the war.

<sup>92</sup> Hobson, "Logistics in the Lifeline," n.p.; Darrell H. Holcomb, "Aircraft Battle Damage Repair for the 90s and Beyond," Research Report No. AU-ARI-93-4, Air Force Materiel Command, Air Force University, Maxwell AFB, 1994, 0-11.

Vietnam, Thailand, Taiwan, Korea, Guam, Okinawa, and the Philippines. Like the RAM teams, the RASS teams were composed of both military and civilian personnel who provided guidance in the establishment of effective accounting, inventory, storage, and issue procedures for USAF operations in Southeast Asia. The teams also processed materiel as it arrived in Southeast Asia. They were either stationed at newly established bases until permanent personnel arrived, or located at rear-echelon bases where the volume of materiel outstripped the processing capability of base personnel.<sup>93</sup>

A third specialized USAF logistics group was organized and trained at the AMAs in 1965. Known as the Rapid Area Transport Support (RATS), the teams were composed mostly of civilians who were deployed, as needed. RATS teams specialized in designing unique packaging and transportation containers for fragile aircraft equipment. They also packed cargo for aircraft shipments. Finally, RATS teams, processed backlogged priority cargo and provided logistics training to Vietnamese civilians.<sup>94</sup>

### 2.2.3.2 Middle of the War

The United States adopted an air war strategy called OPERATION ROLLING THUNDER in March 1965. Under ROLLING THUNDER, USAF, Navy, and South Vietnamese Air Force pilots executed a sustained bombardment of North Vietnamese targets. The mission, which lasted until early November 1968, was more congruent with Air Force capabilities and training than the counterinsurgency missions airmen participated in prior to 1965.<sup>95</sup>

ROLLING THUNDER resulted in a dramatic increase in the need for logistic support. The Air Force Logistics Command embarked on a project known as “Bitter Wine,” in October 1965. According to Air Force General Kenneth B. Hobson, Bitter Wine was an “entirely new concept,” in which related items were requisitioned, grouped together, and shipped as whole unit. In other words, everything a new base may need was grouped together in a push package that was loaded onto a ship in Oakland, California and transported to Vietnam. Even though the push packages were on ships, they remained under the control of the Air Force. This replaced the previous system in which individual items were requisitioned. The General noted that under the old system “one package may contain equipment necessary for an entire machine shop, a jet engine facility, or a complete base laundry.” Bitter Wine stressed a comprehensive logistical approach that included materiel needed to make bases operational, but equally considered what Hobson called “behind the line” support. Under Bitter Wine, a total of 150,000,000 pounds of materiel were shipped to Vietnam between 1965 and 1967. The shipments were valued at \$81,000,000.<sup>96</sup>

The units of supplies and equipment were extremely large. Each shipment weighed approximately 6,500 tons and was all loaded onto one ship for delivery to Southeast Asia. Bitter

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<sup>93</sup> Holcomb, “Aircraft Battle Damage Repair,” 12.

<sup>94</sup> Hobson, “Logistics in the Lifeline,” n.p.; Holcomb, “Aircraft Battle Damage Repair,” 12; Randall P. Ray, “An Analysis of United States Air Force Supply and Support in Vietnam,” M.S. Thesis, School of Systems and Logistics of the Air Force Institute of Technology, Air University, 1987: 53.

<sup>95</sup> Earl H. Tilford Jr. *Setup: What the Air Force Did in Vietnam and Why* (Maxwell Air Force Base, AL: Air University Press, 1991) 71.

<sup>96</sup> Hobson, “Logistics in the Lifeline,” n.p.; Ray, “An Analysis of United States Air Force Supply and Support in Vietnam,” 32-3.

Wine was renamed “Pacer Wine” in late 1967. It appears that the program ran until the end of the ROLLING THUNDER missions.

A second logistics program, called “Grey Eagle” was implemented alongside Bitter Wine. Grey Eagle was the designation for logistical operations that consisted of push packages that included all the materiel needed to establish and man temporary tent camps in Vietnam while permanent buildings were constructed. Grey Eagle packages also facilitated the erection of temporary pre-fab buildings and the ultimate construction of permanent buildings and runways. Like the Bitter Wine packages, the Grey Eagle packages were transported to Vietnam by the Navy and Merchant Marines. The Grey Eagle program was managed from Robins AFB, Georgia.<sup>97</sup>

While the Air Force relied heavily on Navy ships for the movement of large units of supplies and equipment, the importance of the C-130 aircraft cannot be dismissed. The aircraft represented a huge improvement over the C-54s and C-97s used during the Korean War. Flight times from the East Coast of the United States to the combat zone was about 20 hours during the Vietnam War compared to 45 hours during the Korean War. This greatly increased the efficiency in the deployment of troops and airlift capabilities. The Air Force did not use helicopters for transport. Air Force helicopter use was mostly centered on Search and Rescue.

Air Force C-130s also provided important logistical support to ground troops in Vietnam. By 1968, the United States had developed two specialized systems known as the Low Altitude Parachute Extraction System (LAPES) and the Ground Proximity Extraction System (GPES) to deliver supplies into hostile environments. During a LAPES run, the aircraft flew five feet above the airstrip with the tail gate open. The pilot released a drogue parachute at the point of extractions. The parachute, which was attached to roller pallets in the plane’s fuselage, pulled the cargo out of the aircraft and the pallet came to a rest on the runway. Soldiers waiting with forklifts transported the supplies away. The GPES system employed a hook instead of a parachute. The pilot flying above the runway attempted to snatch a wire (similar to those on aircraft carriers). If successful, the pallets were pulled off the plane and came to a rest on the runway. It has been claimed that the GPES system was so successful once perfected that a pallet of 30 dozen eggs could be offloaded without a single egg cracking. C-130 crews also used parachutes to drop supplies to soldiers in the field. Pilots became extremely adept in performing the parachute drops. The average error rate when the Drop Zone (DZ) was not visible was 133 meters and if the DZ was visible it was 92 meters.<sup>98</sup>

The Air Force delivered jet fuel to remote locations using “Bladder Bird” techniques. Bladder Bird, also known as Aerial Bulk Fuel Delivery System, is simply a system in which fuel bladders are loaded onto a cargo plane that is dedicated for fuel deliveries. The aircraft lands at a predestinated airstrip and is met by fuel tankers. The tankers drain the bladder into their holds and drive the fuel to it designated base or storage tank. The Bladder Birds flew out of Tan Son Nhut and Bien Hoa. Deliveries approached as much as a million gallons a month.<sup>99</sup>

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<sup>97</sup> Ray, “Analysis of United States Air Force Supply and Support in Vietnam,” 34.

<sup>98</sup> Thompson, *The Lifeblood of War*, 203.

<sup>99</sup> Heiser, Jr., *Logistic Support*, 79.

### 2.2.3.3 End of War

OPERATION ROLLING THUNDER came to an end in late 1968 resulting in a dramatic reduction of Air Force activity in Vietnam. As a result, major Air Force logistics operations, including Bitter Wine and Grey Eagle were phased out in 1969. Air Force cargo and transport aircraft continued supporting the combined U.S. Forces in Vietnam and the RAM, RASS, and RATS teams operated in Vietnam until 1975.<sup>100</sup> However, unified Air Force specific logistics operations scaled back considerably in the last years of the war as the United States prepared to exit Southeast Asia.

## 2.2.4 NAVY

Historians Edward J. Marolda and G. Wesley Price III described the Navy's logistics efforts in the Vietnam War as an endeavor shaped by the "development of a 7,000-mile, trans-oceanic lifeline to American forces fighting ashore." Approximately 99% of the ammunition and fuel used in the war and 95% of the supplies, vehicles, construction equipment and other materiel used in the war effort was transported via ship. The Navy also transported the huge majority of troops.<sup>101</sup> This support was built on a foundation of ships, but took many forms and evolved throughout the war. The use of Navy vessels in support of the other branches of the military has been generally discussed above, but the Navy also had their own logistical operations.

### 2.2.4.1 Early War

Navy logistics were organized into two divisions. The Service Force, which was originally organized in 1942, provided logistics support to Navy Vessels through a supply train fleet of oilers, gasoline tankers, repair ships, ammunition ships, destroyer tenders, and submarine tenders. The second major component of Navy logistics was the Military Sea Transportation Service (MSTS), managed the seaborne shipment of personnel, equipment, and supplies for all branches of the military. The MSTS, which was originally established in 1949, included both Navy ships and private ships contracted to support supply missions. Navy MSTS ships include the USNS *Core*, which delivered the first Army helicopter units to Vietnam in 1961.

The Navy was not heavily involved in the early war. Direct Navy activity had two main components. The primary Navy activity prior to 1965 was in an advisory role that supported the South Vietnamese Navy with ships, boats, and training. Navy counterinsurgency operations also began in Vietnam prior to 1964.

The early war did lay the groundwork for a logistical mission of ever increasing complexity as the war escalated. With American involvement in Vietnam slowly increasing, the Navy established the HSAS at an abandoned cigarette factory in 1962. The HSAS, which had a staff of 600 mostly-naval personnel by the end of 1964, provided a wide range of support. Medical and dental facilities were available at the Saigon Hospital, established by the Navy in 1963. The facility also provided religious services and recreation. Most importantly, the HSAS was the

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<sup>100</sup> Holcomb, "Aircraft Battle Damage Repair," 10.

<sup>101</sup> Edward J. Marolda and G. Wesley Pryce III, *A Short History of the United States Navy and the Southeast Asian Conflict: 1950–1975* (Washington, DC: Navy Historical Center Department of the Navy 1984), 66; Heiser, Jr., *Logistic Support*, 157.

center for the unloading, storage, and transport of supplies to all branches of the U.S. Military in Vietnam. By the end of 1964, there were over 20,000 American troops in Vietnam.<sup>102</sup>

#### 2.2.4.2 Middle of the War

The year 1965 marked a transition for HSAS. The Navy began turning over much of their logistical oversight to the Army and, as discussed above, the Army took over logistical operations in Saigon in 1966. Nonetheless, the HSAS provided considerable support to the common war effort in 1965. In a single month, the HSAS port offloaded 330,000 tons of material from 96 ships and transshipped 40,000 tons of equipment and supplies to other coastal sites. The HSAS operated 2.7 million square feet of storage space and managed the Saigon hospital and 54 bachelors' enlisted and officers' barracks. The organization also oversaw 318 construction projects.<sup>103</sup>

The HSAS ceased operation on 15 May 1966. The Naval Support Activity (NSA), Saigon replaced it two days later. Unlike HSAS, NSA Saigon only supported Navy operations in the II, III, and IV Corps Tactical Zones (see Figure 2-7). Specifically, the NSA provided logistical support to the Navy's Coastal Surveillance Force, River Patrol Force, Riverine Assault Force, and other specialized units in the southern two-thirds of South Vietnam. The support activity provided the units with weapons, ammunition, and communications equipment. They repaired boats and ships; stockpiled parts and equipment; built bases and other facilities; housed officers and enlisted men; oversaw payroll and other administrative functions; and provided recreational opportunities.<sup>104</sup> The NSA operated a variety of vessels to support their logistical mission. NSA Saigon also operated an air transport service that flew C-47s, C-117, TC-45J, HU-16, and H-46 aircraft from Tan San Nhut airfield.

The escalation of the war in 1965 stressed existing Navy logistical transport resources. It immediately became apparent that there was a shortage of ships available to MSTTS. Therefore, the Navy reactivated the National Reserve Defense Fleet auxiliary ships, a fleet was established in 1946 as the Merchant Marine Service. The National Reserve Defense Fleet, which still exists, consists of ships that carry imports and exports during peacetime, but are available for military service in times of conflict. Navy logistics also employed foreign and American Merchant Marines to establish an effective logistic pipeline from the United States to Southeast Asia.<sup>105</sup>

All the ships were placed under the MSTTS and commanded by the U.S. Pacific Fleet's, Seventh Fleet Logistics Support Force (Task Force 73) whose logistical operations were based out of Hawaii (Service Squadron 5) and Sasebo, Japan (Service Group 5). The Navy also operated support facilities throughout the Pacific. Naval Supply Depots and Ship Repair Facilities were located in Japan, Subic, and Guam. There were Naval Magazines at Subic and Guam, and Naval Ordnance Facilities in Japan. The 7<sup>th</sup> Fleet Post Office was located in San Francisco. Finally,

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<sup>102</sup> Marolda and Pryce III, *A Short History of the United States Navy*, 14; Ewin Bickford Hooper, *Mobility, Support, Endurance: The Story of Naval Operational Logistics in the Vietnam War 1965-1968* (Washington DC.: Department of the Navy Naval History Division, 1972) 59, 62.

<sup>103</sup> Marolda and Pryce III, *A Short History of the United States Navy*, 72.

<sup>104</sup> Marolda and Pryce III, *A Short History of the United States Navy*, 72.

<sup>105</sup> Marolda and Pryce III, *A Short History of the United States Navy*, 21, 67.

there were headquarters installations in Taiwan, Marianas, Philippines, and Japan.<sup>106</sup> Under this structure, the MSTs transported 54 million tons of equipment and supplies, 8 million long tons of fuel, and thousands of soldiers between 1965 and 1969.

By the middle of 1967, the MSTs grew into a fleet of 537 reactivated World War II ships and chartered private vessels from the United States and Allies. The fleet included traditional cargo craft and navy troop transport ships, but was augmented by a diversity of specialized craft. It included craft with novel configurations such as the roll on/roll off ships that were designed to facilitate the rapid unloading of vehicles through rear or side doors. There were also modified escort carriers that transported helicopters and their associated units. The first container vessel, a common ship today, arrived in Vietnam in August 1967. The fleet also included huge fuel tankers, such as the USNS *Maumee*, which could transport 190,000 barrels of fuel.<sup>107</sup>

Once the MSTs ships arrived in Vietnam they were supported by a fleet of LSTs. The LST fleet grew to 43 vessels by 1968. A private contractor, the Alaska Barge and Transport Company, operated a fleet of 19 tugs and 33 barges in Vietnam's ports. The company also ran terminal and port operations.<sup>108</sup>

Vietnam presented other significant logistical challenges. The nation had only one serviceable deep-water port, located at Saigon. Cam Ranh Bay, located north of Saigon, was deep enough to accommodate ships, but it only had one small pier in 1965.<sup>109</sup>

The 600-man Navy Mobile Construction Battalion Three (NMCB-3) arrived in Da Nang from Guam in late May 1965. A second construction battalion, NMCB-9, arrived in Da Nang from Port Hueneme, California a week later. The construction battalions were consolidated with NMCB-10 and redesigned the 30<sup>th</sup> Naval Construction Regiment. Unlike the Seabee Teams, who were conducting nation-building and counterinsurgency operations in coordination with special operations forces, the Seabee Naval Construction Battalions directly supported Navy and Marine Corps operations. The construction battalions' sole purpose in 1965 was to begin construction of a new Navy support facility at Da Nang.

NSA Da Nang, which provided logistic support for all Corps Area 1 Operations, became the largest Navy logistics command during the war, but it began as a modest facility. The Navy established several subordinate support activity detachments throughout the region in order to more efficiently move material in the mountainous terrain of Corps Area 1. These detachments, located at Sa Huynh, Cua Viet, Hue, Chu Lai, Tan My, Dong Ha, and Phu Bai.<sup>110</sup> NSA Saigon also established several logistics detachments that served units in the II, III, and IV Corps Areas. These detachments were located at Qui Nhon, Nha Trang, Cam Ranh Bay, An Thoi, Cat Lo, Vung Tau, Can Tho, Nha Be, Vinh Long, Sa Dec, My Tho, Tan Chau, Dong Tam, and Long

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<sup>106</sup> Marolda and Pryce III, *A Short History of the United States Navy*, 67-68.

<sup>107</sup> Marolda and Pryce III, *A Short History of the United States Navy*, 66.

<sup>108</sup> Marolda and Pryce III, *A Short History of the United States Navy*, 66.

<sup>109</sup> Hooper, *Mobility, Support, Endurance*, 6.

<sup>110</sup> Marolda and Pryce III, *A Short History of the United States Navy*, 70, 71.

Xuyen.<sup>111</sup> The camps served to increase the efficiency of logistical supply in the region and provided crucial support to American troops during the 1968 Tet Offensive.



Source: [http://www.720mpreunion.org/history/project\\_vietnam/maps/corps\\_tactical\\_zones.html](http://www.720mpreunion.org/history/project_vietnam/maps/corps_tactical_zones.html)

**Figure 2-7: Corps Tactical Zones in Vietnam.**

In 1965 NAS Da Nang only had 3 small piers, 3 LST ramps, and a stone quay. The facility had limited storage and there was a paucity of dependable exit routes from the port. These limitations resulted in significant challenges as ships arrived with cargo that needed to be offloaded, stored, and transported.<sup>112</sup>

<sup>111</sup> Marolda and Pryce III, *A Short History of the United States Navy*, 72.

<sup>112</sup> Marolda and Pryce III, *A Short History of the United States Navy*, 70; Hooper, *Mobility, Support, Endurance*, 71.

NSA Da Nang grew dramatically over the next three years. Seabee crews constructed three deep draft piers to support oceangoing vessels, two 300-foot wood piers, an LST causeway, a Bridge Complex consisting of a 1,600-foot-long wharf, 300,000 square feet of refrigerated storage, and 500,000 square feet of covered storage. Crews also laid amphibious fuel lines on the sea floor. The fuel lines linked to storage tanks north of the NSA at Red Mountain and south of the facility at the Marble Mountain air facility.<sup>113</sup>

The Naval Construction Battalions also constructed helipads, airfield runways, taxi strips, and hangars at Da Nang, Chu Lai, and Phu Bai. They built port facilities and boat ramps at Da Nang and Cua Viet. The battalions resurfaced roads throughout South Vietnam and erected thousands of bridges, most notably a 2,000-foot-long span over the Thu Bon River known as the Liberty Bridge. They also constructed a wide variety of other support buildings for the Allied ground war. These include fortifications, observation towers, fuel storage tanks, barracks, mess halls storage buildings, and medical facilities. The construction battalions did not limit themselves to



*Source: Photo K-52140, NARA RG 428: General Records of the Navy, 1941-2004*

**Figure 2-8: Aerial View of U.S. Forces Facilities at Danang. 1968.**

construction. They also repaired Allied installations damaged by Viet Cong rocket, artillery, and mortar fire.<sup>114</sup> The Seabee presence in Vietnam mushroomed from 600 sailors in 1965 to 10,000 sailors in 1968. Only 195 of these men were associated with the activities of the Seabee counterinsurgency teams. The rest operated in support of the Marine Corps and Navy.<sup>115</sup>

NSA Da Nang's logistics support resources grew in number and complexity throughout the middle of the war. The NSA eventually had several logistics vessels at its disposal. These

<sup>113</sup> Marolda and Pryce III, *A Short History of the United States Navy*, 71.

<sup>114</sup> Marolda and Pryce III, *A Short History of the United States Navy*, 69.

<sup>115</sup> Marolda and Pryce III, *A Short History of the United States Navy*, 68.

included LCU, LCM 3, and LCM 6 landing craft, harbor utility craft, small harbor tugs, open lighters, refrigerated barges, and a refrigerator ship. The logistics vessels were supplemented by landing craft, picket boats, and 16-foot Boston Whalers that monitored maritime traffic. One hundred thirty forklifts and 20 cranes facilitated the transfer of cargo from the boats to land-based warehouses and storage facilities.

The evolution of NSA Da Nang over the years allowed it to operate with considerable efficiency in a difficult environment. By July 1968, the NSA was handling 350,000 pounds of cargo for 200,000 Allied troops in Corps Area I (I Corps). Da Nang was also the largest fuel complex in South Vietnam. Finally, the facility had a hospital that had treated over one million patients since 1965.<sup>116</sup>

Ammunition shortages immediately presented challenges to Navy logistics in 1965. Ammunition stores in the Pacific were initially inadequate because of use predictions that the realities of the war belied. Supply problems were exacerbated by a lack of adequate ports, personnel and storage in Vietnam. Finally, budgetary limitations precluded the Navy from producing or acquiring significantly more ammunition, especially for aircraft.<sup>117</sup>

The Navy moved quickly to ameliorate the ammunition supply problems. First, operations in the Continental United States were streamlined. The Navy established a movement control unit and Naval Weapons Station, Concord, California as a centralized location for the shipment of ammunition to Vietnam. Second, a single office was established at Mechanicsburg, Pennsylvania to expedite and track the shipment of all ammunition. The office was also required to identify and resolve any problems and inefficiencies in the supply chain. These procedural modifications resulted in a decrease in shipping times from the mainland to Vietnam from 70 days to 58 days by early 1966.<sup>118</sup>

The Navy also quickly worked to standardize munition components so that items such as fuses and fins could be interchangeable between ordnance as much as possible. Additionally, by late summer 1965, construction battalions began work to expand the Naval Magazine at Subic Bay, Philippines. Concurrently, the Navy shipped materials in low demand away from Subic to make more room for munitions.<sup>119</sup> The Navy and Air Force also developed a specific logistical program for the delivery of air munitions to Southeast Asia. Called the “Special Express,” the program facilitated the efficient delivery of munitions from the West Coast of the United States to Southeast Asia. Originally established as a five-ship shuttle system, it expanded throughout the war as munitions needs increased. The ships were loaded with various types of munitions, which were stored in their own temperature-controlled sections of the ship’s hold. Once they arrived in the conflict zone, the ships anchored offshore and acted as munitions warehouses. When a unit’s air munitions ran low, lighters (shore-based offloading vessels) pulled alongside the “Special Express” ships and munitions were loaded directly into mobile weapons transporters. The lighters returned to shore where waiting tractor trucks hauled the loaded

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<sup>116</sup> Marolda and Pryce III, *A Short History of the United States Navy*, 71.

<sup>117</sup> Hooper, *Mobility, Support, Endurance*, 36-7; The Joint Logistics Review Board, “Logistics Support in the Vietnam Era, Monograph 2: Ammunition,” 1970, 43-4. Available at <http://www.dtic.mil/dtic/tr/fulltext/u2/877960.pdf>.

<sup>118</sup> Logistics Review Board, “Ammunition,” 44.

<sup>119</sup> Logistics Review Board, “Ammunition,” 45.

transporters directly to the units.<sup>120</sup> The logistical innovations and procedural modifications served to stabilize Navy munition supplies by 1967.

The Navy battleships, aircraft carriers, and other combat ships of the Seventh Fleet also required logistical support. When feasible, maintenance was conducted at ship repair facilities at Subic, Yokosuka, and Guam. However, due to the intensity of combat and the distance from port, other maintenance arrangements became important. Some repair support was provided at Da Nang and Saigon, but the vessels largely relied on mobile maintenance provided by repair ships. Indeed, the logistical support of Seventh Fleet operations presented a special challenge. The vessels were scattered along a 1,000-mile swath of sea along the Vietnamese coastline. Moreover, supply lines to the fleet stretched over 6,000 miles from the fleet base at Subic to Vietnam. The distance was compounded by the fact that Navy operations, especially aircraft, consumed unprecedented amounts of ammunition and fuel. For example, the aircraft carrier, USS ENTERPRISE, used almost 4,500 tons of air-to-ground munitions in one month. This was more than twice the amount a single aircraft carrier used through the entire World War II conflict.<sup>121</sup>

The distance from port and intensity of resource use required an active underway replenishment program in which ships plied the Vietnam-area waters delivering supplies, fuel, and ammunition to the Seventh Fleet. For example, fuel supply missions lasted 21 days and covered over 3,000 miles of ocean as ships travelled to Vietnam waters, spent about a week resupplying ships, and returned to their home base at Subic. The volume of fuel and supplies delivered was significant. The USS PONCHATOUA delivered 2,680,000 gallons of fuel oil and 653,000 gallons of jet fuel to twenty vessels in a one-day span in November 1967. While fuel and ammunition deliveries emanated from Subic Bay, provisions were delivered from San Francisco on ships that departed for Southeast Asia every 28 to 42 days.<sup>122</sup>

In order to further streamline logistical support for their own combat operations, the Navy developed a concept known as Vertical Replenishment. This was a technique in which ship-based UH-46 helicopters quickly transferred cargo between ships, reducing the need to go into port for supplies. Vertical replenishment was facilitated by new specialized combat stores ships that improved the Navy's logistic operations. The first combat stores ship, the USS MARS, was commissioned in 1964. The ship integrated vertical replenishment capabilities into its design. Most importantly, A UH-46 helicopter was based on the ship. Other innovations included an automatic highline shuttle system to speed the transfer of equipment and material and an integrated computer system. Indeed, the USS MARS was the first supply Navy ship fitted with a computer system. The Navy added additional combat stores ships to the Pacific fleet during the war. These were the USS NIAGRA FALLS (1967), USS WHITE PLAINS (1968), USS CONCORD (1968), and USS SAN JOSE (1969). The ships provided non-refrigerated supplies and some ammunition to Navy vessels. Another vessel class, the fast combat support ships USS SACRAMENTO and USS CAMDEN also played a significant role in Navy replenishment activities. The fast combat support ships combined the functions of three ships, the fleet oiler, ammunition ship, and refrigerated stores ship, into one. Like the combat stores ships, they were designed to provide vertical replenishment. The USS SACRAMENTO was commissioned in

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<sup>120</sup> Hobson, "Logistics in the Lifeline," n.p.

<sup>121</sup> Hooper, *Mobility, Support, Endurance*, 44-6.

<sup>122</sup> Hooper, *Mobility, Support, Endurance*, 47, 50, 52, 54.

1964 and joined by another combat support ship, the USS CAMDEN, in 1967.<sup>123</sup> Under this system, Navy vessels were able to receive 70 to 97% of their annual ammunition, fuel, and provision requirement while at sea.

Onshore, NSA Saigon and NSA Da Nang and their associated detachments developed an efficient logistical system that served combat forces well enough that they were rarely confronted by a lack of supply. By 1968, the scale of the logistical support was notable. The logistics support provided tens of thousands of tons of equipment to combat forces each month by water. They delivered 300,000-400,000 pounds of supplies and 3,500 passengers by air each month. The maintenance component of the NSAs kept hundreds of craft in operation.<sup>124</sup> Indeed, the NSA logistical efforts provided valuable support to combat troops throughout the trying middle years of the war.

### 2.2.4.3 End of the War

As discussed previously, the United States adopted Vietnamization in 1969. A critical component of the program was the relinquishment of logistics operations and facilities to the South Vietnamese. The Navy established the ACTOVLOG (Accelerated Turnover Program, Logistics) to facilitate this transfer. The program included both the actual transfer of resources and the training of Republic of Vietnam (RVN) personnel in the operation of the logistics bases. Seabee detachments, concomitant with logistical transfers under ACTOVLOG, deployed throughout South Vietnam to construct other support buildings, including barracks, administration buildings, repair and maintenance shops, piers, and other buildings at established and new logistics bases. The first base to come under RVN control was My Tho, located in the Mekong Delta. Three years later, in April 1972, the RVN gained control of last and most important American facilities in South Vietnam. These were Da Nang, Binh Thuy, Cam Ranh Bay, and Nha Be. The transfer marked the end of direct U.S. Navy logistical operations in Vietnam. The complete shift of logistic responsibilities to the South Vietnamese Navy was finished by August 1973.<sup>125</sup> The Navy, however, was still active in the area. Navy ships patrolled the Gulf of Tonkin and a small contingent of Navy advisors remained in Saigon.

A final logistical operation occurred in 1975 when the Military Sealift Command (MSC), formerly the MSTs, oversaw the evacuation of the last remaining anti-Communist strongholds in Cambodia and South Vietnam as Khmer Rouge and Viet Cong forces gained control of the Southeast Asian nations. MSC ships transported thousands of foreigners and refugees to safety.

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<sup>123</sup> Marolda and Pryce III, *A Short History of the United States Navy*, 67; Douglas V Smith, ed. *One Hundred Years of US Navy Air Power* (Annapolis, Maryland.: Naval Institute Press, 2010) 233, 234.

<sup>124</sup> Marolda and Pryce III, *A Short History of the United States Navy*, 73.

<sup>125</sup> Marolda and Pryce III, *A Short History of the United States Navy*, 85-6.

### 3.0 ON THE HOME FRONT

Logistics is the warehousing and transporting of materials. It is a supply chain designed to get the right stuff in the right amount to the right people at the right time. For the Vietnam War, it is estimated that U.S. troops needed roughly ten times the amount of material the Viet Cong were consuming as the Viet Cong could live off the land and they used their limited weapon systems very effectively.<sup>126</sup> The environmental conditions and topography of Vietnam presented unique difficulties as well. In order to meet these new challenges, the military modernized supply centers; constructed additional warehouses and transportation terminals; developed new supply and inventory systems; and conducted logistics training state-side on U.S. installations.

#### 3.1 BACKGROUND

There were three main phases of the conflict in Vietnam: buildup, sustaining, and phase-down. Each phase required special logistics management techniques. During the buildup phase, emphasis was placed on getting equipment and supplies into Vietnam without regard for the lack of logistics units in-country to account for and effectively manage the incoming items. This, of course, was necessitated by the rapidity of the buildup and the tactical requirement to increase the combat strength in South Vietnam as quickly as possible. As a result, supplies arrived in ahead of an adequate logistics base, preventing the orderly establishment of management and accounting operations. During the sustaining phase, there were enough logistics units to start managing the supplies in Vietnam, to identify excesses, to retrograde unnecessary stocks, and to create order out of the chaos of the initial phase. What was started during the sustaining phase was carried forward, intensified, and augmented during the drawdown. Some of the management devices used to support the war were adopted for worldwide use.<sup>127</sup>

General William Westmoreland made the decision to put troops in the field as rapidly as possible without waiting for the logistics buildup. This was a calculated risk, and it meant that troop provisioning and equipping would be somewhat austere in the initial deployment. Dust, rain, and heat also took their toll on clothing and equipment. Jungle boots, light combat fatigues, and other items were in short supply during the early months. Bulldozers operating 24 hours a day in rough terrain chewed up spare parts faster than expected. Helicopters often were dead-lined for want of spare parts.<sup>128</sup>

Vietnam truly provided a combat "logistics proving ground." The challenge in solving the problems associated with supply, maintenance, transportation, communication, automation, and other services required logistic commanders and staff to utilize not only recognized principles and techniques, but also innovate management practices. The challenges required an integrated logistic approach in effective combat support.<sup>129</sup>

Vietnam has over 1,860 miles of coastline which made the country easily accessible by sea and 98% of all the cargo shipped to Vietnam arrived by ship. Initially, however, there was

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<sup>126</sup> Gruenwald, 2015, pp. 57.

<sup>127</sup> Heiser pg. 48.

<sup>128</sup> Committee on Government Operations, House Report 91-1586, October 8, 1970.

<sup>129</sup> Shrader, 1997, pg. 24.

insufficient logistics infrastructure for the U.S. Naval Forces to load and unload materials.<sup>130</sup> At the start of the war, there was one major deep-draft port in the Republic of Vietnam, the Port of Saigon, and that was limited by its water depth and by its pier space. As mentioned in Chapter 2, the only other port that could accommodate ocean-going ships was Cam Ranh Bay, equipped with one small pier. Elsewhere, initial dependence had to be placed almost entirely on logistics-over-the-shore type operations.<sup>131</sup> Major ocean-going vessels used by U.S. Navy were Panama class size with a length over 660 feet, and a summer freeboard line (the distance from the water line to the main deck) in excess of 40 feet and could not dock at Vietnam ports. The cargo had to be littered to smaller ships just offshore which made for easy target for sabotage and MIG attacks.<sup>132</sup>

In the 1965-67 period of rapidly expanding deployment, the "push" concept for supplies was employed. Each incoming unit was given enough supplies for periods up to 180 days while the depot complexes and distribution systems were being established in-country. The contents of the push packages were based on estimates drawn from past experience and faulty consumption data from deploying units. They carried unneeded or unsuitable items, and contributed to the accumulation of excesses. The concern in the early days, however, was about too little, not too much. The fact that South Vietnam's ports and receiving facilities were grossly inadequate to handle the rush of supplies was no secret to military planners. But needs were great and deployment actions were constant. Vessels waiting to get into port became floating warehouses.<sup>133</sup>

The push packages depended on existing supplies wherever available, as well as on new procurements. These new procurements were made in a hurry to accommodate compressed deployment schedules and resulted in their own series of problems. Buying accessories for too many brands and models of equipment caused a consequent proliferation of spare parts stocks at all supply levels. There was also a resultant lack of skilled manpower for maintenance of the various equipment. There were problems of the unsuitability of many commercial-type, off-the-shelf items in the harsh combat environment which led to replacement of unsuitable items by new procurements and added costs.<sup>134</sup>

It did not take long for the supply support problem in Vietnam to change from shortage to excess. Manufactured items were pouring out of the States in response to urgent procurement requests. Included were supplies for the military forces, for the Vietnam economy through the aid programs, and for contractors engaged in various construction projects. As the U.S. ports became jammed, pressures developed to move out the supplies, and foreign-flag vessels had to be called.<sup>135</sup>

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<sup>130</sup> Gruenwald, 2015, pp. 62

<sup>131</sup> Hooper pg 6

<sup>132</sup> Gruenwald, 2015, pp. 62

<sup>133</sup> Committee on Government Operations, House Report 91-1586, October 8, 1970

<sup>134</sup> Committee on Government Operations, House Report 91-1586, October 8, 1970

<sup>135</sup> Committee on Government Operations, House Report 91-1586, October 8, 1970



Source: Photo K-31362, NARA RG 428: General Records of the Navy, 1941-2004

**Figure 3-1: Merchant Ships under Contract to the MSTs Wait to Unload Supplies at the Danang Harbor. 1966.**

On the receiving end, to avoid demurrage charges and release ships for the next run, the pressures were strong to unload and move out. The line of cargo vessels would be strung out to sea, sometimes held up in the Philippines. From 1965 to 1966, as many as 100 ships with a half million tons of cargo stood off the Vietnam coast with no plans to unload or store their cargo.<sup>136</sup> Perishable cargo, like wheat, rotted on the wharves.<sup>137</sup>

As supplies were hauled in and dumped on the docks around-the-clock, the pressures again were strong to move supplies away from the port area and make way for incoming loads. Vast amounts of supplies were crammed into depots or placed in open areas. As the shipping backlog grew, materiel was moved directly from ship to port areas to any available storage area and stacked at random. Documentation was lost or became illegible; locator systems were ineffective; needed supplies were inaccessible; packaging became weathered and damaged; and markings became illegible. Consequently, because needed items could not be identified or

<sup>136</sup> Shrader, 1997, pg. 694

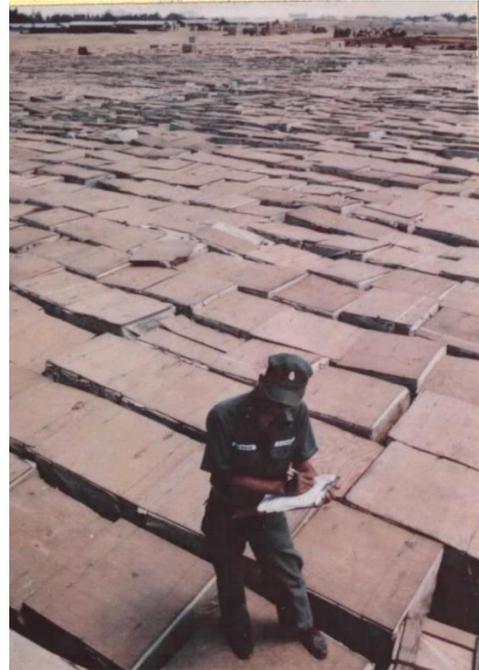
<sup>137</sup> Committee on Government Operations, House Report 91-1586, October 8, 1970

located, they were re-requisitioned, further increasing the incoming flow and compounding the problem.<sup>138</sup>

Observers checking supplies against records would often find as much as 50% of the items not recorded in the inventory. Great stacks of supplies lay around and excesses were obvious. In October 1968, the equivalent of an entire shipload of toilet paper (12,000 measurement tons) was observed in one location, with the books showing “zero balance.” Additionally, Conex shipping containers filled with mattresses, in rows three wide and three deep and several hundred yards long occupied an area and, again records indicated a zero balance. The zero balances meant that masses of supplies did not exist so far as the supply system in Vietnam was concerned, and yet the system depended on stock status reports for purposes of replenishment. New orders were sent for supplies already in excess. Units, lacking confidence in the supply system, sent in multiple requisitions to improve the chances for delivery of what they needed or wanted.<sup>139</sup>

The supplies needed for the economic aid programs resulted in competition for unloading and storage space with basic military requirements. For example, construction aid efforts by U.S. servicemen on behalf of the Vietnamese in 1968 and 1969 included:

- 1,253 schools
- 263 churches
- 175 hospitals
- 422 dispensaries
- 153 market places
- 598 bridges
- 1.86 miles of roads
- 7,099 dwellings<sup>140</sup>



Source: Photo K-31372, NARA RG 428: General Records of the Navy, 1941-2004

**Figure 3-2: A "Sea" of C-Rations,  
Da Nang. 1966.**

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<sup>138</sup> Committee on Government Operations, House Report 91-1586, October 8, 1970

<sup>139</sup> Committee on Government Operations, House Report 91-1586, October 8, 1970

<sup>140</sup> Heiser 1974 pg vi

By the end of the Vietnam War, the statistics for logistics include:

- 352 billion U.S. dollars spent on the war
- 760,000 tons of supplies arrived each month
- 10 million field rations were consumed each month
- 71,000 tons of ammunition was expended each month
- 124,537 flown B-57 missions
- 1,633,035 tons of ordnance dropped
- 18 B-52s were lost to enemy action
- 13 B-52s were lost in collisions and accident
- 750 Aircraft (fixed-wing) were lost in Vietnam
- 12,000 helicopters saw service in Vietnam (all services)
- 4,865 helicopters were downed by Communist ground fire
- 2.59 million Americas saw service in Vietnam
- 3,500,000 acres of Vietnam were sprayed
- 19 million gallons of defoliants were used, the effects of which will last 100 years
- 80 million gallons of petroleum products were consumed each month
- 82,657 acres of airfields were paved
- 44,478 acres of covered and open storage facilities were built
- 18,507 cubic yards of refrigerated storage created
- 2,945 miles of roads built
- 5,030 yards of bridges constructed
- 15 large fortified bases were built in Vietnam
- 10,000 artillery rounds expended in one day by the U.S. in Vietnam<sup>141</sup>

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<sup>141</sup> <http://www.103fieldbatteryraa.net/documents/74.html> 61



Source: Photo K-36671, NARA RG 428: General Records of the Navy, 1941-2004

**Figure 3-3; SEABEES Build Bridge Connecting Two Villages Directed by the Civic Action Group. 1966.**

In addition to the infrastructure challenges of logistics in Vietnam, other short-comings emerged. Supply personnel were not always well trained for their unglamorous work. Stock records frequently did not tally with physical count of goods on hand. Requisitions of ordinary supplies too often carried high priority labels so that the distinction between the urgent and the routine broke down. Lack of uniformity in the unit or issue may have meant that millions of ordinary items were delivered when only thousands were wanted. The requisitioning forms, though they became standardized, passed through many hands and sometimes got lost, strayed, or were stolen. The computers that processed the supply data may have had different languages so that they could not readily "talk" to each other. Excesses and shortages quickly developed because of delays in distribution or redistribution. Unnecessary duplication of stock was also a frequent result of a defective supply information.<sup>142</sup>

At Marine Corps Base Quantico, Marines were taught that combat readiness was the goal, and that a platoon commander should never mistake willingness for readiness. "Willingness is a state of mind; readiness is a matter of fact. Readiness not only implies the mental, physical, and training preparedness of Marines

to fight but it also encompasses materiel readiness; this kind of readiness gives the platoon commander the ability to project his well-trained, mentally prepared, and physically fit Marines into combat and keep them in the fight."<sup>143</sup>

In Basic school, Marines were taught logistics support through amphibious operation demonstrations. It was during an amphibious operation that the truly critical stages of combat logistic support occurred. Once firmly established on land, (if the landing force becomes engaged in a land campaign) the beachhead area would normally become an advanced base from which logistic support would be provided to the landing force.<sup>144</sup>

Military supply systems regulated the flow of military equipment and supplies from the factory to the user in the field. The great bulk of this material was not for immediate use. It was routed to depots and warehouses to replenish inventories, upon which requisitions were drawn by U.S. military "customers" in many parts of the world. Major depots were akin to "wholesale" supply

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<sup>142</sup> Committee on Government Operations, House Report 91-1586, October 8, 1970

<sup>143</sup> Quantico 1968, page 21-1

<sup>144</sup> Quantico 1968, page 21-1

houses; the supply Sergeant in the post, camp or station was a “retail” user down the supply chain.

Computer centers known as inventory control points kept track of inventories for purposes of supply and replenishment. The sheer mass and complexities of military supply operations suggested at once the enormity of the management tasks and the potentials for savings through improved performance. There were 4 million separately identified items in military supply systems. Every day, thousands upon thousands of requisitions flashed through worldwide military network process data centers, and directed to supply depots for action; and every day military goods moved out from storage points to hundreds of destinations in the United States and overseas. Military supply agencies processed more than 60 million requisitions a year. To handle these voluminous and complex supply functions, various organizations have been devised, and revised through the years.

Today each military service, including the Marine Corps, has its own supply system. Above the service level, the Defense Supply Agency buys and distributes a great volume of supplies commonly used by all the military services. Outside the military establishment itself, the General Services Administration, a central supply and service agency for the civilian branch of the Government, also buys and distributes appreciable amounts and varieties of common items for military as well as civilian use. Within and among these services and agencies there were differing supply management philosophies and methods, in part responsive to particular operational needs, in part reflecting tradition and outlook.<sup>145</sup>

In 1968-69, Department of the Army objectives were reoriented toward a streamlined system designed to improve response to the customer. Department of the Army Circular 700-18, published in November 1969, advanced these objectives by providing guidance on an INVENTORY-IN-MOTION principle of non-stop support direct from Continental U.S. to the Direct Support Unit level. The Circular tasked the Army Materiel Command to position stocks in theater-oriented depot complexes and to develop the logistics intelligence to control the system. The Circular laid the ground work for the Army's current worldwide Direct Support System. The RED BALL program integrated supply, transportation, and maintenance activities into a single system, and maintained control of requisitions from inception at the Direct Support Unit until materiel was delivered to Vietnam. Since July 1970, Direct Support System had been changing the image of large overseas depot operations. It was supporting the Army in the field directly from the Continental U.S. wholesale base, bypassing theater depots and break-bulk points. The overseas depots have gradually assumed the role of advance storage location for War Reserve, Operational Project Stocks as a service level.<sup>146</sup>

### **3.2 LOGISTICS PRODUCTION**

Antiquated production facilities and lack of full mobilization during the Vietnam War resulted in shortages and delays. The industrial base utilized by the military services consisted of both government owned and privately-owned production facilities, although, private industrial facilities were of primary importance and were only supplemented by military resources.

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<sup>145</sup> Committee on Government Operations, House Report 91-1586, October 8, 1970

<sup>146</sup> Heiser page 50 -51

Military-owned facilities were required to produce military items having no significant commercial demand. Accordingly, the military has throughout its history maintained varying capabilities for production, mostly in the munitions area.<sup>147</sup>

In 1965, the largest single category of active and inactive industrial facilities of the DoD involved in the production and loading of ammunition and solid propellants. These plants were a legacy of the massive buildup during World War II. At that time, available U.S. manufacturing capacity "... was dangerously inadequate for the national defense and woefully deficient for an offensive war of global extent."<sup>148</sup>

Despite legislation passed in 1948 to allow retention of a reserve of plants, the situation at the beginning of the Korean War was similar to that of World War II. In 1953, the Army Chief of Ordnance stated: "In 1950, there was no ammunition industry for the production of metal components. Our reserve plants for the production of powder and explosives, and for the loading and assembly of finished ammunition were far from being in a state of immediate readiness for production." The manufacturing processes were antiquated, and the equipment was neglected because of the lack of funds for maintenance and required rehabilitation.<sup>149</sup>

Prior to the buildup for Southeast Asia, only 11 of 25 Army-owned munition plants were operating. Immediate actions were taken to activate additional ammunition plants. Six ammunition plants were activated in fiscal year 1966, six more were activated in fiscal year 1967, and the last plant required to meet production requirements was activated in fiscal year 1968. Only one government-owned munition facility remained inactive.<sup>150</sup>

Another issue was that the design of items used in World War II had changed, but until the item was needed to support Vietnam requirements, these design changes had not been identified or planned for. This caused 16- to 24-month delays in production. For example, companies were willing to produce Concertina wire, but the government-owned production equipment that the producer required was insufficient to meet the increased production requirements for Vietnam. Much of the equipment that was available required major rehabilitation before it could be used. In addition, individual pieces of equipment were missing from production units in layaway. Most significant, however, was that there was no modernizing or updating of the existing production base.<sup>151</sup>

The planning assumption that all hostilities would end by 30 June 1967 also contributed to the lag in production. During 1965, President Johnson announced the buildup of forces in South Vietnam. The Army immediately updated its existing studies to ascertain the ammunition needs. These studies became the basis for the supplemental fiscal year 1966 budget programs. The fiscal year 1967 Army budget was restated on the assumption that Vietnam support would continue only through June 1967. Because of this assumption, many producers were not interested in bidding. Due to production lead times involved, they would be reaching peak rates

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<sup>147</sup> Heiser page 29

<sup>148</sup> JLRB, Monograph 12, 1970

<sup>149</sup> JLRB, Monograph 12, 1970

<sup>150</sup> Heiser page 30

<sup>151</sup> JLRB, Monograph 12, 1970

at the time production supposedly would be cut back. Also, more profit could be derived from the manufacturer's production of consumer goods.<sup>152</sup>

The lack of a full mobilization to Vietnam created additional hindrances. Since the U.S. itself was not imminently threatened, it was not appropriate to create a crisis situation among industry. Since there was no crisis, Congress used its powers sparingly under the Defense Production Act of 1950, which permitted the government to direct civilian industries to manufacture those items needed for national defense in preference to civilian oriented items. In many cases, therefore, civilian industries were unwilling to undertake the manufacture of defense-oriented items at the sacrifice of interrupting their supply to a flourishing civilian market.<sup>153</sup>

There was also a "No Buy" restriction placed on the procurement of major items of equipment for temporary forces (units that were to be manned only for the duration of the Vietnam conflict) by the Office of the Secretary of Defense. These procurement restrictions actually made it necessary for certain units to borrow equipment that had been purchased for other units or for reserve stocks.<sup>154</sup>

For some specialized and often high-priced items there was frequently only one source of procurement. The production facility manufacturing a particular item, in some cases, could not increase its production fast enough to meet the rapidly rising military requirements. Also, some manufacturers, due to the great expense, did not deem it feasible to expand their production facilities to meet temporarily increased sales to the government. For the same reason, new sources of supply were not easily convinced to enter into production of these items.<sup>155</sup>

### **3.3 LOGISTICS SUPPLY SYSTEM**

The concepts of integrated materiel management and the providing of common logistics services from a single source for all of the forces of the DoD evolved during the periods following World War II and the Korean conflict and were tested under wartime conditions for the first time during the Vietnam era. The integrated supply managers consisted primarily of the Defense Supply Agency (DSA) and the General Services Administration (GSA). The Service Inventory Control Points (ICPs), DSA, and GSA, shared overall responsibility for ensuring adequate supply support for the forces and each entity was responsible for the materials assigned to it. DSA was assigned inventory management responsibilities for some 1,973,000 items of supply falling within 224 Federal Supply Classes (FSCs). Although established in 1949, GSA did not commence significant supply support to the military until 1963. GSA became the inventory manager for approximately 68,500 DoD-interest items in 68 FSCs.<sup>156</sup>

The DSA functioned as a consolidated wholesaler for assigned supply items and distributed them from a depot system located within the United States. In the case of the Army and the Air Force, DSA provided direct world-wide support from their depots. Most Navy ships and overseas facilities drew their DSA support through Navy tidewater supply centers located on both coasts

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<sup>152</sup> Heiser pg 28

<sup>153</sup> Heiser page 29

<sup>154</sup> Heiser page 29

<sup>155</sup> Heiser page 29

<sup>156</sup> JLRB Monograph 8, 1970, page 10 and page 28

of the U.S. Marine Corps and obtained all DSA items for deployed Fleet Marine Force units through the Marine Corps ICP, Philadelphia, for distribution through their own supply system.<sup>157</sup>

DSA's operations included:

- management of assigned items of materiel
- procurement of common supplies and common services
- operation of a distribution system for assigned supplies in the U.S.
- provision of contract administration services in support of the military departments and other DoD components, other designated federal and state agencies, and friendly foreign governments
- logistics systems analysis and design, procedural development, and the maintenance of assigned supply and service systems
- scientific and technical documentation, including acquiring, storing, announcing, retrieving, and distributing formally recorded information
- administration and supervision of programs as directed by the Secretary of Defense<sup>158</sup>

During the Vietnam era, the DSA field organization consisted of six defense supply centers, four defense depots, four service centers, and 11 defense contract administration services regions and operated as a commodity management system.<sup>159</sup>

Defense Supply Centers were located in the eastern and mid-western area of the United States. Five of the six centers were responsible for centralized inventory control. They were the Defense Personnel Support Center, the Defense Electronics Supply Center, the Defense Industrial Supply Center, the Defense Construction Supply Center, and the Defense General Supply Center. Supply management functions such as procurement, distribution, requisition processing, inventory accountability, stock replenishment, financial accounting, reporting, billing, and collecting were all performed by these centers. The Defense Fuel Supply Center was responsible only for procurement of fuel, petroleum products, and commercial petroleum services.<sup>160</sup>

DSA Depots included the Defense Depot Mechanicsburg, Pennsylvania; Defense Depot Memphis, Tennessee; Defense Depot Ogden, Utah; and Defense Depot Tracy, California. These depots were responsible for receipt, storage, and issues of supplies as directed by the Defense Supply Center. Two other depots were the Defense Construction Supply Center and the Defense General Supply Center, which performed principal distribution depot functions in addition to DSC duties. The seventh depot was the Atlanta Army Depot, which performed principal distribution depot functions on a cross-servicing basis.<sup>161</sup>

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<sup>157</sup> JLRB Monograph 8, 1970, page 10

<sup>158</sup> JLRB Monograph 8, 1970, page 12

<sup>159</sup> JLRB Monograph 8, 1970, page 13

<sup>160</sup> JLRB Monograph 8, 1970, page 13

<sup>161</sup> JLRB Monograph 8, 1970, page 13

In addition to the principal distribution depots, there are four specialized support depots (SSD) and a number of direct supply support points. Two of the four SSDs and all of the direct supply support points belonged to the Navy. The SSDs were the Navy Supply Center, Oakland; and Supply Center, Norfolk, which stocked DSA assets that supported the fleet and overseas areas. The other two SSDs were DSA activities at the Defense Electronics Supply Center for issue of electronics items and at the Defense Personnel Support Center for handling of clothing and textiles.<sup>162</sup>

Defense Contract Administration Services (DCAS) was responsible for providing a wide variety of contract support services. The DCAS ensured compliance with contractual and Armed Services Procurement Regulation provisions regarding management, control, and disposition of government property in the possession of contractors; financial analysis and review of contractor management systems; price and cost analysis; negotiation of contract changes; determining allowable costs; and ensuring overall compliance with the terms of the contracts.<sup>163</sup>

GSA was a geographically organized management system. It was divided into a headquarters and ten regional activities. In GSA, each region generally stocked a full range of support for all activities located within its geographical area of responsibility. Designated regions also provided support to overseas areas.<sup>164</sup>

Several changes in item management responsibilities between the Services and DSA and GSA occurred during the Vietnam era. Other support programs were enlarged to provide expanded and improved support to the customers. The increasing intensity of combat activity in Southeast Asia led to greatly increased support requirements. In DSA, for example, procurements in fiscal year 1967 increased to \$6.2 billion, double the amount spent in fiscal year 1965. DSA's program of providing special management attention to supply items already in its inventory, which were identified as supporting weapons systems, was greatly expanded during the Vietnam era. The program, initiated in 1964 with 3 weapons systems (the Army's Hawk, the Navy's Polaris, and the Air Force's Minuteman, involving a total of 23,000 DSA items) experienced a continuous growth to 32 systems covering approximately 223,000 DSA items by 1970. DSA's special purchase mission originally provided overseas support to Army and Air Force activities. It excluded the Pacific Air Force for decentralized, non-stocked, and non-catalogued items but was extended to include the Pacific Air Force activities in January of 1967.<sup>165</sup> In 1967, 68 Federal Supply Classes comprising a total of some 68,000 items with an inventory value of \$120 million were transferred to GSA from DoD, the Services, and DSA during the Vietnam era.<sup>166</sup>

Materials moved to Vietnam from various ports and air bases. The one Western Pacific Naval Base on U.S. Territory was at Guam. Guam housed the Naval Ship Repair Facility, Naval Supply Depot, Naval Magazine, and Naval Station. Guam was centrally located with regard to operations throughout the Western Pacific.<sup>167</sup> In Guam, the Navy was responsible for handling

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<sup>162</sup> JLRB Monograph 8, 1970, page 13

<sup>163</sup> JLRB Monograph 8, 1970 page 13

<sup>164</sup> JLRB 1970 Monograph 8, page 28

<sup>165</sup> JLRB 1970 Monograph 8, page 27

<sup>166</sup> JLRB 1970 Monograph 8, page 27

<sup>167</sup> Hooper page 232

all military cargoes. This included the offloading of increasingly large quantities of bombs for B-52 strikes. The bombs were then delivered by the Naval Magazine to Andersen AFB, at the other end of the island from Apra Harbor.<sup>168</sup> The naval support ships, aircraft carriers, and amphibious forces delivered the majority of supplies to Vietnam. Supplies were delivered up the Mekong delta through the “small boat navy,” the riverine warfare forces in swift boats and river patrol boats.<sup>169</sup>



*Source: Photo K-52148, NARA RG 428: General Records of the Navy, 1941-2004*

**Figure 3-4: U.S. Navy Light Cargo Ship Unloading Supplies for Forces in the Mekong Delta at Vinh Long Harbor. 1966.**

The naval shore activities on Guam were at a low ebb in early 1965 as a result of severe personnel cuts. An earlier typhoon had destroyed or extensively damaged many of the buildings, and those were gradually being replaced.<sup>170</sup> The build-up in the Ship Repair Facility in Guam was a major effort. In the spring of 1965 only a little over 700 personnel were on the rolls of the work force. By June 1966, 1,700 people were employed with an additional 300 being recruited.<sup>171</sup>

The construction items for the Seabees were assembled and shipped from the Naval Construction Battalion Center, Port Hueneme, California. Generally, all other portions of the Advanced Base

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<sup>168</sup> Hooper page 79

<sup>169</sup> Gruenwald, 2015, page 63

<sup>170</sup> Hooper page 232

<sup>171</sup> Hooper page 237

Functional Components were assembled and shipped from the Naval Supply Center, Oakland, California.<sup>172</sup>

All of the bulk fuel for the Army, Navy, Air Force, and Marines delivered to Vietnam, Thailand, and other Western Pacific bases was transported by ocean tanker. Demands for such fuel was substantial. In Vietnam alone, requirements went from less than 3 million barrels in 1964, to over 8 million in 1965, to 25 million in 1966, to 38 million in 1967, and would increase further.<sup>173</sup>

The Air Force was instrumental in airlifting troops and supplies for the armed forces to Southeast Asia. The Military Airlift Command (MAC) trained, equipped, and operated global airlift forces during the Vietnam War as well as operated bases and air routes while also maintaining airlift command and control systems. Airlift responsibilities were shared between the 21<sup>st</sup> Air Force at McGuire AFB, New Jersey and the 22<sup>nd</sup> Air Force at Travis AFB, California. Other specialized airlift functions were executed by the 89<sup>th</sup> Military Airlift Wing, Special Missions, Andrews AFB, Maryland; the 443<sup>rd</sup> Military Airlift Wing, Training, Tinker AFB, Oklahoma; and the 1405<sup>th</sup> Aeromedical Transport Wing, Scott AFB, Illinois.<sup>174</sup>

By 1967, MAC was airlifting personnel and materiel directly to Southeast Asia from seven bases in the United States. Passengers and cargo were shipped from Travis AFB, Norton AFB, McChord AFB, and McGuire AFB. Flights that only carried cargo left from Dover AFB, Charleston AFB, and Kelly AFB.<sup>175</sup>

The Air Force also had airbases outside of Vietnam mainly in Thailand, Japan, Guam, and Hawaii. Thailand airbases in U-Tapao and Issan played a major role in the supply chain. These bases were within minute's airtime of Vietnam flying either over Cambodia or Laos.<sup>176</sup>

### 3.4 LOGISTIC PERSONNEL TRAINING

A training base for military personnel was almost nonexistent in the Continental U.S. as depots and post, camp, inventory control points, and station storage areas were largely civilianized. During peacetime, emphasis was, in some cases, placed on the maintenance of combat and combat support forces without adequate combat service support units and trained technical personnel. Consequently, when contingency operations were undertaken and the Reserves were not called up, serious deficiencies in logistic units and trained logistic personnel occurred. Additional necessary support existed only in reserve units, and this war was fought without full mobilization or call-up of Reserves. There was a need to enhance readiness for the Vietnam conflict without reliance on national mobilization or call up of Reserves to conduct logistic operations.<sup>177</sup> Limitations of active logistic forces, particularly in the Army, resulted in the assignment of additional logistic responsibilities to the Navy within Vietnam.<sup>178</sup>

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<sup>172</sup> Hooper page 78

<sup>173</sup> Hooper page 255

<sup>174</sup> ERDC/CERL TR-14-7, page 164

<sup>175</sup> ERDC/CERL TR-14-7, page 165

<sup>176</sup> Gruenwald, 2015, pp. 63

<sup>177</sup> Heiser page 34

<sup>178</sup> Hooper page 7

Attrition was another factor. During the period 30 June 1965 through 30 June 1967, a total of 1,057,900 personnel entered the Army. Of the total gains, 977,000 were new accessions with no prior military experience (616,600 draftees; 360,400 first time enlistees). Another 80,900 were procured from other sources such as re-enlistees within 90 days of discharge. While the Army's total strength was expanding by almost 50%, its monthly loss of trained personnel averaged over 24,000. These losses denied the Army the use of immediately available trained skills, and required that over one million men and women be brought on duty to achieve an increase in overall strength of 474,000. Replacing skilled individuals with personnel of like skills was a serious problem. In many cases, support personnel assigned to Vietnam did not have the essential experience in areas such as depot operations, maintenance, and supply management. There was a shortage of junior officers and senior non-commissioned officers who had the logistics experience necessary to supervise "across the board" logistics for brigade-size tactical units in isolated locations.<sup>179</sup>

Logistic support units deployed to Vietnam were also deficient in unit training. With reorganization from the technical service concept to the Combat Service to the Army concept, functional training of units was decentralized in the Continental Army Command to post, camp and station level. There were no Quartermaster, Ordnance, or other titular heads looking after the training of their units. This condition fostered a haphazard incorporation of current doctrine and procedures in training which was already decentralized. A program was initiated at Atlanta Army Depot to provide on-the-job training in depot operations for selected enlisted personnel en route to U.S. Army Vietnam and from 1967 through 1970, 4,619 enlisted personnel received this training.<sup>180</sup>

Other special training programs were established to provide orientation and training for selected officer personnel at the Defense Supply Agency Depot at Richmond and at the U.S. Army Electronics Command, Fort Monmouth, New Jersey. Beginning in June 1968, the 1<sup>st</sup> LOG initiated some fairly extensive training courses in South Vietnam. Project SKILLS was introduced to provide orientation, indoctrination, specialist training, and on-the-job training on a recurring basis at all levels of command. This program was designed not only to help get a job done, but also to contribute to the self-sufficiency of the Republic of Vietnam in the future. The trained personnel shortage was also alleviated somewhat by the arrival in-country of Program Six units. These were force packages consisting of Army, Reserves, and National Guard personnel combined by Department of Army that contained many highly-educated troops who possessed critical skills.<sup>181</sup>

According to the Marine Corps, one of the most neglected areas in any training program was that of training Marines in field logistic procedures. Unit leaders needed to practice making ammunition, food, water, and casualty reports after an attack. They also needed to practice salvage evacuation and casualty evacuation techniques in training so that they could perform these tasks in combat.

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<sup>179</sup> Heiser page 30 - 32

<sup>180</sup> Heiser page 32

<sup>181</sup> Heiser page 32



Source: NARA, Record Group 127: Records of the U.S. Marine Corps

**Figure 3-5: Marines of Supply Battalion, 1st Force Service Regiment, Force Logistics Command, Explains Procedures for Repair of M-16 at the M-16 Plant. 1966.**

The Quantico training manual states “training must be realistic and cover the entire scope of field operations; training without practice infield logistic procedures is neither realistic nor broad in scope. It is, in fact, fantasy.”<sup>182</sup>

Marine Corps Base Quantico taught logistics support in the assault phase in two broad areas: the first during the ship-to-shore movement and the second during operations ashore. The ship-to-shore movement is that part of the assault phase of an amphibious operation during which troops and their equipment are deployed from assault shipping by means of helicopter, landing craft, or amphibian vehicles to designated areas ashore. The movement of combat service support elements from ships to the landing beaches or landing zones in support of the combat units closely follows combat elements. The buildup of logistic facilities ashore proceeds as rapidly as the tactical situation permits.<sup>183</sup>

The Property Disposal Operation was another function of logistics and it was a function of Military Assistance Command, Vietnam until 1 February 1966. It was then passed to U.S. Army Vietnam, and in turn to the 1<sup>st</sup> LOG. During the early years, property disposal operations were also hampered by the lack of trained military personnel. Traditionally, property disposal

<sup>182</sup> Quantico 1968 chapter 22 page 2

<sup>183</sup> Quantico 1968, Chapter 21 page 1-3

operations only generate high interest at or near the end of armed conflicts; during other periods, it was usually assigned a low priority.<sup>184</sup> Materials left behind at the end of the war included:

- 550 light and medium tanks
- 1,200 armored personnel carriers
- 80 small ships and landing craft
- 1,000 aircraft including 200 fighters and ground attacks aircraft
- 100 transport aircraft and 500 helicopters<sup>185</sup>

In 1968, actions were taken to overcome the personnel shortages. Additionally, resident and nonresident courses were established by the U.S. Army Logistics Management Center at Fort Lee, Virginia for property disposal personnel. Resident courses consisted of the Defense Advanced Disposal Management Seminar, Defense Disposal Executive Development Seminar, and the Defense Disposal Management Seminar. The Quartermaster School conducted special property disposal courses for officers, enlisted men, and civilian employees assigned to the property disposal program. Personnel assigned to the disposal operation in Vietnam in 1966 and 1970 are compared in Table 3-1.

**Table 3-1. Personnel assigned to the Property Disposal Operation in 1966 and 1970.**

Category	1966	1970
Officers and Warrant Officers	3	35
Enlisted Men	16	577
Department of the Army Civilians	3	15
Local Nationals	126	267
Total	148	894

Source: Heiser page 209

### 3.5 LOGISTICS INSTALLATIONS

Most cargo traveled to Vietnam by sea through the military sea transport service, which also transported personnel, although most personnel traveled by air. Materiel was shipped from vendors or depots directly to U.S. West Coast military ports or airfields, or from commercial ports. From there it either traveled directly to South Vietnam or to Okinawa.<sup>186</sup>

The following sections provide brief descriptions of some of the major logistics installations for production, storage and supply, and training. Other military installations may have similar missions but did not support the war directly, and at other installations, logistics units may have been stationed to perform these missions. These sections do not include all installations involved in the Vietnam War effort.

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<sup>184</sup> Heiser page 209

<sup>185</sup> <http://www.103fieldbatteryraa.net/documents/74.html> 61

<sup>186</sup> ERDC Page 100

### 3.5.1 CLOSED INSTALLATIONS

**Burlington Army Ammunition Plant, New Jersey** – The plant began producing mortar shells for the Vietnam War early in 1967 and was located near the Burlington Bristol Bridge over the Delaware River. The facility covered 80 acres and included 46 buildings. The production line closed in 1973.<sup>187</sup>

**Joliet Army Ammunition Plant, Illinois** – The Joliet Army Ammunition Plant, prior to the Vietnam War, was known as the Joliet Arsenal, was a U.S. Army arsenal located in Will County, south of Joliet, Illinois. Opened in 1940 during World War II, the facility consisted of the Elwood Ordnance Plant and the Kankakee Ordnance Works. The Elwood unit of the plant was reopened in 1966 and produced artillery rounds, supplementary charge assemblies and cluster bomb units. The major plant operations closed shortly after the end of the war in the late 1970s.<sup>188</sup>

**Sunflower Army Ammunition Plant, Kansas** – Established in 1941 on 10,747 acres, this plant was the world's largest smokeless powder plant. It was owned by the U.S. government and operated by a contractor. Following World War II, the plant was placed on standby and the government took over maintenance and security. The name of the plant was changed from the Sunflower Ordnance Works to Sunflower Army Ammunition Plant on 1 August 1963. Two years later, on 20 August 1965, the plant was reactivated to aid the Vietnam War by producing in excess of 145 million pounds of propellants. A major facility modernization program was started in August 1967. The facility went into standby again in 1971. Early in 1998, the plant was declared excess.<sup>189</sup>

**Umatilla Army Depot, Oregon** – During the Vietnam War, conventional ammunition weapons were shipped from the Umatilla Army Depot. The depot was closed as a depot in 1996.<sup>190</sup>

**Indian Island Naval Ammunition Depot, Washington** - In 1940, the navy acquired 2,716-acre Indian Island in Jefferson County for use as an ammunition depot. Construction started on November 16, 1940, and was completed in eight months. The facility stored and delivered ammunition to ships during World War II. Today Naval Magazine Indian Island provides ordnance support to the Pacific Fleet and joint services and is a secure and highly restricted military installation.

**Naval Magazine/Naval Ammunition Depot, Bangor, Washington** - In July 1944 the Navy acquired 6,500 acres of land near Bangor, on the eastern shore of Hood Canal. Construction began work on a naval magazine to store and provide ammunition to warships coming to the Puget Sound Navy Yard. The construction included a pier, 39 ammunition magazines, nine storehouses, and barracks. Operations begin in January 1945. An additional 68 magazines were built during its first year in operation, and a second pier, storage sheds, and three 250-man

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<sup>187</sup> New York Times Jan. 27, 1973 no pg

<sup>188</sup> [https://en.wikipedia.org/wiki/Joliet\\_Army\\_Ammunition\\_Plant#Vietnam\\_War](https://en.wikipedia.org/wiki/Joliet_Army_Ammunition_Plant#Vietnam_War), accessed 15 April, 2017

<sup>189</sup> [https://en.wikipedia.org/wiki/Sunflower\\_Army\\_Ammunition\\_Plant](https://en.wikipedia.org/wiki/Sunflower_Army_Ammunition_Plant)

<sup>190</sup> Umatilla Army Depot, Susan Badger Doyle, no pg.

barracks were added. The Bangor ammunition depot was in use until 1973, when it was converted to a submarine base.<sup>191</sup>

**Naval Supply Center, California** – The Naval Supply Depot in Oakland, California opened on 15 December 1941, and quickly began a decades-long expansion. In the late 1940s, it was renamed Naval Supply Center, Oakland; later it was renamed Fleet and Industrial Supply Center, Oakland. During the Cold War, it was one of the Navy's most important supply facilities. The Center was closed in 1998.<sup>192</sup>

**Norton AFB, California** – A change of mission in 1966 from Air Force Logistics Command to MAC resulted in Norton AFB becoming one of six MAC strategic-airlift bases, supporting U.S. Army and Marine Corps' airlift requirements among other functions. A new MAC passenger terminal was built to replace the World War II era (1944) facility to better handle passenger traffic, primarily to and from Southeast Asia. The new airline-style building was activated in 1968. Norton was placed on the DoD's base closure list in 1989.<sup>193</sup>

**Fort Monmouth, New Jersey** – The installation gained permanent status in 1925. Fort Monmouth served as the home of the Signal Corps Laboratories and later the Signal Corps Center, consolidating several Signal Corps functions at Fort Monmouth. The Electronics Command (ECOM) was established at Fort Monmouth in 1962 and managed signal research, development and logistics support. ECOM was became the Communications-Electronics Command (CECOM), effective 1 May 1981. In 2005, BRAC ordered the closure of Fort Monmouth and the relocation of CECOM to APG, Maryland.<sup>194</sup>

**Sacramento Army Depot, California** – Sacramento Army Depot was a high-tech facility responsible for the support of numerous DoD Weapon Systems, Army Material Systems and other associated Communication-Electronics end items. During World War II, the mission was to consolidate, pack, and ship all war supplies to Army installations across the West Coast and to the Pacific theater. The new depot cost the government six million dollars to build. It comprised four massive storage warehouses, one especially constructed to also serve as the Supply Headquarters, and the Administration Building. The additional work load created by the Korean War required building four more warehouses, enlisted barracks, and the Maintenance Building. At the height of Depot operations during Vietnam in 1968, the Depot had a work force of 4,000. The repair of night vision equipment for Vietnam began to blossom in 1964-5 resulting in a new mission for the Depot, one that would take it into a state of the art Depot and require expansion of buildings. The BRAC 1991 closed the Sacramento Army Depot industrial area.

**Navy Supply Corps School, Georgia** – Navy Supply Corps School occupied a 58-acre campus. The site had been used as a school since the 1860s. During World War II, from 1942 to 1944, the facilities were leased to the U.S. Army. After the war, the University of Georgia occupied the facilities until the U.S. Navy purchased the buildings and grounds in 1953. In 2005 the federal government announced its decision to close the navy school. Five years later, on 29 October

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<sup>191</sup> <http://www.historylink.org/File/10175> ; Naval Submarine Base Bangor

<sup>192</sup> Naval Supply Center, Oakland <https://topics.revolvy.com/topic/Naval%20Supply%20Center,%20Oakland>

<sup>193</sup> Norton Air Force Base [https://en.wikipedia.org/wiki/Norton\\_Air\\_Force\\_Base#Logistics\\_Depot](https://en.wikipedia.org/wiki/Norton_Air_Force_Base#Logistics_Depot)

<sup>194</sup> <http://www.fortmonmouthnj.com/about-us/history/> accessed April 15, 2017

2010, the last class of students graduated from Navy Supply Corps School in Athens. The school relocated to Newport, Rhode Island, the following December. The deed to the NSCS grounds in Athens was transferred to the University of Georgia on 19 October 2010.<sup>195</sup>

**Fort Ord, California** – From 1947 to 1975, Fort Ord was a basic training center; however, during the 1960s, some soldiers received technical training in logistics, communications, and mechanics. The fort was closed in September 1994.<sup>196</sup>

### 3.5.2 PRODUCTION FACILITIES

**Aberdeen Proving Ground, Maryland** – APG is one of the oldest active military weapons testing and training areas in the U.S, APG was established in 1917 to be the new site for U.S. Army Ordnance Testing. At the time, the nearest proving ground (Sandy Hook at Fort Hancock, New Jersey) was no longer able to conduct major munitions research because it was too close to the New York suburbs, making expansion for munitions testing impossible. Facilities were built, and the proof-testing of field artillery weapons, ammunition, trench mortars, air defense guns, and railway artillery were conducted. After only a few years an ordnance training school and developmental testing of small arms was added to the mission. In the 1920s, much of the research was in developmental testing of powders, projectiles, bombs, and interior and exterior ballistics. In the 1930's, new activities were assigned to APG as a result of President Roosevelt's authorization of 2 million dollars for construction and expansion. In the buildup to World War II, even more land was acquired, and the Ordnance Museum, Ordnance Specialist School, and ballistic research lab were established at APG.<sup>197</sup> Additional information is provided in Appendix B.

**Picatinny Arsenal, New Jersey** – Picatinny Arsenal was established on 6 September 1880 as the Dover Powder Depot. Its initial purpose was the storage of powder, projectiles, and explosives, both for reserve supply and for issue, and to prepare and issue of these stores. The new depot became Picatinny Powder Depot on 10 September 1880 with construction beginning six days later (Panamerican Consultants, Inc., page 3-11). Picatinny Arsenal went into production mode during the Vietnam War until industry could be refit to resume that role. Picatinny Arsenal worked on new types of ammunition for specialty guns, developed and engineered a new weapon system, and was involved in the study of the placement of mines and the revision of mine-warfare doctrine. The arsenal also developed and engineered a new weapon system for use in Vietnam called Beehive ammunition. Beehive ammunition, produced in varying calibers, dispersed great numbers of tiny, lethal steel darts. This type of ammunition was



Source: <https://www.pinterest.com/pin/564849978234775217/>

**Figure 3-6: Picatinny Arsenal.**

<sup>195</sup> Gist, Andy. 08 June 2017. No pg

<sup>196</sup> Training to Fight page 114

<sup>197</sup> <http://aberdeenprovinggroundhousing.com/template.php?name=pages&title=169>. Accessed May 2017

particularly useful in Vietnam since it lent itself to use against troops in frontal mass assault as well as those entrenched behind the cover of heavy jungle.<sup>198</sup>

**Redstone Arsenal, Alabama** – Many weapons advancements occurred at the Redstone Arsenal during the Vietnam War. In October 1965, U.S. Army Materiel Command established a new Rocket Propulsion Technology and Management Center at U.S. Army Missile Command (MICOM) to support Army-wide research and development of missile and rocket propulsion systems. Two Strategic Army Corps Basic HAWK (medium range, surface-to-air guided missile) battalions were deployed, marking the first surface-to-air missile system to be placed at the front in the Vietnam War. The HAWK batteries were never fired in combat during this conflict, but their radars were used in air defense surveillance. The laser guided bomb was successfully demonstrated in 1966, and then developed for combat use in the air war over North Vietnam. The laser guided weapon initiated by the Army saw its first combat as a "smart" bomb for the Air Force. The first MICOM managed M22 subsystems were deployed to Vietnam for use by the 1<sup>st</sup> Cavalry Division. The M22 Armament Subsystem, the U.S. designation for the French built SS-11B (the aircraft armament subsystem modification of the SS-11), was successfully used on 9 October 1966 during the campaign to pacify the Binh Dinh Province. Additional M22 deployments to Vietnam were made in 1967 and 1972.<sup>199</sup>

In February 1968, the MICOM Research and Development Directorate began to reverse engineer a Rocket-Propelled Grenade-7 (RPG-7), a Russian made antitank weapon system captured in Vietnam. The first airborne TOWs (anti-tank missile system) arrived in Vietnam on 24 April 1972. The TOW missile system in its airborne configuration became the first American-made guided missile to be fired by U.S. soldiers in combat. The airborne TOW served in Vietnam until 1973.<sup>200</sup>

In January 1966, a life-size model of a Viet Cong village was built on Redstone Arsenal as part of a new training program at U.S. Army Missile and Munitions Center and School for personnel headed for duty in Vietnam. In addition to the tunnels, huts, shelters, and living facilities found in a real Vietnamese community, booby traps, mines, bamboo spikes, and other war devices unique to the Viet Cong made the training more realistic. In April, MICOM's mission was expanded to include operation of the Army Propulsion Technology and Management Center at RSA, which provided centralized monitoring of all Army missile and rocket propulsion research and development programs.

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<sup>198</sup> Panamerican Consultants, Inc. page 3-30

<sup>199</sup> "Installation History" information comes from the U.S. Army Aviation and Missile Command History Office located on Redstone Arsenal. There isn't one singular author, Redstone Arsenal Historians Dr. Kaylene Hughes and Mike Baker are contributors.

<sup>200</sup> Redstone Arsenal



Source: <http://history.redstone.army.mil/photos-buildings.html>

**Figure 3-7: Redstone Arsenal.**

**Dugway Proving Ground, Utah** – During the early months of American involvement in World War II, the U.S. War Department began to intensify research in chemical warfare defense. In 1942 the U.S. Army selected a spot in Tooele County some 85 miles southwest of Salt Lake City. The construction of Dugway Proving Ground began in the spring of 1942. Almost immediately workers began testing chemical weapons to be used against wartime enemies.

With the end of World War II the Army began to deactivate Dugway Proving Ground, but the Korean War led to the resumption of testing in the summer of 1950. Renovation and new construction continued into the 1960s. The continued involvement of the United States in the Vietnam War created a gradual increase in the country's budget for chemical and biological weapons development. The United States explored the possibility of creating more "humane" chemicals that would remove or greatly decrease the necessity to kill. During the 1960s, outdoor chemical and biological test ranges as well as indoor laboratories were used at Dugway Proving Ground, Utah (Panamerican Consultants, Inc. page 3-29). On 6 March 1968, 6,400 sheep were found dead after grazing in south Skull Valley, an area just outside Dugway's boundaries. When examined, the sheep were found to have been poisoned by a deadly nerve agent called VX. The federal government renounced the use of biological weapons and banned open-air testing of all chemical and biological agents. President Nixon's 1969 and 1970 policy statements limited the U.S. to a defensive stance regarding biological warfare.<sup>201</sup>

**Lake City Army Ammunition Plant, Missouri** – Lake City Army Ammunition Plant (LCAAP) is a U.S. government-owned, contractor-operated facility in northeastern Independence, Missouri, that was established by Remington Arms in 1941 to manufacture and test small caliber ammunition for the U.S. Army. The facility has remained in continuous operation except for one 5-year period following World War II. In addition, Lake City performs small caliber ammunition stockpile reliability testing and has ammunition and weapon testing. Remington Arms operated

<sup>201</sup> Ison, 1995

the plant from its inception until 1985. LCAAP is the single largest producer of small arms ammunition for the U.S. Armed Forces. LCAAP is sited on 3,935 acres with 458 buildings, 40 igloos and storage capacity of 707,000 square feet.<sup>202</sup>

**Rock Island Arsenal, Illinois** – Rock Island Arsenal is an active U.S. Army facility located on a 946-acre island in the Mississippi River. An Act of Congress established Rock Island Arsenal in 1862. In 1962, the tool and equipment distribution mission was transferred from Rossford Army Depot, Ohio. The arsenal was now responsible for stocking and fielding 65,000 different items, including hand tools, band saws, and grinding machines. During the Vietnam War, the M102 105mm lightweight howitzer was developed and produced at Rock Island Arsenal. Made primarily from aluminum, they were transportable by helicopter. An airmobile firing platform was also designed and produced for the M102 howitzer. One of the unique projects at the arsenal was the modification of the M151A1 jeep. More than 3,000 were fitted for a 106mm recoilless rifle in 1965 and 1966. The jeep was also modified as the M718 ambulance. In 1967, the small arms mission was transferred from Springfield Armory, Massachusetts. The arsenal was now responsible for product engineering, research and development, and manufacturing support of small arms.<sup>203</sup>

### **3.5.3 DEPOTS, STORAGE, AND SUPPLY BASES**

**Letterkenny Army Depot, Pennsylvania** – In 1941, the War Department laid plans for 12 large, new Ordnance Depots to control the oncoming deluge of war materiel. Letterkenny Township was chosen because it was a safe, yet convenient distance from the eastern seaboard and Washington, D.C. with land well suited for ammunition storage. It had good rail facilities, nearby power and water, and manpower. The mission was to reduce the surplus of forthcoming war materiel and to store and ship ammunition, trucks, parts and other supplies. Construction began immediately with 798 underground igloos, 12 above-ground magazines and 17 warehouses. Later, in 1956, an additional 104 igloos were constructed bringing the total to 902. At the beginning, a large number of buildings were remodeled farmhouses, barns and chicken houses. Letterkenny Ordnance Depot was renamed Letterkenny Army Depot in August 1962, and command and control of the Depot fell under the U.S. Army Materiel Command. During the war in Vietnam there was an increase in missions and workload. Materiel beyond normal requirements was funneled through the supply system to the troops. The 1960s also brought automation to the Depot. During this time, construction to update many of the buildings and facilities was underway. In 1964, the 28<sup>th</sup> Ordnance Detachment relocated to Letterkenny from Fort Meade, Maryland to dispose of explosive ordnance items such as bombs, shells, rockets, and guided missiles in



Source: *militarybases.com*

**Figure 3-8: Letterkenny Army Depot.**

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<sup>202</sup> <http://www.globalsecurity.org/military/facility/aap-lakecity.htm>

<sup>203</sup> <https://www.usagria.army.mil/about/history.aspx>

addition to assisting police in the disposal of explosives and war souvenirs.<sup>204</sup>

**Naval Base San Diego, California** – At the end of World War I, the Navy was exploring a small tract of land to establish a west coast ship repair facility. During its first years in commission, the base grew rapidly as repair facilities expanded, torpedo and radio schools were established, and more shops were constructed. The base then expanded heavily during World War II and by 1942, the Navy had added expanded fleet training schools, and an amphibious force training unit. After World War II, base operations were again reorganized, with a post-war mission to provide logistical support (including repair and dry-docking) to ships of the active fleet. On 15 September 1946, the Secretary of the Navy re-designated the repair base Naval Station San Diego. By the end of 1946 the Base had grown to 294 buildings with floor space square footage of more than 6.9 million square feet, berthing facilities included five piers of more than 18,000 linear feet of berthing space. Land then totaled more than 921 acres (659 land) and 16 miles of roads. Barracks could accommodate 380 officers and 18,000 enlisted men. More than 3,500 Sailors could be fed in the galley at a single sitting on the base. During the Korean War, the Naval Station was expanded further, to more than 1,108 acres, with a regular workforce of 14,000. During the ensuing years, operations at the base expanded and contracted, as world events dictated, though the mission remained basically the same through the Vietnam War and into the 1980s.<sup>205</sup>

**Naval Supply Depot Guam** – In the final phase of World War II in the Pacific theater, and in less than a year of construction, the U.S. Navy built its largest advanced base on Guam, which supplied material support for more than one-third of U.S. Navy power. The Naval Supply Depot occupied 6,384 acres. Supply facilities developed within the year included 451 Quonset huts providing 1,804,000 square feet of covered storage space; transit sheds totaling 509,100 square feet where incoming and outgoing stores were sorted; and more than 200 large storage tanks for gasoline, fuel oil, and diesel oil with a total capacity exceeding 1,000,000 barrels. At the peak of its operation, the depot's complement included approximately 300 officers and 8,000 enlisted men. In December 1951, the Aviation Supply Annex at Naval Supply Depot was established with the mission to provide aviation supply support for western Pacific Ocean bases south of Japan. By the end of the Korean War, the Navy Supply Depot stored between 21,000 to 30,000 measurement tons monthly (one measurement ton = 40 ft<sup>3</sup> [cubic feet]), with the U.S. Air Force accounting for approximately 23% of the stored materials. The depot stocked 83,000 items valued at \$24,600,000. The U.S. Naval Magazine, Guam, providing munitions for the Seventh Fleet, was the westernmost ammunition supply point on U.S. soil.<sup>206</sup> Due to the increased U.S. commitments to Vietnam, the tug base of the Guam naval station experienced increased workload and personnel work hours making 13 to 15 ship moves per day and are now operating more than 500 hours per month. A ship loaded with cargo vital to support the Vietnam effort required the tugs to float it safely to the pier. The 605<sup>th</sup> AirLift Squadron of the Military Airlift Command provided support for the movement of transpacific cargo and passenger aircraft. During 1967, the 605<sup>th</sup> processed a total of 10,670 aircraft transiting Andersen AFB, an average of 889 aircraft per month and a 24-hour average of 30 aircraft carrying 30,000 passengers and 1,468 tons of cargo per month. The number of casualties arriving from Vietnam also increased

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<sup>204</sup> History of Letterkenny, <http://www.letterkenny.army.mil/history.html>, accessed April 12, 2017

<sup>205</sup> Eland, James, no pg.

<sup>206</sup> Aaron, page 4-5

from an average of 225 to 250 per month to 325 to 350 per month, with a peak of 407 during February 1968.<sup>207</sup>



Source: flickr.com

**Figure 3-9: Naval Weapons Station Seal Beach.**

**Marine Corps Logistics Base, Barstow, California** – The primary logistics support installations in the United States were the two Marine Corps Logistics Bases (MCLBs), one at Barstow, California and one at Albany, Georgia. These MCLBs were responsible for supplying Marine forces both in and outside the United States. The Barstow Base originally began in 1942 as a Marine Corps supply depot to support the Fleet Marine Forces in the Pacific. In addition to that supply role, the Base became the home of the Depot Maintenance Activity in 1961, with the Base then becoming responsible for rebuilding and repairing ground-combat and combat-support equipment as well as supporting installations west of the Mississippi River and in the Pacific.<sup>208</sup>

The Base received the Meritorious Unit Citation for its work during the war in Southeast Asia from 1 April 1965 to December 1970. Over 70% of the supplies shipped to Marines in Vietnam and the Third Force Service regiment on Okinawa were provided by the Center. It functioned

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<sup>207</sup> Aaron, page 4-13

<sup>208</sup> California State Military Museum, "Historic California Posts: Marine Corps Logistics Base, Barstow," accessed online: <http://www.militarymuseum.org/MCLBB.html>

efficiently during the buildup, combat, and withdrawal phase of Marine Corps participation in that war.<sup>209</sup>



Source: <http://www.cobases.com/california/marine-corps-logistics-base-mclb-barstow/>

**Figure 3-10: Marine Corps Logistics Base, Barstow.**

**Red River Army Depot, Texas** – The Red River Army Depot was established in 1941 as an ammunition storage facility. By 1943, the depot's mission had expanded to include general supply storage, tank repair, and an ordnance training center. The ordnance training center trained thousands of ordnance soldiers before finally closing in 1955. Red River Army Depot continued its general supply storage and tank repair missions through the Korean War, Vietnam War, Operation Desert Storm, and Operation Enduring/Iraqi Freedom. In 1956, the Army Materiel Command established the Army Logistics Leadership Center at the depot. In 1962, it became the Supply Management Intern Training Center. The training center was closed in 2012 (Brown 2012). Red River Army Depot has been impacted by numerous Base Realignment and Closure (BRAC) Rounds (1988, 1995, and 2005; all realignment actions). The Depot's primary mission is the maintenance and repair of all Tactical Wheeled Vehicles.<sup>210</sup>

**Naval Weapons Station Seal Beach, California** – Naval Weapons Station Seal Beach was commissioned in 1944 as the Naval Ammunition and Net Depot. It is located within the city of Seal Beach, California in northwest Orange County about six miles southeast of Long Beach and 25 miles southeast of Los Angeles. Naval Weapons Station Seal Beach is the major Southern California ammunition storage and distribution point for the Pacific Fleet.<sup>211</sup> Naval Weapons Station Seal Beach occupies 5,256 acres, has 230 buildings and 128 ammunition magazines providing 589,299 feet<sup>2</sup> of ammunition storage space. Ammunition is moved from storage to the docks on 56 miles of railroad line and 80 miles of road. The base owns 130 pieces of railroad

<sup>209</sup> Marine Corps Logistics Base, Barstow by GlobalSecurity.org accessed <http://www.militarymuseum.org/MCLBB.html>

<sup>210</sup> ACSIM 2015

<sup>211</sup> Seal Beach Naval Weapons Station, Seal Beach, California. [http://www.globalsecurity.org/military/facility/seal\\_beach.htm](http://www.globalsecurity.org/military/facility/seal_beach.htm)

rolling stock and 230 trucks and trailers to move the ammunition which is loaded onto ships using six mobile cranes that can lift up to 90 tons.<sup>212</sup>

**Travis Air Force Base, California** – Travis AFB became the primary West Coast aerial port for troops and supplies heading west to support the war and for those returning to the United States. Between 1965 and 1975, Travis AFB would remain the DoD’s busiest military port. Travis AFB would provide facilities for virtually every aspect related to military airlift during conflict, including aircraft and associated maintenance structures, storage for all types of supplies in warehouses and in open areas, refueling operations, passenger facilities, cargo-handling capabilities, and the associated administrative offices. The refueling operations included support for moving fighter aircraft and B-52 bombers to the conflict zone. There was a constant daily flow of personnel and materiel from Travis AFB to Southeast Asia. Between 1966 and 1970, over 5,579,000 passengers and 1,097,924 tons of cargo were processed at Travis AFB.<sup>213</sup>

The passenger flight terminal at Travis AFB was built in 1946, but it was heavily utilized during the Vietnam War. Military personnel both deploying to South Vietnam and returning to the United States made use of the facility. A 20,000 square-foot addition was constructed in 1967, and the administrative and passenger check-in areas were remodeled that same year. A cafeteria was opened in the terminal in 1968, and a base exchange was opened across the corridor in 1970.<sup>214</sup> Also constructed were a fuel system maintenance dock, C-5 maintenance dock, and C-5 hangar in 1969; an air freight terminal in 1972; and a C-5 maintenance shop in 1973.<sup>215</sup>



*Source: Yelp.com*

**Figure 3-11: Travis AFB Terminal.**

**McChord Air Force Base, Washington** – On 1 January 1965, the 62<sup>nd</sup> Air Transport Wing (Heavy) was one of the largest wings in Military Air Transport Service (MATs). With the increasing commitments in the ever-growing conflict in Southeast Asia, the 62<sup>nd</sup> continued to grow. On 1 January 1966, MATs became the MAC. By 8 January of the same year, the Wing became the 62<sup>nd</sup> Military Airlift Wing (MAW).<sup>216</sup> A new MAC terminal was completed in 1969.<sup>217</sup> McChord AFB was consolidated with the U.S. Army's Fort Lewis on 1 February 2010 to become part of the Joint Base Lewis-McChord complex. This initiative was driven by the BRAC Round in 2005.

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<sup>212</sup> <https://sealbeachea.com/> Naval Weapons Station Seal Beach

<sup>213</sup> ERDC/CERL TR-14-7, page 166

<sup>214</sup> Leiser, Gary 1996, page 70

<sup>215</sup> Mueller, Robert. 1989, page 555

<sup>216</sup> <http://www.mcchordairmuseum.org.htm> Our History, McChord Air Force Base 1950-1970

<sup>217</sup> Mueller, page 393

**McGuire Air Force Base, New Jersey** – Located in Burlington County, New Jersey, south-southeast of Trenton, McGuire AFB was consolidated with two adjoining U.S. Army and Navy facilities to become part of Joint Base McGuire-Dix-Lakehurst on 1 October 2009. On 1 July 1954, MATS took over jurisdiction of McGuire AFB. Through its successor organizations, MAC in 1966, the primary mission of McGuire has remained the strategic airlift of personnel and equipment worldwide. On 1 January 1966 MATS was discontinued and its assets were assigned to the new MAC. The 438<sup>th</sup> MAW completed the replacement of the prop-driven transports of MATS with the new Lockheed C-141 Starlifter, and transported military cargo, mail, and passengers worldwide and to Southeast Asia combat areas during the Vietnam War. Facilities to accommodate the C-141 were completed in 1967.<sup>218</sup>

**Dover Air Force Base, Delaware** – Dover AFB is located 2 miles southeast of the city of Dover, Delaware. On 1 April 1952, Dover AFB was transferred to the MATS and became home to 1607<sup>th</sup> Air Transport Wing (Heavy). A full function hospital was completed in 1958 and base housing was expanded to handle 1,200 families in 1961. Along with the reorganization, the 1607 ATW was discontinued and the 436<sup>th</sup> MAW activated and assumed the mission at Dover AFB. The 436<sup>th</sup> MAW started replacing C-141 Starlifters and C-133 Cargomasters with the new C-5 Galaxy in 1971.<sup>219</sup> Facilities to accommodate the C-5 were completed in 1970 (Mueller, page 112). During the Vietnam War, more than 20,000 American fatalities (soldiers) were brought back to the United States via Dover AFB. The Vietnam War fatalities comprise over 90% of all the remains processed at Dover AFB before 1988.<sup>220</sup>

**Warner Robins Air Force Base, Georgia** – Depots and other types of supply facilities managed and distributed Air Force materiel. The Warner Robins Air Materiel Area (WRAMA) at Warner Robins AFB, Georgia provided vital supply support in the Vietnam War effort. Robins played a key role in the Vietnam War (1964–73), supplying troops and materiel through the Southeast Asian Pipeline and modifying AC-119G/K and AC-130 gunships. Also playing a role were the C-141, the C-130, the C-123, and the C-124 cargo aircraft—all maintained at Robins AFB. Systems serviced and maintained at WRAMA during the Vietnam War were “the AC-130 Gunship, various helicopters, the C-141, the C-130, the C-123, and the C-124 cargo aircraft.”<sup>221</sup> Advanced technology equipment and training of personnel to repair electronic and sophisticated systems for the transport aircraft was added in 1970, and a material processing facilities was constructed in 1976.<sup>222</sup>

**Charleston Air Force Base, South Carolina** – The Charleston AFB is located in the City of North Charleston, South Carolina. The facility is under the jurisdiction of the U.S. Air Force's 628<sup>th</sup> Air Base Wing (628 ABW), a subordinate element of the Air Mobility Command. It is part of Joint Base Charleston, which combined Charleston AFB with Naval Support Activity Charleston. On 1 March 1955, Charleston AFB came under the jurisdiction and control of MATS and the 1608<sup>th</sup> Air Transport Wing (Medium) became the Base's host unit. In 1954, the Base achieved permanent status and with that declaration MATS began various facility construction

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<sup>218</sup> Mueller, page 412

<sup>219</sup> [https://en.wikipedia.org/wiki/Dover\\_Air\\_Force\\_Base](https://en.wikipedia.org/wiki/Dover_Air_Force_Base)

<sup>220</sup> Theresa Humphrey, Associated Press (1988-10-23). Retrieved 6 June 2017

<sup>221</sup> Head, William, Office of History, 1991

<sup>222</sup> Mueller, page 504

projects to further improve upon the Base's status. The 1608<sup>th</sup> received its first C-121C Constellation in September 1955. In June 1958, the 1608<sup>th</sup> received its first C-124C Globemaster aircraft. The next big change came in 1962, when the U.S. Air Force decided to retire the C-121 fleet and sent the 1608<sup>th</sup> its first replacement C-130 Hercules. Two years later, in August 1965, the wing received its first C-141 Starlifter, the newest airlifter in the U.S. Air Force inventory. But, unlike the previous aircraft changes, the arrival of this new aircraft meant a change in host units. On 8 January 1966, the 437<sup>th</sup> Military Airlift Wing took over as Charleston AFB's host unit. Although the 1608<sup>th</sup> inactivated and the 437<sup>th</sup> activated its place, it appeared that every unit with a "1608" in its name simply changed it to "437." All of the 1608<sup>th</sup>'s people, aircraft, buildings, etc. became the 437<sup>th</sup>'s.<sup>223</sup>

**Kelly Air Force Base, Texas** – For 11 years during the Vietnam War, Kelly AFB employees were deeply involved in supplying parts and expertise for the conflict in Southeast Asia, working both within the United States and overseas. In May 1965, during the build-up of American forces in Vietnam, the Logistics Command started sending teams of supply personnel to the Pacific Air Forces. Kelly AFB also sent maintenance teams to Southeast Asia. Some workers served on rapid area maintenance supply support or area transportation teams while others served as weapon system logistic officers. Those who remained in San Antonio also strove to meet the demands for materiel and aircraft maintenance.

On 1 July 1965, Kelly AFB opened as an aerial port of embarkation to provide though-plane cargo service to Southeast Asia. Kelly AFB personnel processed and routed vital war material earmarked for Vietnam to the Southeast Asian Theater. By 1967, the pace of the United States build-up intensified. The C-141 Starlifter cargo aircraft began to enter the U.S. Air Force inventory in sufficient numbers to replace the aging C-124 Globemaster. The air terminal was modernization.

On 1 November 1965, San Antonio Air Materiel Area assumed responsibility for the U.S. Air Force's entire watercraft program. This included all landing-type vessels, spares, engines, and combat ships. Other items included cargo tanks, special service vessels, barges, small craft, dredges, rigging, and marine hardware. Earlier that year, on 3 August 1965, Kelly AFB also became responsible for assembly and shipment of the necessary airfield lighting equipment to establish four semi-fixed installations in Southeast Asia. By the end of the war, the San Antonio Air Materiel Area sent over 18.3 million pounds of cargo 232 missions.<sup>224</sup> A material processing facility was constructed in 1974.<sup>225</sup>

**Tinker Air Force Base, Oklahoma** – In the 1960s, Oklahoma City Air Materiel Area (OCAMA) shifted its focus to support the Vietnam War and Tinker AFB became an inland aerial port for Southeast Asia activities. In January 1968, Tinker AFB employment reached an all-time high of 24,778 civilians and 4,404 military members assigned to OCAMA and its associate organizations. OCAMA became the Oklahoma City Air Logistics Center on 1 April 1974.<sup>226</sup>

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<sup>223</sup> [https://en.wikipedia.org/wiki/Charleston\\_Air\\_Force\\_Base#Cold\\_War](https://en.wikipedia.org/wiki/Charleston_Air_Force_Base#Cold_War)

<sup>224</sup> A Brief History of Kelly AFB, accessed on <http://proft.50megs.com/kelly.html#vietnam>

<sup>225</sup> Mueller, page 273

<sup>226</sup> Tinker AFB History. accessed <http://www.tinker.af.mil/Portals/106/Documents/history>

### 3.5.4 SCHOOLS

**Marine Corps Logistics Base, Georgia** – The MCLB in Albany Georgia is located in Southwest Georgia, approximately 3 hours South of Atlanta. The Albany base provided supply support for Marines east of the Rocky Mountains and in the Atlantic area. However, it also provided formal training to Marines in maintenance and supply sources of various types.<sup>227</sup>

**Air Force Institute of Technology at Wright-Patterson AFB, Ohio** – The Air Force Institute of Technology trained U.S. Air Force students to cope with logistical support during the Vietnam War for forces at a great distance and in a very different environment than previous wars. The Civil Engineering Center at the Base also adjusted its curriculum to handle construction problems posed by combat in Southeast Asia.<sup>228</sup> As a result, the Air Force Institute of Technology campus experienced a building boom throughout the 1960s, which gave the school a more academic, rather than military, appearance.<sup>229</sup>

**Fort Lee, Virginia** – The foremost U.S. Army school for training in logistics is the home of the Quartermaster School. Following the end of World War II, the Quartermaster School continued operation and in 1948, the first permanent brick and mortar structure, the Post Theater, was constructed. On 15 April 1950, the War Department reached the critical decision to keep Camp Lee as a permanent facility, renaming it Fort Lee. The Quartermaster School then picked up from the Infantry School at Fort Benning the “supply by sky” mission, and began training airborne riggers at Fort Lee. In June 1950, the war in Korea resulted in tens of thousands of Soldiers arriving at the Fort between 1950 and 1953 to receive logistics training.

The 1950s and 60s brought nonstop modernization efforts as temporary wooden barracks, training facilities and housing units were replaced with permanent brick and cinderblock structures. New multi-storied brick barracks were built in the mid-1950s, along with whole communities of Capehart housing. The new three-story Quartermaster School Classroom Building, Mifflin Hall, was dedicated in May 1961. Kenner Army Hospital opened in 1962, replacing the remnants of the old WWII era facility; and the privately-funded, new brick Quartermaster Museum opened its doors in 1963. The rapid logistics buildup in Vietnam after 1965 signaled an urgent need for many more Quartermaster Soldiers. For a time, the School maintained three shifts, and round-the-clock training. A Quartermaster



Source: <http://www.lee.army.mil/about/history.aspx>

**Figure 3-12: Training at Fort Lee.**

<sup>227</sup> “Marine Corps Logistics Base (MCLB), Albany,” undated <http://www.globalsecurity.org/military/facility/mclb-albany.htm>.

<sup>228</sup> Training to Fight, page 166

<sup>229</sup> Training to Fight, page 64

Officer Candidate School opened in 1966, for the first time since World War II. A mock Vietnamese “village” was created on post to familiarize trainees with guerrilla tactics and the conditions they could expect fighting in the jungles of Southeast Asia. Part of the 60s-era Quartermaster training program also saw the first widespread local use of automated data processing equipment. In 1973, the U.S. Army Logistics Center was created at Fort Lee to serve as an “integrating center” for the Quartermaster, Transportation, Ordnance, and Missile and Munitions centers and schools – the traditional combat service support branches.<sup>230</sup> See Appendix C for additional information.

**Fort Gillem, Georgia** – The Base was initially known as Atlanta Army Depot. Decades later, its name was changed to Atlanta General Depot. Its mission was to store and ship military equipment, tools and advanced machinery to problematic areas in the world. Over its history, Fort Gillem didn’t play any major roles; however, it supported all the American wars from World War I through the Vietnam War. Tens of thousands of individuals also went through training at this Base. In June 1973, it was renamed Fort Gillem and set up as a complementary Base for Fort McPherson. In 2005, it was set up for closure. Today, the Base is not closed, but inactive.<sup>231</sup>

**Red River Army Depot, Texas** – Red River Army Depot was established in 1941 to create an ammunition storage facility. By 1943, the Depot’s mission had expanded to include general supply storage, tank repair, and an ordnance training center. The ordnance training center trained thousands of ordnance soldiers before finally closing in 1955. Red River Army Depot continued its general supply storage and tank repair missions through the Korean War, Vietnam War, Operation Desert Storm, and Operation Enduring/Iraqi Freedom. Red River Army Depot currently serves as the TACOM Life Cycle Management Command Center of Industrial and Technical Excellence for tactical wheeled vehicles, the Bradley Fighting Vehicle, and Multiple Launch Rocket System. The Depot has the only DoD capability for the remanufacture of road wheel and tracked vehicle systems.

**Defense Supply Center, Virginia** – The Defense Supply Center serves as the Aviation Demand and Supply Chain manager for Defense Logistics Agency (see appendix A). It is located in Chesterfield County located south of Richmond, Virginia. The installation comprises 631 acres that was the Bellwood farm and was opened in 1942. Originally activated as the Richmond General Depot, the site was later renamed the Richmond Armed Service Forces Depot, which became the Richmond Quartermaster Depot.

In its first two decades, the mission of the Richmond Quartermaster Depot was one of traditional logistics support to the U.S. Army with emphasis on Quartermaster items. When the Military General Supply Agency was activated in 1962, it absorbed the Defense Supply Agency. This resulted in an expanded mission for the depot, which included supply management of more than 30,000 general supply items for the military services and certain civilian agencies worldwide. The installation name changed to Defense General Supply Center to match its new logistical mission. In 1977 Defense Supply Agency became Defense Logistics Agency. In 1986, depot

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<sup>230</sup> <http://www.lee.army.mil/about/history.aspx>

<sup>231</sup> <https://militarybases.com/fort-gillem-army-base-in-forest-park-ga/>

operations were separated from inventory control point functions and a separate command was established on the site: Defense Distribution Depot Richmond.

DSCR's core mission is to supply products with a direct application to aviation. These items include a mix of military-unique items supporting over 1,300 major weapons systems and other items readily available in the commercial market. They range from critical, safety-of-flight air frame structural components, bearings, and aircraft engine parts, to electric cable and electrical power products; lubricating oils; batteries; industrial gases, bearings; precision instruments; environmental products; metalworking machinery and consumable items. DSCR also operates an industrial plant equipment repair facility in Mechanicsburg, Pennsylvania.<sup>232</sup>

**Fort Eustis, Virginia** – With the United States entry into World War I in April 1917, the War Department required vast tracts of land to train its rapidly expanding Army. On 7 March 1918, the government purchased Mulberry Island for \$538,000 as a Coastal Artillery replacement training center and balloon observation school. The uninhabited land bounded by water on three sides provided an ideal impact area for artillery. The Camp laid miles of railroad track for its railway guns. In 1923 the Camp became Fort Eustis, a permanent military installation. During World War II, Fort Eustis became a training center for Anti-Aircraft Artillery in 1940. All new temporary wooden construction replaced any earlier structures.<sup>233</sup>



Source: Military.com

In 1946, the U.S. Army Transportation School relocated there to consolidate its officer, maritime, stevedore, rail and amphibious training. The school selected the Fort because it had a functioning rail line, sheltered access to the sea for a port and a beach landing training site nearby at Fort Story. This began the brick and mortar phase of permanent structures on Fort Eustis. Fort Eustis served as the home of the Transportation Corps until 2010.<sup>234</sup>

**Figure 3-13: Fort Eustis.**

Because of the new occupant, Fort Eustis acquired some structures unique to an Army installation. It already had a rail line from its World War I past. To provide berthing for the Army's watercraft fleet, the Army constructed a pier in 1947 and named the military port facility Third Port. Third Port offered the Army's navy a platform from which to deploy. To train its stevedores, the Transportation School constructed a concrete replica of a cargo vessel known as the land ship or "SS Never Sail." The functioning military port also provided a home for the Army divers of the Engineer Corps and dive school until the Army divers began training with the

<sup>232</sup> [http://military.wikia.com/wiki/Defense\\_Supply\\_Center,\\_Richmond](http://military.wikia.com/wiki/Defense_Supply_Center,_Richmond)

<sup>233</sup> <http://www.jble.af.mil/About-Us/Fort-Eustis-History/>

<sup>234</sup> <http://www.jble.af.mil/About-Us/Fort-Eustis-History/>

U.S. Navy in 1973. Third Port gave Fort Eustis its most significant characteristic making it different from any other Army fort. It was the only fort with a port.<sup>235</sup>

In 1950, the Army Transportation Corps assumed responsibility for the development of helicopters, the U.S. Army Aviation Applied Technology Directorate became another tenant on Fort Eustis. It had responsibility to design and develop the different types of Army helicopters; and in 1954, the post constructed the first airfield designed specifically for helicopters.<sup>236</sup>

Third Port and access to the sea made Fort Eustis the ideal location for the 48<sup>th</sup> Transportation Group, the Army's only port opening capability, and the railroad served to train the Army's only active duty railroad division with two rail battalions. To house them, the post constructed hammer-shaped, three-story, cinderblock barracks to replace the World War II temporary wooden barracks. The 48<sup>th</sup> Group supported annual logistics over the shore operations in the Arctic Circle and northern coast of France. Fort Eustis trained up all the railway battalions for the Korean War. After the war, the Army no longer deployed railway operating battalions and only one railway battalion, the 714<sup>th</sup> Transportation Battalion, remained on active duty at Fort Eustis until its inactivation in 1972. The majority of the 48<sup>th</sup> Group deployed to the Republic of Vietnam during that war and was subsequently replaced by the reactivated 7<sup>th</sup> Transportation Group.<sup>237</sup>

During the massive troop buildup for the Vietnam War, Fort Eustis trained up many Transportation units that deployed to Vietnam. In addition, the Transportation School activated a Transportation Corps Officer Candidate School to meet the high demand for officers. To house and train these soldiers the post erected prefabricated metal buildings adjacent to the aviation maintenance school.<sup>238</sup>

The Vietnam War saw the most diversified assortment of transportation units ever assembled. For over a decade the Transportation Corps provided continuous support for American and allied forces through an unimproved tropical environment using watercraft, amphibians, motor trucks and Transportation Corps aircraft. During the Vietnam War, it was the mission of the U.S. Army Transportation Corps to ferry supplies from the coastal ports of Qui Nhon and Cam Ranh Bay to inland bases located at Bong Son, An Khe, Pleiku, Da Lat, and Buon Ma Thuot. The logistical requirements of the MACV were huge, and 200-truck convoys were not uncommon. These formations were tempting targets for Viet Cong guerrilla groups, who often sprung ambushes in remote areas.<sup>239</sup>

After the Vietnam War, the subordinate battalions were redesignated to the previous battalions that had deployed to Vietnam but the 7<sup>th</sup> Group retained its unit designation. The Vietnam War brought about a significant change in deployments. The majority of soldiers traveled by air and

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<sup>235</sup> <http://www.jble.af.mil/About-Us/Fort-Eustis-History/>

<sup>236</sup> <http://www.jble.af.mil/About-Us/Fort-Eustis-History/>

<sup>237</sup> <http://www.jble.af.mil/About-Us/Fort-Eustis-History/>

<sup>238</sup> <http://www.jble.af.mil/About-Us/Fort-Eustis-History/>

<sup>239</sup> Killblane, 2014

the equipment by sea. Nearby Langley AFB and Third Port provided force projection platforms for both air and sea deployments.<sup>240</sup>

**Robins Air Force Base, Georgia** – In February 1948, Robins AFB was designated and received its first major tenant, the 14<sup>th</sup> Air Force. When the U.S. Air Force closed down its maintenance depots at the former Brookley AFB in Mobile, Alabama and the former Olmsted AFB in Middleton Township, Pennsylvania, Robins AFB assumed the workload of these depots. Maintenance teams from Robins AFB frequently traveled to Southeast Asia to repair severely damaged aircraft. Robins AFB eventually managed the Lockheed C-141, C-7, and the F-15 Eagle as well as modifying the C-130s to the gunship configuration.

Robins AFB played a key role in the Vietnam War (1964–73), supplying troops and materiel through the Southeast Asian Pipeline and modifying AC-119G/K and AC-130 gunships. Also playing a role were the C-141, the C-130, the C-123, and the C-124 cargo aircraft—all maintained at Robins AFB.<sup>241</sup>

**Navy War College, Newport, Rhode Island** - The complexity of sealift logistics required specialized training. Naval supply training occurred at the Navy War College at Naval Station Newport, Rhode Island. The college began planning for a new logistics course on 20 January 1947. In the early 1950s, areas of study included strategy and tactics, strategy and logistics, and command and staff. In 1953, strategy and tactics and strategy and logistics were merged into naval warfare. Each year, from 1962 – 1974, an average of 373 students began classes at the school with the highest number in 1972 at 450. Of the 4,842 students that started school during the Vietnam War, 44% were studying naval warfare. On 1 March 1974, Naval Base, Newport becomes Naval Education and Training Center.<sup>242</sup>



Source: <https://www.usnwc.edu>

**Figure 3-14: Navy War College, Newport.**

Over the years, the Naval War College has expanded greatly. The original building, the former Newport Asylum for the Poor, is now the Naval War College Museum. In 1892, Luce Hall was completed and the building housed lecture rooms and a library and the residence wings at either

<sup>240</sup> <http://www.jble.af.mil/About-Us/Fort-Eustis-History/>

<sup>241</sup> [https://en.wikipedia.org/wiki/Robins\\_Air\\_Force\\_Base#Cold\\_War](https://en.wikipedia.org/wiki/Robins_Air_Force_Base#Cold_War)

<sup>242</sup> <https://usnwc.edu/About/History/Chronology-of-Courses-and-Significant-Events/>

end for the president and faculty. Mahan Hall opened in 1904 and Pringle Hall opened in 1934. In 1947, the Navy War College acquired an existing barracks building and converted it to a secondary war gaming facility (Sims Hall). The greatest expansion occurred during the 1970s. In 1972, Spruance Hall, was completed with faculty offices and a 1,100-seat auditorium. In 1974, Conolly Hall was opened with the Navy War College Quarterdeck, Administrative and faculty offices, and numerous class and conference rooms. Hewitt Hall opened in 1976 and has a library, café, bookstore and barbershop, and student study areas and lounge.<sup>243</sup>

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<sup>243</sup> [https://en.wikipedia.org/wiki/Naval\\_War\\_College#Buildings\\_and\\_structures](https://en.wikipedia.org/wiki/Naval_War_College#Buildings_and_structures)

## 4.0 APPLICATION OF THE SUBCONTEXT IN THE IDENTIFICATION AND EVALUATION OF HISTORIC RESOURCES

This chapter presents how to apply this historic subcontext in the identification and evaluation of historic resources. The latter portion of this chapter describes the property types on U.S. military installations associated with logistics during the Vietnam War. The selection of these property types was based on research and field investigations. Field data were collected at Fort Lee, Virginia and APG, Maryland (see Appendixes B and C). The purpose of the site visits was to identify real property associated with logistics support. Additional data was acquired from installations via email, telephone calls, and previous surveys and studies.

Once resources have been identified, evaluation of a property involves two steps. First, the property will be assessed against eligibility criteria for listing on the National Register of Historic Places (National Register); then it must be assessed for its integrity. The following National Register publications are useful guides when evaluating Vietnam War special operation forces and warfare training resources:

1. How to Apply National Register Criteria for Evaluation
2. Guidelines for Completing National Register for Historic Places Forms
3. Researching a Historic Property
4. Guidelines for Evaluating and Documenting Historic Aviation Properties
5. Guidelines for Evaluating and Documenting Historic Properties that Have Achieved Significance Within the Last 50 Years

These guides maybe found at: <http://www.cr.nps.gov/nr/publications/index.htm>.

### 4.1 NATIONAL HISTORIC PRESERVATION ACT

The NHPA is the centerpiece of federal legislation protecting cultural resources. In the act, Congress states that the federal government will “provide leadership in the preservation of the prehistoric and historic resources of the United States,” including resources that are federally owned, administered, or controlled. The NHPA requires the DoD to identify its significant resources, evaluate them for National Register eligibility, and plan for the protection of the listed or eligible historic properties.

The NHPA established the National Register, which is a list of buildings, structures, objects, sites, and districts that have demonstrated significance to U.S. history, architecture, archaeology, engineering, and/or culture. The National Register is maintained by the Secretary of the Interior and is managed by the National Park Service Keeper of the Register. Regulations for listing a property on the National Register were developed by the Department of the Interior and are found in 36 *Code of Federal Regulations* (CFR) Part 60. The NHPA requires that federal agencies identify historically significant properties that are eligible for listing on the National Register.

Section 106 of the NHPA requires the federal government to take into account the effects of its actions on historic properties prior to implementation of the action. For U.S. military

installations, this requirement applies to all proposed actions on federal lands and any proposed activities that are federally supported or funded. Consultation with the state historic preservation office (SHPO) and/or the Advisory Council on Historic Preservation (ACHP) is a critical step in this process. Activities on lands held by an American Indian tribe with a designated tribal historic preservation officer must be coordinated with this official. If an undertaking on federal lands may affect properties having historic value to a federally recognized American Indian tribe, such tribe shall be afforded the opportunity to participate as consulting parties during the consultation process defined in 36 CFR 800.

Section 110 of the NHPA requires federal agencies to locate, inventory, and identify all properties under their ownership or control that may qualify for the National Register. It also requires that the agencies manage and protect historic properties. The Federal Agency Preservation Assistance Program provides assistance to federal agencies in meeting Section 110 historic preservation responsibilities.

Section 106 compliance can also be accomplished using agreed-upon streamlined methods and agreement documents such as programmatic agreements. The agreements, which are developed among federal agencies, the ACHP, and SHPOs to provide efficient section 106 compliance guidance for specified historic properties and/or undertakings.

Failure to take into account the effects of an undertaking on historic properties, and afford the ACHP a reasonable opportunity to comment on such effects, can result in formal notification from the Advisory Council to the head of the federal agency of foreclosure of the ACHP opportunity to comment on the undertaking pursuant to the NHPA. A notice of foreclosure can be used by litigants against the federal agency in a manner that can halt or delay critical activities or programs.

The NHPA requires the DoD to identify its significant resources, evaluate them for National Register eligibility, and plan for the protection of the listed or eligible historic properties. The Vietnam War overview historic context “Vietnam and the Home Front: How DoD Installations Adapted, 1962–1975” and this subcontext are designed to assist professionals in the field of cultural resources in identifying significant U.S. military Vietnam War special operation forces and warfare training use-related properties that may be present on military installations state-side. Criteria for evaluating these properties, once identified, are provided in Section 4.3.

## **4.2 IDENTIFICATION OF HISTORIC PROPERTIES AND METHODOLOGY UNDER THIS SUBCONTEXT**

*The Secretary of the Interior’s Standards and Guidelines for Archeology and Historic Preservation (48 Federal Register 44716)* outline the process for the identification of historic properties. The process includes developing a research design, conducting a review of archival literature, completing a field survey, and analyzing the results of the literature review and field survey.

Those conducting the identification and evaluation of historic properties must meet professional qualifications established by the Secretary of the Interior. The qualifications are divided into five

subject areas: History, Archeology, Architectural History, Architecture, and Historic Architecture.

The minimum professional qualifications in history and architectural history are: a graduate degree in history/architectural history or a bachelor's degree in history/architectural history and at least two years of full-time experience in research, writing, teaching, interpretation, or other demonstrable professional activity with an academic institution, historic organization or agency, museum, or other professional institution; or substantial contribution through research and publication to the body of scholarly knowledge in the field of history/architectural history.

The minimum professional qualifications in archeology are a graduate degree in archeology or anthropology and at least one year of full-time professional experience or equivalent specialized training in archeological research, administration, or management; at least four months of supervised field and analytic experience in general North American archeology and demonstrated ability to carry research to completion.

The minimum professional qualifications in architecture are a professional degree in architecture plus at least two years of full-time experience in architecture or a state license to practice architecture. The minimum professional qualifications in historic architecture are a professional degree in architecture or a state license to practice architecture plus at least one year of graduate study in architectural preservation, American architectural history, preservation planning, or closely related field; or at least one year of full-time professional experience on historic preservation projects.

A research design should define the purpose and objectives of the survey as well as the methodologies that will be employed to achieve the objectives. Most often, as stated above, surveys to identify historic properties are undertaken in compliance with Section 106 of the NHPA, which requires federal agencies to take into account the effect of its actions on historic properties and to mitigate adverse effects. Another driver for performing inventories is Section 110 of the NHPA that requires agencies to identify historic properties and manage them in the interest of the public. This requires the establishment of a baseline of known historic properties that must be kept updated, which is then used to develop a management plan for the properties. Depending on the driver, identification could be limited to a single property in compliance with a limited Section 106 action, or it may incorporate an entire installation in compliance with Section 110.

After the objective and scope of identification has been defined, a methodology should be developed to ensure that the identification meets the goals and also makes the best use of time and fiscal resources to guarantee the information obtained from the identification is as comprehensive as possible in anticipation of future actions that may be required. The methodology should include how to determine dates for original construction and all alterations, repairs, and additions; construction techniques and materials; history of property function; and the history of surrounding properties. These types of information are essential to place a resource within a specific historic context for the property and determining the property's historic significance and integrity.

Historic properties are identified primarily through a combination of literature and archival record reviews and field surveys. Record reviews are conducted using real property records, historic maps and aerial photographs, blueprints and construction drawings, other archival records, and sometimes oral histories. Generally, major command headquarters, installation real property managers and departments of public works, installation historians, and one or more branches of the NARA keep these types of records. Other sources of information for resources and installation history related to helicopters are local newspaper archives, archives at academic institutions (especially The Vietnam Center and Archive, Texas Tech University), historical societies, websites, and libraries. Previous installation and unit histories may also contain information valuable to understanding the use and history of a building or site in relation to Vietnam War rotary-wing aircraft.

Field surveys should be undertaken with care to gather as much information as possible as efficiently as possible. Contemporary aerial photographs can be consulted before going into the field and used as a guide to map current features of the property and identify elements that have been added or removed. Using a current aerial photograph also could reduce field mapping time. Photographs should be taken of all elements being inventoried. These photographs should be keyed on the aerial photograph to ensure they can be properly labeled. Photographs should be taken of each building and property feature, including close-ups of unique and representative details. Even if the pictures are not used as part of an inventory report, they could be helpful to document a time line of the property's condition.

Meticulous notes should be taken during a field survey. Oftentimes, database forms or applets can be created and loaded onto data collectors (including most submeter GPS units) to standardize data collection. In this manner, data can then be linked to geospatial databases creating a useful management tool for both cultural resource managers and for facility managers who may need to know, on a moment's notice, if a property or a specific element of a property is eligible for the National Register.

### **4.3 CHOOSING THE CORRECT HISTORIC CONTEXT**

The broader overview context contained in *Vietnam and the Home Front: How DoD Installations Adapted, 1962–1975*, can be preliminarily used in determining which properties may be significant on an individual installation by the cultural resources manager; however, the follow-on subcontexts will provide the specifics necessary for determinations of eligibility at the installation level.

Recommendations in *Vietnam and the Home Front: How DoD Installations Adapted, 1962–1975* include the development of additional subthemes for the Vietnam War. The subthemes include ground training, air training, housing, counterinsurgency warfare training, housing, medical facilities, and logistical facilities. Subthemes for each of these thematic areas should be developed to include an in-depth historic context, determination of associated property types, and character-defining features. Every thematic area may not be equally applicable to each branch of the Armed Services. Currently, the subtheme *Vietnam War-Era Ground Combat Training and Associated Facilities* and Legacy project 14-739, *Vietnam War: Helicopter Training and Use on US Military Installations, Vietnam Historic Context Subtheme* are also being developed.

Association with logistics at an installation does not automatically imply a relationship to the Vietnam War. There were many other program and developments occurring due to the Cold War with Russia. In other cases, facilities were built previously and may have served an important role during the Vietnam War but may have significance to more than one context.

#### **4.4 APPLYING NATIONAL REGISTER CRITERIA FOR EVALUATION**

The Secretary of the Interior has developed the National Register Criteria for Evaluation (36 CFR Part 60.4) to assist in the evaluation of properties eligible for inclusion in the National Register. The National Park Service has published guidance for applying the criteria in *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation* (NPS 1991). To qualify for the National Register, a property must have significance and retain historic integrity. Significance for U.S. military Vietnam War logistics-related historic properties can be ascertained through Chapters 2 and 3 of this subcontext.

To be listed on, or considered eligible for listing on the National Register, a cultural resource must meet at least one of the four criteria that follow:

- A. Associated with events that have made a significant contribution to the broad patterns of our history.
- B. Associated with the lives of persons significant in our past.
- C. Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.
- D. Have yielded, or may be likely to yield, information important in prehistory or history.

In addition to meeting at least one of the above criteria, a historic property must possess integrity of location, design, setting, materials, workmanship, feeling, and association. Integrity is defined as the authenticity of a property's historic identity, as evidenced by the survival of physical characteristics it possessed in the past and its capacity to convey information about a culture or group of people, a historic pattern, or a specific type of architectural or engineering design or technology.

##### **4.4.1 CRITERION A: ASSOCIATION WITH EVENTS**

The first criterion recognizes properties associated with single events such as the evacuation of the U.S. embassy in Saigon, or with a pattern of events, repeated activities, or historic trends such as innovations in new military strategies, testing, and training. The event or trends, however, must clearly be important within the associated history.

The U.S. involvement in the Vietnam War comprised a complex series of political, military, diplomatic, and economic events and programs that affected the lives of millions of people in the United States and Asia. The Vietnam War was an event that made significant contributions to the broad patterns of U.S. history; however, because the Vietnam War occurred during the Cold War-era (1947–1989), not all military properties related to logistics constructed from 1961 to

1975 are significant under this subcontext. The historic property(ies) being considered must have an important and specific association with logistics and logistics training for Vietnam.

Military properties associated with logistics during the Vietnam War are likely to fall under this criterion. Properties generally related to units that participated in the Vietnam War would also likely be evaluated under this criterion. To determine if a property is significant within subcontext under Criterion A:

1. Determine the nature of the property, including date of construction, type of construction, dates and purposes of modifications, and function(s) from time of construction to the end of the Vietnam War (1975).
2. Determine if the property is associated specifically with Vietnam War logistics training and missions, events, discoveries, inventions, or trends.
3. Evaluate the property's history as to whether it is associated with the Vietnam War in a significant way.

#### **4.4.2 CRITERION B: ASSOCIATION WITH SIGNIFICANT PEOPLE**

Properties may be listed in the National Register for their association with the lives of significant people. The individual in question must have made contributions to history that can be specifically documented and that were important within history. This criterion may be applicable, but to only a small portion of buildings or structures, as the history focuses on events and on design and construction rather than on individuals. However, background research on a particular installation or building may indicate that it is associated with an individual who made an important contribution to special operation forces and warfare training in the Vietnam War trends or specific events. To determine if a property is significant within this subcontext under Criterion B:

1. Determine the importance of the individual.
2. Determine the length and nature of the person's association with the property.
3. Determine if the person is individually significant within history.
4. Determine if the property is associated with the time period during which the individual made significant contributions to history.
5. Compare the property to other properties associated with the individual to determine if the property in question best represents the individual's most significant contribution.

Refer to National Register Bulletin 32: Guidelines for Evaluating and Documenting Properties Associated with Significant Persons (National Park Service) for more information.

#### **4.4.3 CRITERION C: DESIGN/CONSTRUCTION**

To be eligible for listing on the National Register under Criterion C, properties must meet at least one of four requirements: (1) embody distinctive characteristics of a type, period, or method of construction; (2) represent the work of a master; (3) possess high artistic value; or (4) represent a significant and distinguishable entity whose components may lack individual distinction.

Vietnam War special operation forces and warfare training-related resources are most likely to be eligible under the first or fourth of these requirements.

*National Register Bulletin 15* defines distinctive characteristics as “the physical features or traits that commonly recur” in properties; type, period, or method of construction is defined as “the certain way properties are related to one another by cultural tradition or function, by dates of construction or style, or by choice or availability of materials and technology.” Properties are eligible for listing on the National Register if they are important examples, within history, of design and construction of a particular time. This component of Criterion C can apply to buildings, structures, objects, or districts.

“Significant and distinguishable entities” refers to historic properties that contain a collection of components that may lack individual distinction but form a significant and distinguishable whole. This portion of Criterion C applies only to districts.

Military properties associated with logistics and logistics training, development of tactics and strategies, housed separated helicopter units, research and development, and transport may fall under this criterion (and may also fall under Criterion A). To determine if a property is significant as an important example of distinctive characteristics of a building type or as a significant and distinguishable district:

1. Determine the nature of the property, including date of construction, type of construction, major modifications (dates and purpose) historic appearance, and functions during the period of significance.
2. Determine the distinctive characteristics of the property type represented by the property in question.
3. Compare the property with other examples of the property type and determine if it possesses the distinctive characteristics of a specific building type construction.
4. Evaluate the property’s design and construction to determine if it is an important example of building type construction.

Although many military installations were impacted significantly by increases in troop levels, changing training requirements, and the engineering demands of the Southeast Asian geography, there was the lack of a unified building campaign in response to the Vietnam War’s requirements (Hartman et al. 2014). While many Army, Navy, Marine Corps, and Air Force facilities were reopened, expanded, or adapted, there was no identifying architectural style used during that time. The reuse of WWII and 1950s buildings was common, and new construction was often part of the larger modernization initiatives that were being executed by the DoD during the 1950s and 1960s.

The writers of the report, *Vietnam and the Home Front: How DoD Installations Adapted, 1962–1975*, concluded that the Vietnam War differed from previous 20th century conflicts. It was long in duration and the U.S. involvement was gradual. There was no need to repeat the massive WWII effort to establish and fully construct working installations in a few months. As a result, there was no major overarching construction program across the Department of Defense as a response to the United States military activities in the Vietnam War. Consequently, there was

also no large-scale effort to produce standardized designs to be replicated across the county. Aside from new training methods such as “Quick Kill” ranges and Viet Cong villages, construction was largely piecemeal and focused on specialized training needs (Hartman et al. 2014).

#### **4.4.4 CRITERION D: INFORMATION POTENTIAL**

Properties may be listed on the National Register if they have yielded, or may be likely to yield, information important in prehistory or history. Two requirements must be met for a property to meet Criterion D: (1) the property must have, or have had, information to contribute to the understanding of history or prehistory, and (2) the information must be considered important. This criterion generally applies to archaeological sites. In a few cases, it can apply to buildings, structures, and objects if the property itself is the principal source of information and the information is important. For example, a building that displays a unique structural system or unusual use of materials and where the building itself is the main source of information (i.e., no construction drawings or other historic records) might be considered under Criterion D. Properties significant within this subcontext would rarely be eligible under Criterion D.

#### **4.4.5 INTEGRITY**

A historic property determined to be significant under the criteria for evaluation for the National Register must possess integrity. Integrity is the ability of a property to convey its significance through retention of the property’s essential physical characteristics from its period of significance. The National Register Criteria for Evaluation lists seven aspects of integrity. A property eligible for the National Register must possess several of these aspects. The assessments of a property’s integrity are rooted in its significance. The reason why a property is important should be established first, then the qualities necessary to convey that significance can be identified. *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation* defines the seven aspects of integrity as the following:

1. Location: the place where the cultural resource was constructed or the place where the historic event occurred.
2. Design: the combination of elements that create the form, plan, space, structure, and style of a cultural resource.
3. Setting: the physical environment of a cultural resource.
4. Materials: the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a cultural resource.
5. Workmanship: the physical evidence of the crafts of a particular culture or people during any given period in history or prehistory.
6. Feeling: a property’s expression of the aesthetic or historic sense of a particular period of time.
7. Association: the direct link between an important historic event or person and a cultural resource.

*National Register Bulletin 15* describes the following steps in assessing historical integrity:

1. Determine the essential physical features that must be present for a property to represent its significance.
2. Determine whether the essential physical features are sufficiently visible to convey significance.
3. Compare the property with similar properties if the physical features necessary to convey significance are not well-defined.
4. Determine, based on the property's significance, which aspects of integrity are particularly important to the property in question and if they are intact.

For properties significant for their association with logistics and logistics training during the Vietnam War on U.S. military installations, they must retain the key physical features associated with these themes. Properties significant for their design and construction must retain the physical features that are the essential elements of the aspects of the building type construction that the property represents.

In cases of active military installations, buildings are more likely to have been modified to extend their useful life. These modifications generally include adapting buildings for new communication systems or equipment, mission and staff changes, and changes in military assets such as new aircraft models or weaponry. These integrity issues will be critical in the evaluation process of significant resources.

To qualify for listing as a historic district, the majority of the properties in the district associated with the history must possess integrity and a sufficient number of properties must be retained from the period of significance to represent that significance. The relationship among the district's components, i.e., massing, arrangement of buildings, and installation plan must be substantially unchanged since the period of significance.

#### **4.4.6 CRITERION CONSIDERATIONS**

Certain kinds of properties are not usually considered for listing on the National Register, including:

1. religious properties (criteria consideration A)
2. moved properties (criteria consideration B)
3. birthplaces or graves (criteria consideration C)
4. cemeteries (criteria consideration D)
5. reconstructed properties (criteria consideration E)
6. commemorative properties (criteria consideration F)
7. properties that have achieved significance within the last 50 years (criteria consideration G)

These properties can be eligible for listing only if they meet special requirements called "criteria considerations." A property must meet one or more of the four criteria for evaluation (A through

D discussed in previous sections) and also possess integrity of materials and design before it can be considered under the various criteria considerations. Three of these criteria considerations may be applicable to U.S. military properties; moved properties (criterion consideration B), commemorative properties (criteria consideration F), and properties that have achieved significance within the last 50 years (criteria consideration G).

A property removed from its original or historically significant location can be eligible if it is significant primarily for architectural value or if it is the surviving property most importantly associated with a historic person or event. Properties that are moveable by their nature, such as a ship or rail car, do not need to meet this criterion consideration.

Commemorative properties are designed or constructed after the occurrence of an important historic event or after the life of an important person. They are not directly associated with the event or with the person's productive life, but serve as evidence of a later generation's assessment of the past. The significance comes from their value as cultural expressions at the date of their creation. Therefore, a commemorative property generally must be over 50 years old and must possess significance based on its own value, not on the value of the event or person being memorialized. A commemorative marker erected in the past by a cultural group at the site of an event in its history would not meet this criterion if the marker were significant only for association with the event and it had not become significant itself through tradition.

Properties less than 50 years old are normally excluded from the National Register to allow time to develop sufficient historical perspective. However, under criteria consideration G, a property may be eligible for the National Register if it possesses "exceptional importance" or significance. Vietnam War resources span from 1961 through 1975, so could have been built 55 years ago (at this writing), or as recently as 41 years ago. Buildings constructed before 1961 could have significance during the latter part of the Vietnam War. Criteria consideration G (properties that have achieved significance within the last 50 years) applies to buildings and structures that are less than 50 years old at the time of evaluation. This criterion also includes buildings that were constructed more than 50 years ago and that continue to achieve significance into a period less than 50 years ago, or has noncontiguous periods of significance, one of which is less than 50 years ago, or had no significance until a period less than 50 years ago. For buildings, structures, objects, sites, or districts that have achieved significance within the last 50 years, only those of "exceptional importance" can be considered eligible for nomination to the National Register, and the finding of "exceptional importance" must be made within the specific history associated with the property. National Park Service publication *How to Evaluate and Nominate Potential National Register Properties That Have Achieved Significance Within the Last 50 Years* further describes criteria consideration G.

Properties evaluated under criteria consideration G that do not qualify for exceptional importance must be reevaluated when they reach 50 years of age under National Register criteria A through D.

## **4.5 SIGNIFICANCE**

To qualify for the National Register, a cultural resource must be significant, meaning that it must represent a significant part of U.S. history, architecture, archaeology, engineering, or culture. A

resource may possess significance on the local, state, or national level. The significance of a cultural resource can be determined only when it is evaluated within its history. As outlined in *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation*, the following steps are taken to evaluate a cultural resource within its history:

- Identify what the property represents: the theme(s), geographical limits, and chronological period that provide a perspective from which to evaluate the property's significance.
- Determine how the theme of the history is significant to the local area, the state, or the nation.
- Determine the property type and whether it is important in illustrating the history.
- Determine how the property represents the history through specific associations, architectural or engineering values, or information potential (the National Register criteria for evaluation).
- Determine what physical features the property must possess in order for it to reflect the significance of the history.

A cultural resource may be significant within more than one area of history. In such cases, all areas of history should be identified. However, significance within only one area is required. If a cultural resource is determined to possess sufficient significance to qualify for the National Register, the level of integrity of those features necessary to convey the resource's significance must then be examined.

Logistics facilities such as depots, ports and piers, ammunition storage, and airfields were important in the Vietnam War effort. Efficiently moving thousands of troops and the necessary materiel from the United States to Southeast Asia was a complex undertaking. For this subcontext, property types integral to war logistics were production facilities and arsenals, ammunition storage, depots, and training facilities.

#### **4.6 PROPERTY CLASSIFICATIONS**

Significant properties are classified as buildings, sites, districts, structures, or objects. Sites or structures that may not be considered individually significant may be considered eligible for listing on the National Register as part of a historic district. The classifications are defined as:

- A building such as a house, barn, church, hotel, or similar construction is created principally to shelter any form of human activity. "Building" may also be used to refer to a historically and functionally related unit such as a courthouse and jail or a house and barn.
- The term "structure" is used to distinguish from buildings those functional constructions made usually for purposes other than creating human shelter.
- The term "object" is used to distinguish from buildings and structures those constructions that are primarily artistic in nature or are relatively small in scale and simply constructed. Although it may be movable, by nature or design, an object is associated with a specific setting or environment.

- A site is the location of a significant event, a prehistoric or historic occupation or activity, or a building or structure, whether standing, ruined, or vanished, where the location itself possesses historic, cultural, or archaeological value regardless of the value of any existing structure.
- A district possesses a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development.

#### **4.6.1 INDIVIDUAL ELIGIBILITY VS. HISTORIC DISTRICT**

While logistic installations, as a class of resources, may be significant, not every structure associated with logistics support during the Vietnam War is eligible for listing on the National Register. The framework established by the historic context focuses on the role of logistics support during the Vietnam War to assess its significance and the significance of its component resources. In general, logistics support installation and facilities should first be evaluated as potential districts.

For component structures and buildings to be individually eligible for listing on the National Register with the context of Vietnam War special warfare, they should individually embody a significant event associated with the necessary supply system needed to support the deployment of large numbers of troops to Vietnam, developing new methods to provide logistics support, and training; or represent an example of a type or method of construction or engineering necessary to fulfill logistics missions, or the important work of a significant architect. Infrastructure and support buildings typically are not individually eligible.

Logistics facilities were typically designed and intended to be utilized as a whole complex. Each structure or element provided a vital component of the overall installation. The overall importance of a particular pier or warehouse depended of the mission of the specific installation. For example, a large storage building, a munitions bunker, or a material assembly facility may not be individually significant. However, considered together, they represent a specialized Vietnam War logistics complex and could be a significant historic district.

#### **4.6.2 INDIVIDUAL PROPERTIES**

Individual properties are those whose physical attributes singularly represent or embody the Vietnam War Special Operations subtheme. While individual properties need not be unique, they must have integrity and cannot be part of a multiple-property grouping.

For properties that are less than 50 years old to be individually eligible for listing on the National Register, they should:

- Clearly and explicitly reflect the important logistics mission of the installation.
- Be regarded as symbolic of the installation or of an aspect of the mission.
- Represent particularly significant examples of a type or method of construction or an important technological advancement.

Examples for above may include passenger terminal or material processing center. Infrastructure and support buildings are not typically individually eligible unless they were: (1) the site of a particular event, (2) directly associated with a significant individual, or (3) of exceptional note as an example of architectural or engineering design.

### **4.6.3 HISTORIC DISTRICTS WITH ELEMENTS LESS THAN 50 YEARS OLD**

Properties less than 50 years old may be integral parts of a district when there is sufficient perspective to consider the properties as historic. This consideration is accomplished by demonstrating that: (1) the district's period of significance is justified as a discrete period with a defined beginning and end, (2) the character of the district's historic resources is clearly defined and assessed, (3) specific resources in the district are demonstrated to date from that discrete era, and (4) most district properties are over 50 years old. In these instances, it is unnecessary to prove exceptional importance of either the district or of the less than 50-year-old properties.

Exceptional importance still must be demonstrated for districts where the majority of properties or the major period of significance is less than 50 years old, and for less than 50-year-old properties that are nominated individually. Some historic districts represent events or trends that began more than 50 years ago. Frequently, construction of buildings continued into the less than 50-year period, with the later resources resulting in representation of the continuation of the event. In instances where these later buildings make up only a small part of the district and reflect the architectural and/or historic significance of the district they can be considered integral parts of the district (and contributing resources) without showing exceptional importance of either the district or the less than 50-year-old buildings.

An exceptional historic district is one comprised principally of structures less than 50 years of age that are integral to understanding the unique aspects of the district's mission or association. Structures that clearly contribute to this understanding would be considered contributing elements to the district. Structures that only tangentially or marginally contribute would not be considered contributing members unless they qualify under the standard National Register criteria. Since the Vietnam War and corresponding construction span a period of time that stretches from 42 to 56 years ago, there may be districts or features of districts that will fall into this category.

### **4.6.4 ONE-OF-A-KIND PROPERTIES**

These are properties whose character-defining features singularly embody the logistics subtheme and that are the only known property of its type. Singularity alone does not impart exceptional importance if the property is less than 50 years old. Vietnam War logistics properties that are singular must be compared against other property types within the same theme to determine if they are truly exceptional. Although unique properties can never be precisely compared quantitatively, a qualitative comparison must take place to protect the exclusivity of the term "exceptional."

The phrase "exceptional importance" may be applied to the extraordinary importance of an event or to an entire category of resources so fragile that survivors of any age are unusual. Properties listed that had attained significance in less than 50 years include, for example, the launch pad at

Cape Canaveral from which astronauts first traveled to the moon. Properties less than 50 years old that qualify as exceptional because the entire category of resources is fragile. An example of a fragile resource is a traditional sailing canoe in the Trust Territory of the Pacific Islands, where because of rapid deterioration of materials, no working Micronesian canoes exist that are more than 20 years old.

#### **4.6.5 PROPERTIES SIGNIFICANT WITHIN MORE THAN ONE AREA OF HISTORY**

Properties may possess significance within multiple areas of history. For instance, a building may be individually significant to Vietnam War special warfare training history because of its design characteristics, and may also be part of a district related to a particular mission of an installation. Military installations should be evaluated holistically, with attention to their interrelated historic associations over time. When evaluating the significance of a military property, the period of significance should be defined based on the range of important associations over time. In districts, buildings may illustrate various dates of construction, architectural design, and historical associations. A single building may be associated with several periods of history; for example, a building may have played a vital role in both the Vietnam and Korean Wars. Significance within one historic period is sufficient for the property to meet the National Register criteria for evaluation. However, all areas of significance should be identified to have a comprehensive picture of the property's importance. For properties constructed during the period of the Vietnam War (1961–1975), other Vietnam War subtheme reports should be referenced (on [www.denix.osd.mil](http://www.denix.osd.mil) as available).

#### **4.7 PROPERTY TYPES ASSOCIATED WITH LOGISITICS SUPPORT DURING THE VIETNAM WAR ON U.S. MILITARY INSTALLATIONS**

The Vietnam War provided a combat "logistics proving ground" in solving the problems associated with supply, maintenance, transportation, communication, automation, and other services required to support the conflict in Vietnam. To provide the necessary supplies and troops to the war aboard and improve the logistics system, buildings, structures and other infrastructure was needed. In general, building types that were most important based on this subcontext include those facilities constructed or renovated for production, storage, training, and transporting supplies and troops to Vietnam during the buildup and throughout the war. The rapid buildup and sustained conflict paired with the unique tactical demands and technological advancements during the Vietnam War provided challenges to be overcome.

Buildings and structures do not necessarily need to have been built during the Vietnam War period (1962–1975); they may have been previously constructed and repurposed for the Vietnam War. For example, many Vietnam-era construction projects augmented existing WWII-era infrastructure that became heavily reutilized in support of the Vietnam War. Furthermore, the financial demands of the Vietnam War came to overshadow most stateside military decisions and operations. Therefore, mobilizing and supporting the war slowed stateside military construction and led to a piecemeal approach of reactive construction efforts that corresponded to the immediate and ever-changing combat requirements (Hartman et al. 2014).

For buildings and indoor spaces used to support logistics, the Vietnam War-era did not feature an identifiable, unified architectural style that was unique to the time; as such, many buildings associated with the subtheme were constructed using standard designs that do not make them readily-distinguishable for this specific period or training mission. Instead, new construction was often part of larger modernizing initiatives (Hartman et al. 2014).

Three broad types of logistics installations are presented in this report including production; supply, storage, and shipping; and training. In addition, as with the other Vietnam subcontext reports, support buildings may have also been constructed to support logistics and training. These support building types include those constructed to accommodate and house increased numbers of troops and officers at the installations during the war. Building types that could accommodate these needs included barracks and other housing as well as recreation buildings and administrative buildings.

The following identifies the types of building, structure, and landscape features that are associated with logistics on U.S. installations during the Vietnam War. Individual properties need to be investigated at the installation level to determine if they are eligible for listing on the NRHP under Criteria A (see section 4.4.1). The omission of a property type in the following sections does not automatically exclude it from potential significance under this subtheme as a contributing resource of a historic district.

#### **4.7.1 PRODUCTION**

The military could procure many materials through commercial sources (e.g., tools, spare parts, food, etc.). However, the DoD did design, engineer, test and manufacturing most weapon systems and ammunition. These weapons systems included field artillery, small arms, trench mortars, mines, air defense guns, bombs, projectiles, missiles, and chemical and biological weapons. The types of buildings, structures, and features on installation that are associated with production include:

- administration buildings
- research and design laboratories
- manufacturing buildings and production plants
- maintenance shops
- warehouses
- storage igloos for powder, projectiles, explosives, and weapons systems
- weapons testing areas

In some cases, the massive buildup of production capacity was required by the government to produce materials not available through commercial sources. This resulted in large scale construction at production installations, either for new construction or major renovation of existing buildings. Many of the buildings and structures were constructed using standard designs and represent a repetitive but cohesive area. Changes in weapons may have resulted in new designs for igloos and bunkers due to needed safety precautions at the installations. Office buildings, shops, warehouses, housing and other support buildings and structures may have been

of a similar design to others built on the installation around the same time period. Many of the buildings associated with production, are utilitarian in design. Office building may include some architectural adornment.

A laboratory, production, and test facilities associated with the development of a specific weapon for use in Vietnam could have significance under Criterion A. For example, the M102 105mm lightweight howitzer and the M102 howitzer airmobile firing platform were developed and produced at Rock Island Arsenal for the Vietnam War. The M102 was designed to be towed behind a vehicle, but it also fit the missions of the airborne and airmobile units. Being lighter than the M101 and having a longer barrel allowed the M102 to use the same ammunition with greater range. A major weapon upgrade was a roller located at the base of the tail which allowed the gun to turn 360 degrees. In Vietnam, it was necessary to engage targets in all directions with short notice as fire bases were attacked from many sides simultaneously. The U.S. Army and U.S. Marine Corps transported the howitzer by helicopter or parachute drop to support all types of air assault operations for U.S. forces and the ARVN military units. Research production and testing facilities associated with this weapon could be significant, either individually or as primary resources of a historic district, under Criterion A.



Source: <http://historywarsweapons.com/m102-howitzer/>

**Figure 4-1: M102-Howitzer.**

### Character Defining Features

These facilities include those constructed or adapted and heavily used during 1962–1975 and were directly related to manufacturing, production, and storage of weapons and ammunition to be used to train troops for the Vietnam war or to be shipped to Vietnam. These property types will vary in size, shape, and design; they may include an entire building or a portion of the building. Buildings may be of similar design to other installation buildings constructed during

the same period, may be former World War II temporary or permanent structures, or may be of a one-off design (see section 4.4.3). Interior features include original floor plans, furnishings, and manufacturing equipment. Exterior features include finishes and construction materials.

As discussed above, there was no identifying architectural style used specifically for Vietnam War construction. Therefore, buildings would not be evaluated for listing on the NRHP under Criterion C (see section 4.4.3). Many DoD buildings constructed during this time were influenced by architectural Modernism. Modernism covers several architectural movements and styles. If the building was constructed during this period and possesses an architectural style beyond utilitarian, refer to Legacy Project Number 11-448, *Historic Context for Evaluating Mid-Century Modern Military Buildings*, (Hampton, et al, 2012) to determine if it would be eligible under this context and to assess character defining features for the various architectural movements.

Property types could also include ranges and targets for testing weapons systems and munitions, and munitions storage areas. These features would not likely be individually eligible. These properties would be more likely to be part of a district if the resources retain integrity.

### Evaluation and Integrity

National Register Bulletin 15 states that for each property, there are essential features that must have been retained for the property to have integrity and be able to convey a sense of the significant place and time with which it is associated. Many of these properties would not likely be eligible unless containing unique manufacturing or testing equipment. Without these features, a property could no longer be identified as a product of the place and time from which it came. Many of these properties would not likely be eligible unless they have not been significantly altered since the end of the Vietnam War.

Some buildings and testing areas may be individually eligible due to the program it supported. Others may have provided support functions and individually are not significant but do contribute to a historic district (see section 4.6.1). Under 36 CFR Part 60, a historic district is defined as a “Geographically definable area, urban or rural, possessing a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united by past events or aesthetically by plan or physical environment.” In addition to being recognizable, a district must also be significant. The significance of a historic district may be achieved if it also meets NRHP requirements under Criteria A (see section 4.4.1).

### **4.7.2 DEPOTS, STORAGE, AND SUPPLY BASES.**

Once products were manufactured, procured, or brought into inventory, they needed to be stored, maintained, serviced or repaired, processed, packaged and shipped. The types of buildings, structures, and features that are associated with these activities and missions would include:

- repair and maintenance facilities and shops
- administration buildings

- processes and packing warehouses
- rail facilities
- railroad rolling stock
- ship terminals
- piers and berthing facilities
- air terminals and ports for troops and supplies
- assembly areas
- aircraft maintenance facilities
- advanced equipment to repair electronic and sophisticated systems for the transport aircraft
- other facilities to accommodate cargo aircraft
- refueling operations
- runways, tarmacs, and other flightline resources
- underground igloos and above-ground magazines
- warehouses and general supply storage
- transit sheds and other storage areas
- storage tanks for gasoline, fuel oil, and diesel oil
- explosive disposal areas
- repair and dry-docks (for ships)
- tank repair

Many of these buildings and structures are utilitarian and were constructed using standard designs and, therefore, represent a repetitive design and property type. Shipping ports, aircraft terminals, and, possibly, administrative buildings would be the most likely to be unique in design. Terminals and office buildings would be the most likely to have any architectural adornment, and as stated previously, could have Modernism features. The warehouses, housing and other support buildings and structures may have been of a similar design to others built on the installation around the same time. These buildings and structures may have significance as part of a district under this subcontext for Criterion A.

For example, the escalation of activity by United States forces in Southeast Asia precipitated notable increases in the Defense General Supply Center (DGSC) [now Defense Supply Center Richmond (DSCR)] DGSC workload from the previous decade, and by 1967, the DGSC was again active and procuring more than \$730 million worth of general supplies. Among the most requested items were sandbags to support increased fighting in Vietnam. Practically overnight, the DGSC had to find sources for a product that had only been needed in small quantities prior to the war. By 1968, suppliers were keeping up with the demand, and more than 48 million

sandbags a month were being shipped to Vietnam. Warehouses, like building 65 built for the Korean War, were again pressed into service for storing and shipping supplies.



Source: Earth Tech, Inc. 2004

**Figure 4-2: Defense Supply Center Richmond, Building 65**

### Character Defining Features

These facilities include those constructed or adapted and heavily used during 1962–1975 and were used to store, maintain, service or repair, process, package and ship materials and troops to Vietnam. These property types will vary in size, shape, and design; they may include an entire building or a portion of the building. Buildings may be of similar design to other installation buildings constructed during the same period, may be former World War II temporary or permanent structures, or may be of a one-off design (see section 4.4.3). Interior features include original floor plans, furnishings, and specialized equipment. Exterior features include finishes and construction materials.

As discussed above, there was no identifying architectural style used specifically for Vietnam War construction. However, some DoD buildings constructed during this time were influenced by architectural Modernism. Modernism covers many architectural movements and styles in the post-World War II era. If the building was constructed during this period, also refer to Legacy Project Number 11-448, *Historic Context for Evaluating Mid-Century Modern Military Buildings*, (Hampton, et al, 2012) for character defining features for the various architectural movements, and possible significance under this context.

Property types could also include rail facilities, piers and berthing facilities, outdoor open or covered storage and assembly areas, aircraft maintenance facilities, flightline resources, refueling operations, underground igloos and above-ground magazines, buffer zones, transit sheds, fuel storage tanks, explosive disposal areas, and ship docks. These features would not likely be individually eligible. These properties would be more likely to be part of a district if the resources retain integrity.

### Evaluation and Integrity

National Register Bulletin 15 states that for each property, there are essential features that must have been retained for the property to have integrity and be able to convey a sense of the significant place and time with which it is associated. Many of these properties would not likely be eligible unless containing unique manufacturing or testing equipment. Without these features, a property could no longer be identified as a product of the place and time from which it came. Many of these properties would not likely be eligible unless they have not been significantly altered since the end of the Vietnam War.

Some buildings and structures may be individually eligible due to the specific program it supported. Others may have provided support functions and individually are not significant but do contribute to a historic district (see section 4.6.1). Under 36 CFR Part 60, a historic district is defined as a “Geographically definable area, urban or rural, possessing a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united by past events or aesthetically by plan or physical environment.” In addition to being recognizable, a district must also be significant. The significance of a historic district may be achieved if it also meets NRHP requirements under Criteria A (see section 4.4.1).

### **4.7.3 SCHOOLS AND TRAINING**

As more and more troops were deployed to Vietnam, more supplies were needed, and logistics systems and procedures changed. Increased numbers of military personnel required training in the systems to procure, fulfill requisitions, track materials to Vietnam, and track the transfer of equipment to the South Vietnamese military. Buildings and structures required for training logistics personnel included:

- buildings used for schools, classrooms, and auditoriums
- computer and data processing laboratories
- maintenance training facilities
- ordnance training school
- administrative and faculty offices
- dormitories
- libraries

Academic buildings, classrooms, and auditoriums provided venues for lectures on military logistics systems and protocols, skills, and applications of these skills. Indoor academic training facilities accommodated classrooms, studios, laboratories, and libraries for formal lectures and

practical applications. Other buildings and rooms provided space and equipment for hands-on training, including shops, piers, transportation terminals, and warehouses.

As an example, the Transportation Corps Officer Candidate School was activated at Fort Eustis during the Vietnam War to meet the high demand for officers. Prefabricated metal buildings were erected for housing and training accommodations. The Transportation Corps trained for operations in an unimproved tropical environment using watercraft, amphibians, motor trucks and aircraft. The port, training buildings and grounds, and housing constructed or used during the war could have significance under Criterion A, and, if retain integrity, likely as part of a historic district, not individually eligible.

Another example is at the Navy War College. The greatest expansion at the Navy War College in Newport, Rhode Island, occurred during the Vietnam War-era. In 1972, Spruance Hall, was completed with faculty offices and a 1,100-seat auditorium. In 1974, Conolly Hall was opened with the Navy War College Quarterdeck, administrative and faculty offices, and numerous class and conference rooms. Hewitt Hall opened in 1976 and has a library, café, bookstore, barbershop, student study areas, and lounge. It is not known if these resources have been evaluated under a Vietnam War context; however, they could be significant under Criterion A and/or C, and either individually or as a primary resource of a historic district under Criterion A.



Source: <https://www.bing.com/images/search>

**Figure 4-3: Auditorium Naval War College**

### Character Defining Features

These facilities include those constructed or adapted and heavily used during 1962–1975 and were directly related to providing logistics training. This property type will vary in size, shape, and design; they may include an entire building, a portion of the building, or designated classrooms. Buildings may be of similar design to other installation buildings constructed during the same period, may be former World War II temporary or permanent structures, or may be of a one-off design (see section 4.4.3). Interior features include original floor plans, furnishings, and

training equipment and materials. Exterior features include finishes, and construction materials. Equipment may include audio visual equipment, close circuit televisions, and computers.

As discussed above, there was no identifying architectural style used specifically for Vietnam War construction. Therefore, Criteria C would not be applicable for evaluating properties under this subcontext. However, many DoD buildings constructed during this time were influenced by architectural Modernism. Modernism covers a number of architectural movements and styles. If the building was constructed during this period and possess an architectural style beyond utilitarian, refer to Legacy Project Number 11-448, *Historic Context for Evaluating Mid-Century Modern Military Buildings*, (Hampton, et al, 2012) for character defining features for the various different architectural movements.

Property types could also include rail facilities, piers and berthing facilities, outdoor open or covered storage and assembly areas, aircraft maintenance facilities, flightline resources, refueling operations, underground igloos and above-ground magazines, buffer zones, transit sheds, fuel storage tanks, explosive disposal areas, and ship docks. These features would not likely be individually eligible. These properties would be more likely to be part of a district if the resources retain integrity.

### Evaluation and Integrity

Properties may be eligible under Criteria A (see section 4.4.1). Installations may have supported training programs. National Register Bulletin 15 states that for each property, there are essential features that must have been retained for the property to have integrity and be able to convey a sense of the significant place and time with which it is associated. Many of these properties would not likely be eligible unless containing unique equipment. Without these features, a property could no longer be identified as a product of the place and time from which it came. Many of these properties would not likely be eligible unless they have not been significantly altered since the end of the Vietnam War.

Some buildings of this type may be individually eligible due to the program it supported. Others may have provided support functions and individually are not significant but do contribute to a district (see section 4.6.1).

## **4.7.4 OTHER SUPPORT**

To support the increase in logistics capabilities and training at installations, additional buildings may have been built or renovated to accommodate additional staff and troops. These may have included headquarters and offices, housing, and morale/ welfare/recreation facilities.

### Character Defining Features

These facilities include those that were constructed or adapted and heavily used during 1962–1975 and were used to for housing, recreation and administrative support for the production; storage or maintenance or repairing; packaging and shipping of materials and troops to Vietnam; or logistics training. These property types will vary in size, shape, and design and may include entire buildings, portions of buildings, or man-made features may.

As discussed above, there was no identifying architectural style used specifically for Vietnam War construction. Many of the buildings were constructed using modern designs and not necessarily unique in architectural design or style to a training mission or the Vietnam War. For example, if a special unit was stationed in a separate area of a base, the housing and support buildings (mess, offices, etc.) may have been of a similar design to other housing built around the same time period. Therefore, Criteria C would not be applicable for evaluating properties under this subcontext. However, many DoD buildings constructed during this time were influenced by architectural Modernism. Modernism covers a number of architectural movements and styles. If the building was constructed during this period and possess an architectural style beyond utilitarian, refer to Legacy Project Number 11-448, *Historic Context for Evaluating Mid-Century Modern Military Buildings*, (Hampton, et al, 2012) for character defining features for the various different architectural movements.

### Evaluation and Integrity

Additional billeting/housing, offices, and other buildings may have been necessary to provide lodging and support for an influx of military students and faculty. These areas may have been separated from other base areas or integrated into the overall installation. Buildings and structures did not necessarily need to be constructed during the Vietnam War period (1962–1975); they may have been previously constructed and repurposed for the Vietnam War.

Buildings will vary in size, shape, and design; and may be an entire building or a portion of a building. Administrative buildings, offices, housing and other support buildings and structures may have been of a similar in design to others built on the installation around the same period, former World War II temporary or permanent buildings, or of a unique or custom design. These properties would likely not be individually eligible, but could be part of a historic district under this subcontext for Criteria A.

Property types could also include rail facilities, piers and berthing facilities, outdoor open or covered storage and assembly areas, aircraft maintenance facilities, flightline resources, refueling operations, underground igloos and above-ground magazines, buffer zones, transit sheds, fuel storage tanks, explosive disposal areas, and ship docks. These features would not likely be individually eligible. These properties would be more likely to be part of a district if the resources retain integrity.

## **4.8 CONCLUSION**

For this report a context was developed to evaluate the historical significance of resources constructed on military installations as they pertained to logistics supply system and training during the Vietnam War. The goal of this historic context was to provide military and cultural resource professionals with a common understanding for determining the significance of DoD facilities within this context in order to increase efficiency and cost savings. It outlines logistic support that occurred in the USAF, Navy, USMC, and U.S. Army as necessitated by the Vietnam War and provides examples of logistics installations or logistical training. Finally, it provides a means for applying the logistics support subcontext for the identification and evaluation of historic resources at these and other military installations. It could include structures and buildings built

and renovated based on the need to supply troops in Vietnam. These could include supply centers, warehouses, munitions igloos, production facilities, transportation terminals, and training facilities. Support building types could include those constructed as a reaction to overcrowding including barracks and other housing as well as recreation buildings and administrative buildings.

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**APPENDIX A:  
DEFENSE LOGISTICS AGENCY**

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## **A.0 DEFENSE LOGISTICS AGENCY**

### **A.1 HISTORY OF THE DEFENSE LOGISTICS AGENCY**

The following is excerpted from Defense Logistics Agency page on Wikipedia. It is included to provide context and clarity for how this agency operates and the types of services it provides.

The origins of the Defense Logistics Agency (DLA) date back to World War II, when America's huge military buildup required the rapid procurement of vast amounts of munitions and supplies. During the war, the military services began to coordinate more extensively when it came to procurement, particularly procurement of petroleum products, medical supplies, clothing, and other commodities. The main offices of the Army and Navy for each commodity were collocated. After the war, the call grew louder for more complete coordination throughout the whole field of supply—including storage, distribution, transportation, and other aspects of supply. In 1947, there were seven supply systems in the Army, plus an Air Technical Service Command, and 18 systems in the Navy, including the quartermaster of the Marine Corps.

Passage of the National Security Act of 1947 prompted new efforts to eliminate duplication and overlap among the services in the supply area and laid the foundation for the eventual creation of a single integrated supply agency. The act created the Munitions Board, which began to reorganize these major supply categories into joint procurement agencies. Meanwhile, in 1949, the Commission on the Organization of the Executive Branch of the Government (Hoover Commission), a presidential commission headed by former President Herbert Hoover, recommended that the National Security Act be specifically amended so as to strengthen the authority of the Secretary of Defense so that he could integrate the organization and procedures of the various phases of supply in the military services.

The Munitions Board was not as successful as hoped in eliminating duplication among the services in the supply area. Congress became disenchanted with the board, and in the Defense Cataloging and Standardization Act of 1952, transferred the board's functions to a new Defense Supply Management Agency. The Eisenhower Reorganization Plan Number 6 (1953) abolished both this agency and the Munitions Board, replacing them with a single executive, an Assistant Secretary of Defense for Supply and Logistics. Meanwhile, the Korean War led to several investigations by Congress of military supply management, which threatened to impose a common supply service on the military services from the outside.

Integrated management of supplies and services began in 1952 with the establishment of a joint Army-Navy-Air Force Support Center to control identification of supply items. For the first time, all the military services bought, stored, and issued items using a common nomenclature. The Defense Department and the services defined the material that would be managed on an integrated basis as "consumables", meaning supplies that are not repairable or are consumed in normal use. Consumable items, also called commodities were assigned to one military service to manage for all the services.

## **A.2 EARLY HISTORY (1941–1961)**

The pressure for consolidation continued. In July 1955, the second Hoover Commission recommended centralizing management of common military logistics support and introducing uniform financial management practices. It also recommended that a separate and completely civilian-managed agency be created with the Defense Department to administer all military common supply and service activities. The military services feared that such an agency would be less responsive to military requirements and jeopardize the success of military operations. Congress, however, remained concerned about the Hoover Commission's indictment of waste and inefficiencies in the military services. To avoid having Congress take the matter away from the military entirely, Department of Defense (DoD) reversed its position. The solution proposed and approved by the Secretary of Defense was to appoint "single managers" for a selected group of common supply and service activities.

Under a Defense directive approved by the Assistant Secretary of Defense for Supply and Logistics, the Secretary of Defense would formally appoint one of the three service secretaries as single manager for selected group of commodities or common service activities. The Army managed food and clothing; the Navy managed medical supplies, petroleum, and industrial parts; and the Air Force managed electronic items. In each category, the single manager was able to reduce his investment by centralizing wholesale stocks, and to simplify the supply process by persuading the services to adopt the same standard items. Over a six-year period, the single manager agencies reduced their item assignments by about 9,000, or 20 percent, and their inventories by about \$800 million, or 30 percent. Proposals were soon made to extend this concept to other commodities. The single manager concept was the most significant advance toward integrated supply management within DoD or the military services since World War II.

The Defense Cataloging and Standardization Act led to the creation of the first Federal Catalog, completed in 1956. The federal catalog system provided an organized and systematic approach for describing an item of supply, assigning and recording a unique identifying number, and providing information on the item to the system's users. The initial catalog, containing about 3.5 million items, was a rough draft, full of duplications and errors, but it effectively highlighted the areas where standardization was feasible and necessary.

## **A.3 DEFENSE SUPPLY AGENCY (1961–1977)**

When Secretary of Defense Robert S. McNamara assumed office in the spring of 1961, the first generation of single managers were handling roughly 39,000 items by procedures with which the Services had become familiar. Yet, it was clear that the single manager concept, though successful, did not provide the uniform procedures that the Hoover Commission had recommended. Each single manager operated under the procedures of its parent service, and customers had to use as many sets of procedures as there were commodity managers. Secretary McNamara was convinced that the problem required some kind of an organizational arrangement to "manage the managers". On March 23, 1961, he convened a panel of high-ranking Defense officials, and directed them to study alternative plans for improving DoD-wide organization for integrated supply management, a task designated as "Project 100". The committee's report highlighted the principle weaknesses of the multiple single manager supply system.

After much debate among the service chiefs and secretaries, on August 31, 1961, Secretary McNamara announced the establishment of a separate common supply and service agency known as the Defense Supply Agency (DSA). The new agency was formally established on October 1, 1961, under the command of Lieutenant General Andrew T. McNamara. McNamara, an energetic and experienced Army logistician who had served as Quartermaster General, rapidly pulled together a small staff and set up operations in the worn Munitions Building in Washington, D.C. A short time later, he moved his staff into more suitable facilities at Cameron Station in Alexandria, Virginia.

When the agency formally began operations on January 1, 1962, it controlled six commodity-type and two service-type single managers: Defense Clothing & Textile Supply Center, (formerly the Philadelphia Quartermaster Depot);<sup>[1]</sup> Defense Construction Supply Center, Columbus, Ohio; Defense General Supply Center, Richmond, Virginia; Defense Medical Supply Center, Brooklyn, New York; Defense Petroleum Supply Center, Washington, D.C.; Defense Subsistence Supply Center, Chicago, Illinois; Defense Traffic Management Service, Washington, D.C.; and Defense Logistics Services Center, Washington, D.C. Officials estimated that the consolidation of these functions under DSA and subsequent unified operations would allow them to reduce the workforce by 3,300 people and save more than \$30 million each year. The results far exceeded these expectations. The agency, made up primarily of civilians but with military from all the services, would administer the Federal Catalog Program, the Defense Standardization Program, the Defense Utilization Program, and the Surplus Personal Property Disposal Program.

During the first six months, two additional single managers—the Defense Industrial Supply Center in Philadelphia and the Defense Automotive Supply Center in Detroit, Michigan—came under DSA control, as did the Defense Electronic Supply Center, Dayton, Ohio. By July 1, 1962, the agency included 11 field organizations, employed 16,500 people, and managed 45 facilities. The Defense Industrial Plant Equipment Center, a new activity, was established under the agency in March 1963 to handle storage, repair, and redistribution of idle equipment. By late June 1963 the agency was managing over one million different items in nine supply centers with an estimated inventory of \$2.5 billion. On July 1, 1965, the Defense Subsistence Supply Center, Defense Clothing Supply Center, and Defense Medical Supply Center were merged to form the Defense Personnel Support Center in Philadelphia.

The Defense Supply Agency was tested almost immediately with the Cuban missile crisis and the military buildup in Vietnam. Supporting U.S. forces in Vietnam was the most severe, extensive test of the supply system in the young agency's history. The agency launched an accelerated procurement program to meet the extra demand created by the military buildup in Southeast Asia. The agency's supply centers responded in record time to orders for everything from boots and lightweight tropical uniforms to food, sandbags, construction materials, and petroleum products. Between 1965 and 1969 over 22 million short tons of dry cargo and over 14 million short tons of bulk petroleum were transported to Vietnam. As a result of support to the operations in Vietnam, DSA's total procurement soared to \$4 billion in fiscal year 1966 and \$6.2 billion in fiscal year 1967. Until the mid-1960s, the demand for food was largely for non-perishables, both canned and dehydrated. But in 1966, thousands of portable walk-in, refrigerated storage boxes filled with perishable beef, eggs, fresh fruits and vegetables began arriving in Vietnam, a logistics miracle.

As the buildup continued in Southeast Asia, on 1 January 1963, the agency acquired Army general depots at Columbus, Ohio, and Tracy, California, and the Navy depot at Mechanicsburg, Pennsylvania. Acquisition of Army depots at Memphis, Tennessee, and Ogden, Utah, on January 1, 1964, completed the DSA depot network.

In addition to the depot mission, the agency became responsible for administering most Defense contracts—both those awarded by DSA and by the military services. In 1965, the Defense Department consolidated most of the contract administration activities of the military services to avoid duplication of effort and provide uniform procedures in administering contracts. Officials established the Defense Contract Administration Services (DCAS) within DSA to manage the consolidated functions. The agency's new contract administration mission gave it responsibility for the performance of most defense contractors, including some new weapon systems and their components. Yet, the services retained contract administration of state-of-the-art weapon systems.

The expanded contract administration mission significantly altered the shape of DSA. The agency that had begun operations three years earlier with more than 90 percent of its resources devoted to supply operations had evolved to one almost evenly divided between supply support and logistics services. As part of a streamlining effort, in 1975, the eleven DCAS regions were reduced to nine. The following year, officials reorganized the DCAS field structure to eliminate the intermediate command supervisory levels known as DCAS districts.

As the move to consolidate Defense contracting progressed, a congressional report in 1972 recommended centralizing the disposal of DoD property for better accountability. In response, on September 12, 1972, DSA established the Defense Property Disposal Service (later renamed the Defense Reutilization and Marketing Service) at the Michigan Battle Creek Federal Center, (now renamed the Hart-Dole-Inouye Federal Center) as a primary-level field activity.

During 1972 and 1973, the agency's responsibilities extended overseas when it assumed responsibility for defense overseas property disposal operations and worldwide procurement, management, and distribution of coal and bulk petroleum products (1972), and worldwide management of food items for troop feeding and in support of commissaries (1973). One dramatic example of the agency's overseas support role was during the Middle East crisis in October 1973 when it was called upon to deliver, on an urgent basis, a wide range of vitally needed military equipment. Responsibilities for subsistence management were expanded in 1976 and 1977 with improvements required in the current wholesale management system and the assumption of major responsibilities in the DoD Food Service Program. By 1977, the agency had expanded from an agency that administered a handful of single manager supply agencies to one that had a dominant role in logistics functions throughout the Defense Department.

#### **A.4 DEFENSE LOGISTICS AGENCY (1977–2000)**

In recognition of 16 years of growth and greatly expanded responsibilities, on January 1, 1977, officials changed the name of the Defense Supply Agency to the Defense Logistics Agency (DLA). The next decade was a period of continued change and expanded missions. Officials published a revised agency charter in June 1978. Major revisions included a change in reporting channels directed by the Secretary of Defense which placed the agency under the management,

direction, and control of the Assistant Secretary of Defense for Manpower, Reserve Affairs, and Logistics.

As part of various organizational changes during this period, officials eliminated depot operations at the Defense Electronics Supply Center in 1979 and began stocking electronic material at depots closer to the using military activities. The Defense Industrial Plant Equipment Center was phased out in the late 1980s when responsibility for managing the Defense Department's reserve of industrial plant equipment was transferred to the Defense General Supply Center in Richmond, Virginia.

Another major mission came in July 1988 when, by presidential order, the agency assumed management of the nation's stockpile of strategic materials from the General Services Administration. Soon after, DLA established the Defense National Stockpile Center as a primary-level field activity. In 1989, the military services were directed to transfer one million consumable items to DLA for management.

The 1980s brought other changes as well. On October 1, 1986, the Goldwater-Nichols Reorganization Act identified DLA as a combat support agency and required that the selection the DLA Director be approved by the Chairman of the Joint Chiefs of Staff. The act also directed the Office of the Secretary of Defense to study the functions and organizational structure of DLA to determine the most effective and economical means of providing required services to its customers. It helped the agency's mission evolve from functional concerns (e.g. inventory management, contract administration) to operational concerns (e.g., enhancement of materiel readiness and sustainability of the military services and the unified and specified commands).

Further implementation of reorganization recommendations, especially from the Goldwater-Nichols Act, resulted from Secretary of Defense Richard Cheney's Defense Management Review report to the President in July 1989. The report emphasized improving management efficiencies in the Defense Department by "cutting excess infrastructure, eliminating redundant functions and initiating common business practices". After the implementation of the Defense Management Review decisions, DLA assumed some of the military services' responsibilities, such as inventory management and distribution functions.

A Defense Management Review-directed study recommended the consolidation of DoD contract management. Although DLA had received responsibility for administering most defense contracts in 1965, the military services had retained responsibility for administering most major weapons systems and overseas contracts. On February 6, 1990, DoD directed that virtually all contract administration functions be consolidated within DLA. In response, the agency established the Defense Contract Management Command (DCMC), absorbing its Defense Contract Administration Services into the new command. The military services retained responsibility for contracts covering shipbuilding and ammunition plants. In June, however, the services' responsibility (5,400 personnel and 100,000 contracts valued at \$400 million) for managing the majority of weapons systems contracts was transferred to the Defense Contract Management Command.

The Base Realignment and Closure (BRAC) process instituted in 1993 significantly affected the way the agency organized for its contract administration and supply distribution missions. As a

result of BRAC 1993, officials merged, realigned, or closed several DLA primary-level field activities. Specifically, they closed two of the five contract management districts and Defense Electronics Supply Center. Defense Distribution Depot Charleston, Defense Distribution Depot Oakland, and the Tooele Facility, Defense Distribution Depot Ogden, Utah, were disestablished. Defense General Supply Center became Defense Supply Center, Richmond. In response to BRAC 1993, in 1996 officials merged the former Defense Construction Supply Center Columbus and the former Defense Electronic Supply Center Dayton to form Defense Supply Center Columbus. On July 3, 1999, Defense Industrial Supply Center was disestablished and merged with Defense Personnel Support Center to form the new Defense Supply Center Philadelphia. Also on March 27, 2000, Defense Contract Management Command was renamed Defense Contract Management Agency and established as a separate agency within the DoD to operate more efficiently.

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**APPENDIX B:**  
**ABERDEEN PROVING GROUND – VIETNAM WAR HISTORIC  
CONTEXT AND RESOURCE TYPES**

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## **B.0 ABERDEEN PROVING GROUND**

Aberdeen Proving Ground is the Army's oldest active proving ground, dating back to World War I. Aberdeen Proving Ground started as two separate military installations – one in Edgewood focused on chemical weapons research and development, and one in Aberdeen dedicated to munitions testing and evaluation. These installations eventually merged into one in 1971.

In World War I, the new proving ground at Aberdeen (Aberdeen Proving Ground-North) was used for proof-testing field artillery weapons, ammunition, trench mortars, air defense guns, and railway artillery. The mission was later expanded to include the operation of an Ordnance training school and developmental testing of small arms.

At Edgewood Arsenal (Aberdeen Proving Ground-South), the Army conducted research, design, test, and manufacture of chemical weapons and protective equipment, to counter the threat posed by the German Army in World War I. During World War II, Aberdeen and Edgewood greatly expanded, with its workforce growing to include 27,185 military and 5,479 civilians as all fields of research, development, and training expanded to meet the heavy workload of wartime. After the War ended, the workforce reduced to its pre-war levels and the role of the proving ground returned to research, development and testing.

Early scientists and researchers at Aberdeen and Edgewood were responsible for many revolutionary inventions and improvements:

- During the 1920s, gas masks were developed at Aberdeen Proving Ground.
- The first digital computer, Electronic Numerical Integrator and Computer (ENIAC), was created to compute World War II ballistic firing tables, enabling users to analyze in a half- minute what it took a person 20 hours to compute.
- During the 1950s and 1960s, the Army studied both chemical agents and their defenses at Edgewood. In 1969, production and transportation of chemical weapons was banned and Edgewood's focus turned to defense. Since then, Edgewood has become the nation's center of expertise in chemical and biological defense for both military and civilian populations (<http://armyalliance.org/about-apg/history-of-apg/>).

### **B.1 EARLY HISTORY OF ABERDEEN PROVING GROUND (NORTH)**

This section is excerpted from Jeffrey K. Smart and Benjamin T. Sepulveda, "History of Aberdeen Proving Ground – North," 2011.

In April 1917, the United States entered World War I and quickly realized that the nation was unprepared to provide the equipment and weapons necessary to win the war as the testing of artillery and weapons at Sandy Hook Proving Ground, New Jersey proved inadequate. The Army selected the peninsula in Harford County, Maryland for its rural location still accessible by train and water.

During 1918, the mission of the post expanded beyond artillery testing. The site of Old Baltimore became a balloon bombing range for the 28<sup>th</sup> Balloon Company. A small airfield was constructed for the 271<sup>st</sup> Aero Squadron. Other new projects included the testing of anti-aircraft

weapons and tanks. The Railway Artillery School and the Ordnance Engineering School also moved to the installation.

By the end of World War I, the post had tested almost every type of weapon used by and developed for the U.S. Army. In recognition of this important mission, War Department General Order No. 6, 1919, named the post Aberdeen Proving Ground and made it a permanent installation.

During the 1930s a growing mission was the testing of vehicles and tanks. To test vehicles, in 1933 Aberdeen Proving Ground constructed a water course, mud course, circular track, and rough terrain course. Aberdeen Proving Ground's mission again grew when the Ordnance School headquarters moved to Aberdeen Proving Ground from Watertown Arsenal, Massachusetts, in 1932. The creation of a new Research Division in 1935 led to the start of construction of a large three-story laboratory building (328) in 1940. This facility focused on the study of ballistics, eventually taking the name Ballistics Research Laboratory (BRL).

With the outbreak of World War II in 1939, the Army expanded both the size and workload of Aberdeen Proving Ground. To meet the demand for more Ordnance soldiers, the Army approved an Ordnance Training Center at Aberdeen Proving Ground. Following the entry of the U.S. into WWII in December 1941, Aberdeen Proving Ground again became the Army's main testing facility for ordnance and vehicles.

Despite a major demobilization following the war, testing and training at Aberdeen Proving Ground continued and some of the most important development projects took place at Aberdeen Proving Ground soon after the end of World War II. The Ballistics Research Laboratory (BRL) led the way in ordnance research and development. BRL completed a new wing on Building 328 for the ENIAC in 1947.

In September 1950, the Ordnance Training Center was reestablished and the Ordnance Replacement Training Center established to assist in the training of Ordnance personnel. The next month, the Ordnance Training Command was created and included the Ordnance School. The same year, the Human Engineering Laboratory (HEL) was established under jurisdiction of the Ordnance Corps. HEL became one of the premier military organizations in charge of researching the relationship between humans and the machines they create. Another new organization was the Coating and Chemical Laboratory (C&CL), established in 1956 from the preexisting Development and Proof Services (D&PS).

## **B.2 HISTORY OF ABERDEEN PROVING GROUND (NORTH) DURING VIETNAM**

The 1960s was a time of change at Aberdeen Proving Ground, with the start of the Vietnam War and a major Army-wide reorganization. In 1962, the Army eliminated the Technical Services as separate headquarters and replaced them with the Army Material Command (AMC). At Aberdeen Proving Ground, this removed the Ordnance Training Command and redesignated the Ordnance School as the Ordnance Center and School. A new organization called the Test and Evaluation Command (TECOM) took control of the Army's test programs. Initially the new headquarters was located in Building 3071 until Building 314 was converted from a warehouse to an office building in 1969 (Smart and Sepulveda, 2011).

## **B.2.1 MATERIEL DEVELOPMENT AND TESTING**

TECOM assumed responsibility for all test and evaluation activities formerly conducted by the individual technical services. The purpose of this new command was to streamline engineering and user testing during the design and production phases of materiel development, while ensuring that materiel met military requirements and contractual specification. It was also charged to eliminate duplications of effort through integrated coordination of testing programs.

Many Cold War testing activities occurred in buildings or facilities constructed before or during World War II. The Main Front was the main test firing range and additional ranges and support buildings were located at Mulberry Point, an area primarily developed during World War II. Automotive performance testing continued at Munson Test Course. Additional facilities were constructed to support testing programs at a variety of firing ranges as required during the Cold War era. These facilities included a radar tracking site facility and a moving target simulator (Integrated Cultural Resources Management Plan Aberdeen Proving Ground, Maryland, 2008).

## **B.2.2 RESEARCH**

In 1961, Building 120 added a hypersonic wind tunnel which became operational in 1961. This new tunnel reached wind speeds of Mach 6.

Organized in 1962 at Aberdeen Proving Ground was the Limited Warfare Laboratory (LWL) which had the responsibility of creating rapid response strategies to urgent military requirements in remote areas.

In 1968 AMSAA completed a new laboratory building (Building 392) for their projects and a new test facility for testing radioactive materials against equipment was completed the same year. The year 1968 also saw another major reorganization. To consolidate several of the Army laboratories and research organizations at Aberdeen Proving Ground, the Army created the Aberdeen Research and Development Center (ARDC). This new organization consolidated the Ballistics Research Laboratory (BRL), Human Engineering Laboratory (HEL), Coating and Chemical Laboratory (C&CL), Nuclear Defense Laboratory (NDL), and, briefly, the new Army Materials Systems Analysis Activity (AMSAA) and these laboratories continued research throughout the Cold War era (Smart and Sepulveda, 2011).

As technology grew more sophisticated during the Cold War, the activities of the BRL expanded to include research on weapons systems of all types. Studies conducted at the laboratories included the interior ballistics trajectories, gun chambers and gun tube motion and wear, ignition, and propellant formulation and combustion (interior ballistics); aerodynamics of bombs, shell and other missiles and prepared firing tables (exterior ballistics); and, the mechanical damaging mechanisms producing the terminal effects of convention and special weapons (terminal ballistics). Studies were also undertaken to determine the vulnerability of military targets, weapons systems, munitions, and other equipment (vulnerability); the effects of radiation; improvements to weapon lethality; and, enhanced protection against enemy weapons. In addition, many types of research instruments were developed to perform, measure, and analyze the test results.

By the mid-1970s, the BRL compound occupied approximately 70 acres surrounding Headquarters Building 328. Building 328 also contained the aerodynamic range, the world's first large-scale, fully instrumented ballistic range that provided data on the aerodynamic characteristics of projectiles in flight. This range was constructed by the early 1950s. In 1982, the aerodynamics range was designated a National Historic Mechanical Engineering Landmark by the American Society of Mechanical Engineers. BRL laboratories included Interior Ballistics (Building 390), Exterior Ballistics (Buildings 120 and 327), Terminal Ballistics (Buildings 309 and 393), Concepts Analysis (Building 394), Library (Building 330), and Hollow Charge Facility (Building 391).

In addition to the main laboratory buildings, BRL operated a variety of specialized facilities. Many BRL field facilities were located on Spesutie Island and included barricaded positions for conducting live investigations into blast, penetration, or fragmentation effects. Spesutie Island was also the location of the Antenna Research and Electromagnetic Range Facility where millimeter wave control research and target acquisition, guidance, and control research were undertaken. Research into lasers was conducted at the Laser Propagation Research Facility.

The BRL maintained two shock tube facilities. The first was constructed to research shock wave phenomena and gauge calibrations used to measure blast parameters of shock waves produced by high explosive and nuclear detonations. In 1967, a second shock tube facility was constructed on Spesutie Island (Facility 1185). The original purpose of this facility was to study the effects of nuclear blasts on the operation of internal combustion engines. The facility was developed as part of the Nike-X generation of tactical nuclear missiles. Although constructed for the Nike-X project Office at Redstone Arsenal, the facility was operated by BRL (Integrated Cultural Resources Management Plan Aberdeen Proving Ground, Maryland, 2008).

In 1972, ARDC was disestablished and its laboratories either abolished or relocated to different organizations. The Land Warfare Laboratory (LWL, formerly the Limited Warfare Laboratory) was discontinued in 1974 and its mission transferred to the Human Engineering Laboratory (HEL). The Coating and Chemical Laboratory (C&CL) was also disestablished that year (Smart and Sepulveda, 2011).

### **B.2.3 EDUCATION**

The Ordnance School, opened in 1939, continued its training mission in the use and maintenance of ordnance throughout the Cold War era. In 1962, the school was placed under the authority of the Continental Army Command when the technical services were combined under Army Materiel Command. During the 1960s, attendance rose in response to the conflict in Vietnam. In 1967, the school graduated more than 1,100 automotive fuel and electrical repairmen to maintain Army ordnance equipment, particularly tanks and automotive vehicles.

During the Cold War era, the school was expanded through the construction of permanent facilities. During the 1950s, two concrete block school buildings (Buildings 3147 and 3148) were constructed, completing the design of the second campus. Additional repair and maintenance training facilities were also built. During the Cold War era, permanent masonry barracks and student support buildings were constructed to replace World War II temporary

barracks (Integrated Cultural Resources Management Plan Aberdeen Proving Ground, Maryland, 2008).

#### **B.2.4 OTHER CONSTRUCTION PROJECTS**

Perhaps the most important construction project in the 1960s was a new hospital complex. In 1964 a new 3-story medical facility was completed and was designated Kirk Army Hospital; dedicated to Major General Norman T. Kirk, a former Surgeon General of the Army (1943-1947).

As the United States entered the 1970s, a combination of economic conditions, various political changes in government, and the end of the Vietnam War, resulted in reduced government spending throughout the country. One effect of this change was the consolidation of Aberdeen Proving Ground and Edgewood Arsenal in 1971. Most of Edgewood's installation support missions were transferred to Aberdeen Proving Ground (North) including Civilian Personnel Offices, Security, and Military Police. Aberdeen Proving Ground's Material Testing Directorate took control of all range firings in both Aberdeen Proving Ground - North and South.

One new contribution during the 1970s was the completion of a new Ordnance Museum (Building 2601) in 1973. The Ordnance School also added another training facility (Building 5043) in 1974. Other construction included additional Bachelor Officers' Quarters, a new bowling center (Building 2342), and a Post Exchange (Building 2401) (Smart and Sepulveda, 2011).

#### **B.3 EARLY HISTORY OF EDGEWOOD ARSENAL (ABERDEEN PROVING GROUND-SOUTH)**

The Edgewood area of Aberdeen Proving Ground is approximately 13,000 acres. The Edgewood area was used for the development and testing of chemical agent munitions. From 1917 to the present, the Edgewood area conducted chemical research programs, manufactured chemical agents, and tested, stored, and disposed of toxic materials.

This section is excerpted from "History of Aberdeen Proving Ground – South," 2010.

The site of Aberdeen Proving Ground -South is Gunpowder Neck, a peninsula created by the Bush and Gunpowder Rivers in Harford County, Maryland. In October 1917, President Woodrow Wilson approved Gunpowder Neck as the site for the Army's first chemical weapons arsenal. During the winter, construction began on Gunpowder Neck Reservation, renamed Edgewood Arsenal. The power plant of Shell Filling Plant No. 1 was the first permanent building completed with the rest of Shell Filling Plant No. 1 becoming operational in April 1918. The Army also built four chemical agent production plants to produce chlorine, phosgene, chloropicrin, and mustard agent and completed its first chemical laboratory.

After World War I, the mission of the post's parent organization Chemical Warfare Services (CWS) was centralized at Edgewood Arsenal. At the onset of World War II, new construction projects began to create new equipment that no longer existed onsite by this time and to repair the extant chemical production plants. For research and development, the Chemical Warfare Service's Technical Command constructed a new laboratory to replace World War I-era

laboratories. The Chemical Warfare School set up a live agent gas obstacle training course for realistic chemical warfare training and trained over 21,600 troops in chemical warfare during this time.

Early in the war, President Franklin Roosevelt established a “no first use” policy for chemical weapons. Since neither Germany nor Japan chose to initiate chemical warfare, the enormous production of defensive equipment and chemical weapons all went into storage. Edgewood did, however, make many other non-chemical offensive and defensive contributions to the war.

Following World War II, the Chemical Warfare Service became the Chemical Corps and the Chemical Warfare Center was renamed the Army Chemical Center. At this time the Center took on two new challenges—first, organizing a Radiological Division to concentrate on various aspects of nuclear war. The division eventually became the Nuclear Defense Laboratories before moving to the Aberdeen area in the 1970s. The second task was developing a new generation of munitions, protective masks, protective clothing, and detection systems to deal with nerve agents. Additionally, a Wound Ballistic Laboratory was established in 1957 which contributed to the design of body armor. Meanwhile, the Chemical School grew such that it was moved to Fort McClellan, Alabama, in 1951.

#### **B.4 EDGEWOOD ARSENAL DURING VIETNAM**

From 1955 to 1975, the U.S. Army Chemical Corps conducted classified medical studies at Edgewood Arsenal, Maryland. The purpose was to evaluate the impact of low-dose chemical warfare agents on military personnel and to test protective clothing and pharmaceuticals. About 7,000 soldiers took part in these experiments that involved exposures to more than 250 different chemicals, according to the Department of Defense (DoD). Some of the volunteers exhibited symptoms at the time of exposure to these agents but long-term follow-up was not planned as part of the DoD studies.

The agents tested included chemical warfare agents and other related agents:

- Anticholinesterase nerve agents [Agent VX, sarin, and common organophosphorus (OP) and carbamate pesticides]
- Mustard agent
- Nerve agent antidotes atropine and scopolamine
- Nerve agent reactivators (e.g., the common OP antidote 2-PAM chloride)
- Psychoactive agents (LSD, PCP, cannabinoids, and Agent BZ)
- Irritants and riot control agents
- Alcohol and caffeine (<http://armyalliance.org/about-apg/history-of-apg/>).

This section is excerpted from “History of Aberdeen Proving Ground – South,” 2010, unless cited otherwise.

In 1962, the Chemical Corps was abolished as a separate headquarters and the center was merged into the new Army Material Command (AMC). The post headquarters also outgrew its old

building and moved to building E5101. Three years later, Edgewood Arsenal was designated the Army's Chemical Commodity Center.

The 1960s saw the construction of several new laboratory facilities on the post. The Amos A. Fries Laboratory (E3300) was built in 1963 for advanced studies of chemical compounds, radioactive materials, and toxins. The U.S. Army Environmental Hygiene Agency (AEHA) Wesley C. Cox Laboratory (E2100) was constructed in 1967. The John R. Wood Laboratory (E3100) was finished in 1968 and replaced the WWII Medical Research facility. The Harry C. Gilbert Laboratory (E5100) was dedicated in 1969 as a quality assurance chemical testing laboratory.

The arsenal also began replacing its World War I and World War II troop barracks with newer units in 1962. A year later, the arsenal completed a new dispensary (E4110) across from the troop barracks. A small wooden frame World War II chapel built in 1941 was replaced by a new larger brick chapel (E4620) in 1963 and the older chapel was later removed. The old enlisted men's service club was also replaced by the new Edgar D. Stark Recreation Center (E4140) in 1960.

Edgewood Arsenal provided extensive support to the growing conflict in Vietnam throughout the 1960s and 1970s. The arsenal provided many non-lethal riot and control devices and designed a new lightweight protective mask for the troops. The post also studied wound ballistics and contributed to the development of body armor.

During the week of July 14, 1969, personnel from Naval Applied Science Laboratory in conjunction with personnel from Limited War Laboratory conducted a defoliation test along the shoreline of Poole's Island, Aberdeen Proving Ground using Agent Orange and Agent Orange Plus foam (DoD 2012). The Laboratory was initially established to meet Army requirements anywhere in the world. With the deployment of U.S. Forces in Vietnam shortly after the establishment of the LWL, the lab's efforts became concentrated on the solution of urgent problems facing U.S. forces in combat in Southeast Asia. Although much of the materiel developed had application to other geographical areas and other forms of warfare, little attention was devoted to the troops outside of Vietnam (Mortland, 1974).

The image of the Army's chemical warfare program took a severe beating in 1969 after a widely-publicized chemical testing incident at Dugway Proving Ground, Utah, and growing environmental concerns over the land movement and sea disposal of old chemical munitions. The resulting Congressional concern with the chemical program and public opposition was reflected in reduced budgets and personnel cutbacks. In 1969, President Richard Nixon shut down the production of lethal chemical weapons at Edgewood.

In 1971, the post became a portion of Aberdeen Proving Ground. Edgewood Arsenal (the installation) became known as the Edgewood Area of Aberdeen Proving Ground. Edgewood Arsenal (the organization) continued to exist until 1977 when it was broken up and its mission and personnel assigned to various new and smaller organizations. There was little new construction in the 1970s.

## B.5 PROPERTIES TYPES

More than 880 building were constructed at Aberdeen Proving Grounds during the Cold War (1946-1989). In Aberdeen, there were 570 buildings constructed and in Edgewood area, there were 268. The majority, (431 or 49%) were housing, hospitals, utilities, or other community support. There were 75 administrative buildings, 126 supply buildings, and 18 maintenance buildings constructed. Research, development, testing, and evaluation buildings totaled 104, and operations and training buildings totaled 84. Of the 880 buildings constructed during the Cold War era, 282 were constructed in one decade of the Vietnam War between 1961 and 1970. Of these buildings, approximately 39% housing, hospitals, utilities, or other community support; 4% were maintenance; 9% were for supply; 16% were for research, development, testing, and evaluation; 11% were for administrative purposes; and 21% were for operations and training (ICRMP 2008).

Maryland Historic Trust National Register of Historic Places (NRHP)-Eligibility Review Forms were located for a few of the Cold War buildings and are summarized in Table B-1 below:

**Table B-1. Maryland Historic Trust National Register of Historic Places Eligibility for Select Cold War Buildings at Aberdeen Proving Ground.**

<b>Building Number</b>	<b>Location</b>	<b>Historic Use</b>	<b>Date of Construction</b>	<b>NRHP determination</b>
393	Aberdeen	Nuclear, Physics & Chemistry Lab - radiological testing	1968	Eligible under A & G
718	Aberdeen	Temporary ammunition hut	1966	Not eligible
860	Aberdeen	Nuclear, Physics & Chemistry Lab - Army Pulse Reactor facility	1968	Eligible under A & G
938	Aberdeen	Range facility - ordnance mission	1967	Not eligible under G (Eligible under A)
945	Aberdeen	Safety shelter - support for ordnance mission	1967	Not eligible under G (Eligible under A)
948	Aberdeen	Safety shelter - support for ordnance mission	1967	Not eligible under G (Eligible under A)
950	Aberdeen	Safety shelter - support for ordnance mission	1967	Not eligible under G (Eligible under A)
952	Aberdeen	Safety shelter - support for ordnance mission	1967	Not eligible under G (Eligible under A)
989	Aberdeen	Range facility - ordnance mission	1968	Not eligible under G (Eligible under A)
1114	Aberdeen	Administrative and test building - advanced electronic and antenna development	1965	Eligible under A & G
1190	Aberdeen	Range facility	1966	Not eligible under G (Eligible under A)
0391A	Aberdeen	Administrative/General Purpose facility	1965	Not eligible under G (Eligible under A)

<b>Building Number</b>	<b>Location</b>	<b>Historic Use</b>	<b>Date of Construction</b>	<b>NRHP determination</b>
1130A	Aberdeen	range/testing house	1962	Not eligible under G (Eligible under A)
E3300	Edgewood	Part of chemical warfare research and development complex	1966	Eligible under A & G
E5951	Edgewood	Nuclear Defense Lab - detection and use of chemical agents	1968	Eligible under A & G
948	Aberdeen	Safety shelter - support for ordnance mission	1967	Not eligible under G (Eligible under A)
950	Aberdeen	Safety shelter - support for ordnance mission	1967	Not eligible under G (Eligible under A)

The above buildings were evaluated when they were less than 50 years old and under a general Cold War context, not specifically for contributions to the Vietnam War. Now that many of the Vietnam War-era constructed building are 50 years of age, they may be eligible for listing on the national register. Buildings, structures and ranges that may have significance within this Vietnam War context include those associated with:

- Weapons systems develop during and used in the Vietnam War
- Research and testing of lethal and non-lethal chemical and biological warfare agents used in Vietnam
- Equipment and materiel development and testing in support of the war effort, including non-lethal riot and control devices, and new lightweight protective mask
- Limited Warfare Laboratory, Ballistics Research Laboratory, Human Engineering Laboratory, and Coating and Chemical Laboratory - The Amos A. Fries Laboratory (E3300), Wesley C. Cox Laboratory (E2100), John R. Wood Laboratory (E3100) was finished in 1968, and the Harry C. Gilbert Laboratory (E5100)
- Additions and changes to the Ordnance School
- Repair and maintenance training facilities

Some housing, hospital, and community support building may contribute to a Vietnam War district.



Source: Spacewar.com

**Figure B-1: Aberdeen Proving Ground.**

Mission-related buildings constructed during this time period generally supported specific research, development, testing and evaluation programs or educational buildings. Often test facilities were unique buildings designed to house specific functions (ICRMP 2008).

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**APPENDIX C:  
FORT LEE – VIETNAM WAR HISTORIC CONTEXT AND RESOURCE  
TYPES**

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## **C.0 FORT LEE**

### **C.1 EARLY HISTORY OF FORT LEE**

Fort Lee, located in Prince George County, Virginia on 4,500 acres near the tri-cities of Hopewell, Petersburg, and Colonial Heights was first established as Camp Lee in 1917. Camp Lee was established as a state military cantonment to meet World War I demands and eventually became a divisional training camp. In 1921 the camp was completely closed and all but one building was razed. The remaining building, The Davis House, served as post headquarters (New South Associates, Inc., 2011).

In the late 1930s with World War II looming, the War Department ordered the rebuilding of Camp Lee on the site of the original base. Much of the original acreage of Camp Lee was used again for the creation of the second base. The new base would hold elements of the Army Quartermaster Corps (QMC). By February 1941, the Quartermaster Replacement Training Center (QMRTC) was opened and the school, previously located in Philadelphia, was entirely relocated to Camp Lee. By that October, the new school was teaching all Quartermaster courses to both enlisted and officer training classes. The QMRTC was deactivated in 1947 but reestablished during the Korean War, training 31,000 troops. The QMRTC continued training operations at Fort Lee until 1953 (New South Associates, Inc., 2011).

In 1952, the Quartermaster Training Command (QMTC) took the place of the Quartermaster Center and was charged with directing all quartermaster training at Fort Lee and at other training sites. The QMTC took over operation of the Quartermaster School, thus overseeing all soldiers training in quartermaster operations (New South Associates, Inc., 2011).

Part of the Logistics division of the Chief of Staff, the Army Supply Management Course, was established at Fort Lee in 1954. This venture and several other non-QMC undertakings were established at the post during this period. In April 1957, the Army Communications Agency established a field post at Fort Lee as part of the Army's global communication network. The Fort Lee Air Station, home to the Washington Air Defense Sector (WADS), was established in 1956, and was enhanced in 1956-1957 with the addition of the Semi-Automatic Ground Environment (SAGE) system. The system provided warning to WADS of incoming hostile aircraft so that countermeasures could be implemented (New South Associates, Inc., 2011).

In 1962, the Army reorganized and created the position of Quartermaster General, which led to the heightening of Fort Lee to a Class I military installation under the Second Army. At this time, Fort Lee was designated as the official Home of the QMC, with the Quartermaster School becoming part of the Continental Army Command service school system. At Quartermaster school, students learn to provide units with food, water, petroleum, repair parts and other field services during a military or relief operation (<https://www.goarmy.com>).

### **C.2 HISTORY OF FORT LEE PRIOR TO AND DURING THE VIETNAM WAR**

The 1950s and 60s witnessed almost nonstop modernization efforts as Fort Lee's temporary wooden barracks, training facilities, and housing units were replaced by permanent brick and cinderblock structures. New multi-storied brick barracks were built in the mid-50s, along with whole communities of Capehart housing. Kenner Army Hospital opened in 1962, replacing the

remnants of the old WWII era facility; and the privately-funded, new brick Quartermaster Museum opened its doors in 1963 (<http://www.militarybases.us/army/fort-lee/>).

New teaching methods were incorporated into the training at Fort Lee as the technology became available. A closed-circuit television station was established in 1960 for classroom instruction use. This type of technology allows troops to receive training while they are at remote locations, or deployed. The building housing the Quartermaster School, built in 1941, was replaced with a permanent building, Mifflin Hall, in 1961. It also served as the Headquarters (HQ) of the Quartermaster School (Griffits, 2010).

The three-story Mifflin Hall included wide variety of classrooms capable of accommodating nearly 700 students, offices for upwards of 415 staff and faculty members, a bookstore, mailroom, barber shop, 300-plus-seat cafeteria and a Main Auditorium with over 500 seats. A 66-seat-capacity Model Theater on the second floor demonstrated in a very concrete fashion 1960s style, state-of-the-art "over the shore logistics." During the 1960s and early 1970s, tens of thousands of student graduates passed through Mifflin Hall due to the Vietnam War. Mifflin Hall has since been demolished (<http://www.qmmuseum.lee.army.mil/research/mifflin-hall.html>).

The rapid logistics buildup in Vietnam after 1965 signaled an urgent need for many more Quartermaster Soldiers. For a time, the School maintained three shifts, and round-the-clock training. A Quartermaster Officer Candidate School opened in 1966, for the first time since World War II. A mock Vietnamese "village" was created on post to familiarize trainees with guerrilla tactics and the conditions they could expect fighting in the jungles of Southeast Asia. Part of the sixties-era Quartermaster training program also saw the first widespread local use of automated data processing equipment (New South Associates, Inc., 2011).

Quartermaster officers are responsible for making sure equipment, materials and systems are available and functioning for missions. The quartermaster officer provides supply support for soldiers and units in field services, aerial delivery, and material and distribution management. Quartermaster officers learn leadership skills, tactics, maintenance and operational aspects of weapons and vehicles used in a quartermaster platoon (<https://www.goarmy.com>).

As the Vietnam War wound down in the early- to mid-1970s, the Army went through a period of reorganization. The Army also introduced new doctrine, weapons, and equipment, and unveiled new training and leader development techniques. In 1973, the Continental Army Command (CONARC) headquarters at Fort Monroe was replaced by the U.S. Army Training and Doctrine Command (TRADOC). At Fort Lee, the U.S. Army Logistics Center was created to serve as an "integrating center" for the Quartermaster, Transportation, Ordnance, and Missile and Munitions centers and schools – the traditional combat service support branches. There was a post reorganization and realignment in 1990. The Logistics Center, which heretofore had been a tenant activity, was redesignated the U.S. Army Combined Arms Support Command (CASCOM), and the CASCOM Commander became the Installation Commander as well.

Since World War II, Fort Lee installation has played host to a growing number of tenant activities, such as: the Army Logistics Management Center (ALMC), Readiness Group Lee, Materiel Systems Analysis Activity, Gerow U.S. Army Reserve Center, Defense Commissary Agency (DECA), USAR 80th Division, and several other Department of Army and Department

of Defense activities. A whole Vietnam QM OCS new three-story wing was added to ALMC. Also, the Quartermaster NCO Academy and barracks complex was completed, as well new on-post child care and physical fitness centers. Throughout this period the Quartermaster School routinely graduated 20-25,000 students annually, and ALMC another 10-12,000 (<http://www.militarybases.us/army/fort-lee/>).

### **C.3 U.S. ARMY LOGISTICS MANAGEMENT CENTER**

The U. S. Army Logistics University (ALU) was a 12-week Army Supply Management Course established on 1 July 1954 at Fort Lee. The course was established as a Class II Activity of the Quartermaster General, but with direct control exercised by the Deputy Chief of Staff for Logistics (DCSLOG) at the Department of the Army (DA) headquarters level. Effective 1 May 1956, the U. S. Army Management Center (ALMC) was established at Fort Lee under the operational control of the DA DCSLOG, and shortly thereafter five new functional courses in management of requirements, procurement, distribution, maintenance, and property disposal were added to the curriculum. In September 1956, the ALMC curriculum was expanded to include correspondence courses and use of accredited instructors in off-campus modes. Logistics research and doctrine were added as ALMC missions in September 1958 (<http://www.alu.army.mil/about/history/>).

On 1 August 1962, ALMC was placed under the command of the U. S. Army Materiel Command (AMC). Under AMC, new emphasis was placed on instruction in management of research and development, acquisition management, and integration of all phases of the life cycle of materiel. Army Logistician was established in 1969 by DA as the official magazine for Army logistics. Its mission was to publish timely, authoritative information on Army and Defense logistics plans, programs, policies, operations, procedures, and doctrine for the benefit of all Army personnel, provide a medium for disseminating and exchanging logistics news and information, and create a forum for Soldiers and DA civilians to express original, creative, innovative thought about logistics support. In May 1971, ALMC absorbed courses previously taught by the Army Management School (<http://www.alu.army.mil/about/history/>).

ALMC's educational mission included the comprehensive professional development of military officers. In March 1973, DA approved establishment of two Cooperative Degree Programs between the ALMC and Florida Institute of Technology (Florida Tech) (<http://www.alu.army.mil/about/history/>).

### **C.4 VIETNAM WAR-ERA BUILDINGS**

As of 14 September 2016, there were 45 buildings and structures listed in the Fort Lee real property inventory as being constructed between 1962 and 1975. Eleven of the remaining buildings have been previously evaluated for historical significance. Table C-1 lists the 11 previously evaluated buildings. Table C-2 lists the remaining 34 buildings. The following provides an assessment of the buildings listed in Table C-2 and their association and eligibility under this historic context.

**Table C-1 – Vietnam War-Era Buildings Previously Evaluated.**

Building Number	Historic Use	Date of Construction	NRHP determination	Survey
3127	Administration Building / Headquarters Building	1962	Not eligible	Griffits, 2010
5218	Museum	1963	Not eligible	Griffits, 2010
8130	Medical /Health Clinic	1962	Not eligible	Griffits, 2010
8131	Utilities/Heating plant	1962	Not eligible	Griffits, 2010
8133	Housing/Officers Quarters	1962	Not eligible	Griffits, 2010
8135	Administration Building	1962	Not eligible	Griffits, 2010
12402	Administration Building / Army Reserve Center	1962	Not eligible	Griffits, 2010
12403	Vehicle Maintenance	1962	Not eligible	Griffits, 2010
3620	Fire Station	1963	Not eligible	New South Associates, Inc., 2011
6268	Administration Building	1962	Not eligible	New South Associates, Inc., 2011
8140	Storage Shed	1962	Not eligible	New South Associates, Inc., 2011

**Table C-2 – Extant Vietnam War-Era Buildings.**

Building Number	Use / Type	Date of Construction	Date of Renovation	Square Footage	Notes / NRHP Determination Under This Context
4229	Administration (listed on 1972 master plan as Bachelor Officer Quarters)	1972	N/A	49,646	Not eligible
6044	Museum storage	1967	N/A	5,000	Not eligible
6045	Education center	1967	N/A	4,138	Additional research needed, possible district
6046	Administration	1967	N/A	4,138	Additional research needed, possible district
6047	Education center	1967	N/A	4,138	Additional research needed, possible district
6048	Education/Training	1967	N/A	4,138	Additional research needed, possible district
6049	Education/Training	1967	1986	4,138	Additional research needed, possible district
6050	Education/Training	1967	1986	4,138	Additional research needed, possible district
6051	Repair facility	1967	1986	4,138	Additional research needed, possible district
6052	Education/Training	1967	1986	4,138	Additional research needed, possible district
6053	Education/Training	1967	1997	4,138	Additional research needed, possible district

Building Number	Use / Type	Date of Construction	Date of Renovation	Square Footage	Notes / NRHP Determination Under This Context
6055	Education/Training	1967	1997	4,138	Additional research needed, possible district
6056	Administration	1967	N/A	4,138	Additional research needed, possible district
6213	Storage	1970	N/A	784	Not eligible
6253	Storage	1970	N/A	320	Not eligible
6269	Warehouse	1964	N/A	4,216	Not eligible
6274	Vehicle maintenance shop	1970	1986	4,787	Not eligible
6275	Vehicle maintenance shop	1970	1986	4,787	Not eligible
6276	Oil storage	1970	N/A	120	Not eligible
6279	Dispatch	1970	1986	195	Not eligible
6280	Fuel/POL storage	1970	N/A	120	Not eligible
6283	Storage shed	1971	N/A	1,800	Not eligible
8025	Housing Admin and Officers' Quarters	1975	N/A	69,762	Not eligible
8026	Housing/Officers Quarters	1975	1999	69,762	Not eligible
8204	Dental clinic	1971	N/A	20,479	Not eligible
9025	Main exchange, café, Warehouse,	1972	N/A	74,172	Not eligible
9030	Post office	1973	N/A	9,240	Not eligible
9035	Auto skill center	1969	N/A	17,332	Not eligible
9040	Bowling center	1971	1987	21,328	Not eligible
10600	Chapel	1971	1987	25,350	Not eligible
11020	Storage	1966	N/A	205	Not eligible
11430	Education/Training (labeled petroleum laboratory raining building on 1971 drawings)	1971	N/A	26,587	Additional research needed, possible district
11806	Golf course maintenance	1975	N/A	2,100	Not eligible
12500	Education/Training/Televideo Center, Cafe	1970	N/A	179,462	Additional research needed, possible eligibility

Of the 34 buildings in Table C-2, buildings 6044, 6213, 6253, 6269, 6276, 6279, 6280, 6283, 11020, and 11806 were constructed and used for equipment or materials storage. These buildings lack significant associations with logistics training to support the Vietnam War (events) and individuals important to history that would qualify them as meeting Criterion A or B. The buildings are a common, non-distinctive example of utilitarian construction lacking architectural distinction sufficient to meet Criterion C. These buildings would not likely be recommended as eligible for listing in the NRHP under this or another historic context.

Buildings 6274 and 6275 were constructed for vehicle maintenance. These are a common type of facility constructed on military installations to repair and maintain vehicles and equipment. These buildings lack significant associations with logistics training to support the Vietnam War (events) and individuals important to history that would qualify them as meeting Criterion A or B. The buildings are a common, non-distinctive example of utilitarian construction lacking architectural distinction sufficient to meet Criterion C. These buildings would not likely be recommended as eligible for listing in the NRHP or another historic context.



Source: J. Aaron

**Figure C-1: Buildings 6274 and 6275.**

Buildings 4229, 8025, 8026, 8204, 8025, 9030, 9040, and 1060 were constructed to house officers or provide community support facilities to soldier and base personnel. These buildings are common type of facilities constructed on military installations to provide housing, recreational, spiritual, and medical services. These buildings lack significant associations with logistics training to support the Vietnam War (events) and individuals important to history that would qualify them as meeting Criterion A or B. The buildings are constructed of brick, a common construction material used on this base since the 1950s. The designs are mid-century modern but do not represent the work of a master, or that possess high artistic values sufficient to meet Criterion C. These buildings would not likely be recommended as eligible for listing in the NRHP or another historic context.



Source: J. Aaron

**Figure C-2: Building 8204.**



Source: J. Aaron

**Figure C-3: Building 8025.**



Source: J. Aaron

**Figure C-4: Building 9025.**

Building 11430 is an irregular shaped approximately 177 feet long by 96 feet wide, one story with flat roof. It has brick facing and mid-century modern details, including precast concrete fascia, pre-cast concrete panels, vertical single pane windows set in concrete sills. Entrances are aluminum and tempered glass store-front doors flanked by side and transom lights. The building originally contained two class rooms, three lab rooms, administrative and instructor offices, break room, latrine, storage, and utilities rooms. The 2010 master plan shows an addition on the building, almost doubling its size. This building is associated with a building up of needed trained Quartermaster personnel during the Vietnam War (Criterion A). The building lacks significant association with individuals important to history that would qualify them as meeting Criterion B. The building is constructed of brick, a common construction material used on this base since the 1950s. The designs are mid-century modern but do not represent the work of a master, or that possess high artistic values sufficient to meet Criterion C. This building would not likely be recommended as individually eligible for listing in the NRHP; however, there is the possibility that it with other education facilities of the same era could form a cohesive district, if enough integrity remains.

Building 12500 is an irregular-shaped, red brick building. The building has a quarter circle 400-seat auditorium wrapped on two sides by 176-foot by 189-foot, two story “L” shaped wings with class rooms. A 45-foot by 256-foot four story wing abuts the northeast side. This wing has over 40 rooms per floor. The exterior facades of wings are punctuated by 4-foot by 6-foot windows: 96 windows on the west elevation and 86 on the east elevation. The roofs are flat, with the roof over the auditorium in two tiers. This building is associated with a building up of



Source: Google Maps

**Figure C-5: Building 12500.**

needed trained Quartermaster personnel during the Vietnam War (Criterion A). The buildings lack significant associations with individuals important to history that would qualify them as meeting Criterion B. The building is constructed of brick, a common construction material used on this base since the 1950s. The design is mid-century modern and is distinctive and could be sufficient to meet Criterion C. This building would likely be recommended as individually eligible for listing in the NRHP, if it retains integrity.

Buildings 6045, 6046, 6047, 6048, 6049, 6050, 6051, 6052, 6053, 6055, and 6056 were of the same design and constructed at the same time. They were listed as semi-permanent on the 1972 master plan. The buildings are 40 feet wide by 122 feet long, one story, rectilinear in floor plan, with a metal, raised-seamed, gabled roof. In 1986, the buildings underwent extensive exterior renovations, including new vinyl siding, added roof insulation, and replacement of doors and windows. The northwest and southeast elevations (long sides) have window openings 12' 2" wide by 4' 2" tall that contain three aluminum-sashed, double hung, windows. The short elevations have single aluminum sashed double hung windows measuring 3' 8" wide by 4' 2" tall, or two aluminum-sashed, double hung windows in an opening measuring 6' 10" wide by 4' 2" tall. Pedestrian doors are insulated steel, double doors; single steel door with louver; or aluminum store-front type door with tempered glass. These buildings were generally divided into two class rooms with a latrine and storage. During the 1980s, the buildings had interior renovations that reconfigured these spaces to include a second latrine for women, new finishes and, in some cases, a change to the floor plan. These buildings are associated with a building up of needed trained Quartermaster personnel during the Vietnam War (Criterion A), but the buildings lack significant associations with individuals important to history that would qualify them as meeting Criterion B. The buildings are a common, non-distinctive example of utilitarian construction lacking architectural distinction sufficient to meet Criterion C. These buildings would not likely be recommended as individually eligible for listing in the NRHP; however, there is the possibility they could form a cohesive district, if enough integrity remains.



Source: J. Aaron

**Figure C-6: Buildings 6047-6056, looking north.**

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**APPENDIX D:  
TABLE OF PRIMARY LOGISTICS BASES AND ASSIGNED UNITS**

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Logistics Bases			
Atlanta Army Depot	Georgia	N/A	U.S. Army
Camp Pendleton	California	Force Logistics Command	U.S. Marine Corps
Camp Pendleton	California	Marine Corps Force Logistics Support Group	U.S. Marine Corps
Camp Pendleton	California	1 <sup>st</sup> Combat Engineer Battalion	U.S. Marine Corps
Camp Pendleton	California	1 <sup>st</sup> Maintenance Battalion	U.S. Marine Corps
Camp Pendleton	California	9 <sup>th</sup> Engineer Battalion	U.S. Marine Corps
Camp Pendleton	California	1 <sup>st</sup> Marines Logistics Group	U.S. Marine Corps
Defense Supply Agency Depot	Virginia	N/A	U.S. Army
England AFB	Louisiana	319 <sup>th</sup> Troop Carrier Squadron (Commando)	U.S. Air Force
Fort Benning	Georgia	58 <sup>th</sup> Transportation Battalion	U.S. Army
Fort Bragg	North Carolina	528 <sup>th</sup> Ammunition Battalion (Provisional)	U.S. Army
Fort Bragg	North Carolina	57 <sup>th</sup> Transportation Company	U.S. Army
Fort Bragg	North Carolina	44 <sup>th</sup> Medical Brigade	U.S. Army
Fort Devens	Massachusetts	93 <sup>rd</sup> Transportation Company	U.S. Army
Fort Eustis	Virginia	8 <sup>th</sup> Transportation Group (Motor Transport)	U.S. Army
Fort Eustis	Virginia	500 <sup>th</sup> Transportation Group (Motor Transport)	U.S. Army
Fort Eustis	Virginia	1 <sup>st</sup> Transportation Company (GOER)	U.S. Army
Fort Eustis	Virginia	4 <sup>th</sup> Transportation Command (terminal Command)	U.S. Army
Fort Eustis	Virginia	11 <sup>th</sup> Transportation Battalion (terminal)	U.S. Army
Fort Eustis	Virginia	394 <sup>th</sup> Transportation Battalion (terminal)	U.S. Army
Fort Eustis	Virginia	10 <sup>th</sup> Transportation Battalion (terminal)	U.S. Army
Fort Eustis	Virginia	604 <sup>th</sup> Composite Service Company	U.S. Army
Fort Knox	Kentucky	114 <sup>th</sup> Air Mobile Company	U.S. Army
Fort Lee	Virginia	Air Delivery Platoon	U.S. Marine Corps
Fort Lee	Virginia	402 <sup>nd</sup> Transportation Corps Detachment	U.S. Army
Fort Lewis	Washington	8 <sup>th</sup> Transportation Company	U.S. Army
Fort Lewis	Washington	3 <sup>rd</sup> Ordnance Battalion (Ammo)	U.S. Army
Fort Monmouth	New Jersey	U.S. Army Electronics Command	U.S. Army
Fort Ord	California	33 <sup>rd</sup> Transportation Company	U.S. Army
Fort Sill	Texas	81 <sup>st</sup> Transportation Company	U.S. Army
Griffiss AFB	New York	Rome Air Depot	U.S. Air Force
Hill AFB	Utah	Ogden Air Materiel Area / Air Logistics Complex	U.S. Air Force

Logistics Bases	Location	Units / Designations	Branch
Hurlburt Field	Florida	319 <sup>th</sup> Troop Carrier Squadron (Commando)	U.S. Air Force
Kelley AFB	Texas	San Antonio Air Materiel Area / Air Logistics Center	U.S. Air Force
Marine Corps Base Hawaii	Hawaii	Combat Logistics Battalion 3	U.S. Marine Corps
Marine Corps Logistics Base Albany	Georgia	N/A	U.S. Marine Corps
Marine Corps Logistics Base Barstow	California	N/A	U.S. Marine Corps
MCAGCC Twentynine Palms	California	3 <sup>rd</sup> Combat Engineer Battalion	U.S. Marine Corps
MCAS Miramar	California	Marine Corps Fleet Replacement Squadron	U.S. Marine Corps
MCAS Yuma	Arizona	Marine Corps Fleet Replacement Squadron	U.S. Marine Corps
Naval Base San Diego	California	Military Sealift Command / Military Sea Transportation Service / Pacific	U.S. Navy
Naval Construction Battalion Center, Port Hueneme	California	32 <sup>nd</sup> Naval Construction Regiment	U.S. Navy
Naval Construction Battalion Center, Port Hueneme	California	Navy Mobile Construction Battalion Three	U.S. Navy
Naval Construction Battalion Center, Port Hueneme	California	Navy Mobile Construction Battalion Nine	U.S. Navy
Naval Construction Battalion Center, Port Hueneme	California	Navy Mobile Construction Battalion Ten	U.S. Navy
Naval Supply Depot	Guam	7 <sup>th</sup> Fleet	
Newport News	Virginia	Material Supply and Maintenance Battalion	U.S. Marine Corps (Reserve)
Pearl Harbor	Hawaii	Service Squadron 5	U.S. Navy
Pope AFB	North Carolina	Mule Train/346 <sup>th</sup> Tactical Airlift Squadron	U.S. Air Force
Red River Army Depot	Texas	80 <sup>th</sup> General Service Group	U.S. Army
Red River Army Depot	Texas	80 <sup>th</sup> General Support Unit	U.S. Army
Sacramento Air Depot / Sacramento Air Materiel Area / Air Logistics Center	California	Air Force Logistics Command	U.S. Air Force
San Francisco	California	7 <sup>th</sup> Fleet Post Office	U.S. Navy
Tinker AFB	Oklahoma	Oklahoma City Air Materiel Area /Air Logistics Complex	U.S. Air Force
Travis Air Force Base	California	Military Airlift Command	U.S. Army, U.S. Air Force
Warner Robbins AFB	Georgia	Air Force Materiel Command	U.S. Air Force
Wright Patterson AFB	Ohio	Logistics Activation Task Force	U.S. Air Force
Wright Patterson AFB	Ohio	Air Force Materiel Command	U.S. Air Force
Yakima Training Center Army Base	Washington	26 <sup>th</sup> General Support Unit	U.S. Army

**APPENDIX E:  
CONTRIBUTORS**

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## Jayne Aaron, LEED AP Environmental Planner / Architectural Historian

### Education

- Master of Environmental Policy and Management, University of Denver
- Bachelor of Environmental Design (Architecture and Planning), University of Colorado, Boulder

### Summary

Ms. Aaron has over 20 years of hands-on experience as a project manager, architectural historian / cultural resources specialist, and NEPA specialist. Ms. Aaron meets the qualification of the Secretary of the Interior for Architectural Historian. She has been involved in all aspects of Section 106 compliance for cultural resources, including the evaluation of US Coast Guard vessels, campgrounds, civil works projects, numerous military installations, and other buildings and structures. She has also designed innovative strategies and management plans to integrate new and existing regulations, policies, and guidance, and cultural and natural resource management activities into single planning and compliance programs, including NEPA, Environmental Justice, and the National Historic Preservation Act, and Native American Graves Protection and Repatriation Act of 1990. As part of her compliance responsibilities, Ms. Aaron has participated in consultation and meetings with a variety of stakeholder groups, including state and federal regulators, Indian tribes, environmental consultants, and the public. She has written public releases, given presentations, responded to public comments, and facilitated meetings for various sized groups. She has also designed and developed training courses and has taught in numerous educational and training programs.

As an Architectural Historian and Cultural Resources Specialist, she has extensive experience evaluating a large variety of historic properties for many federal agencies, developing management plans and strategies, and, when necessary, completing mitigation strategies for historic buildings, structures, and districts. The following are just a few project examples to illustrate this experience:

### Project Experience

**Vietnam War: Helicopter Training and Use on US Military Installations Vietnam Historic Context Subtheme, Legacy 14-739.** Ms. Aaron was the project manager and principal investigator to develop a historic context and typology for Vietnam War (1962–1975) helicopter-related resources on Department of Defense (DoD) installations in the United States. The report can be used to identify and evaluate Vietnam War helicopter-related facilities at DoD military installations in the United States. This report’s historic context provides military cultural resources professionals with a common understanding for determining the historical significance of Vietnam War helicopter-related facilities, greatly increasing efficiency and cost-savings for this necessary effort.

**Wake Atoll Hurricane Damage Assessment, Cultural Resources Inventory, and HABS Documentation for Air Force, Wake Island.** Ms. Aaron was the project manager and principal investigator for the survey and evaluation of 128 buildings and structures for listing on the National Register of Historic Places (NRHP). Ms. Aaron also assessed 139 features that comprise the Wake Island National Historic Landmark for damage caused by Typhoon Ioke in 2006. Upon completion of the inventory, Ms. Aaron prepared the HABS documentation for the air terminal on Wake Island. The package included 123 black and white 4 x 5 photographs of the exterior, interior, and architectural details, and architectural drawings and a Level II report.

**Project Manager / Principal Investigator. DoD Legacy Project.** A National Historic Context for the Hush House (Test Cell) on Current DoD Installations Nationwide and Evaluation of a Representative Sample of Extant Hush Houses on DoD Installations. Ms. Aaron was the project manager and principal investigator for the development of a historic context, survey, and evaluation of a sample of ANG and other military branch hush houses. Ms. Aaron led a team of researchers to develop a context detailing the military development and use of the hush house at installations throughout the United States, spanning from WWII through the Cold War. The report provides an understanding of the evolution of test cell structures and technology from propeller testing rigs to jet engine development and maintenance. The context further examines different types of hush houses with attention being paid to technical demands, their spatial arrangement on the landscape, function, and other influences, such as fire considerations, military construction and design regulations, federal FAA regulations, aircraft changes with related maintenance practices, and requirements based on surrounding population density and “good neighbor” policies. The report includes examples of hush houses from all military branches, addressing similarities and differences based on service branch, function, and aircraft.

**Principal Investigator. Determination of Eligibility and Determination of Affect for Building 2050, Fairchild Air Force Base, Spokane Washington.** Ms. Aaron developed a Determination of Eligibility and Determination of Affect for a World War II-constructed hangar at Fairchild Air Force Base in support of an environmental assessment. The project was on a short time schedule and both the DOE and DOA were conducted simultaneously and presented in the same report. The entire process, including consultation with the SHPO and the Spokane County Historic Preservation Office, was completed in less than four months.

**Project Manager / Principal Investigator. Cultural Resource Evaluations for the Air National Guard.** Ms. Aaron was the Project Manager and Technical Lead for aboveground cultural resources on the development of four Air National Guard Base (ANGB) installations. The installations are Camp Perry ANG Station and its subinstallation Plumbrook ANG; Alpena ANGB and its subinstallation Grayling Weapons Range; Klamath Falls ANGB; and Des Moines ANGB. The team is identifying significant cultural resource properties and making recommendations on potential National Register of Historic Places eligibility, special protection requirements, and management requirements. Ms. Aaron evaluated over 275 buildings and structures at these four installations.

**Project Manager, Case Study for Preserving a DoD Historic Building and Achieving LEED Certification for Renovation Project.**

Ms. Aaron was the project manager for a Legacy project to determine the feasibility of renovating a DoD historic building to achieve LEED certification and preserve the historic integrity of the building. The purpose of this feasibility study is to apply existing guidance and other studies and involve military and industry experts into an actual renovation scenario to determine whether preservation, sustainability, and energy conservation goals can be incorporated, and to understand the costs, benefits, and tradeoffs of doing so. The building is Indiana Army National Guard (INARNG), Indianapolis Stout Field Building 5. Building 5 was built in 1941 as a National Defense Project funded by the federal New Deal Works Projects Administration. The feasibility study and information provided as part of this project will be used by the INARNG in the design and construction phases of the renovation of Building 5.

**Project Manager / Principal Investigator. Historic American Engineering Record (HAER) for the Northwest Field, Andersen Air Force Base, Guam.**

Ms. Aaron is managing, designing, and developing the HAER for the Northwest Field Complex at Andersen Air Force Base, Guam, which is eligible for listing on the National Register of Historic Places. The final HAER documentation is mitigation for the proposed adverse effects to the field. The package will record five historic contexts, including large format photography and drawings to depict the critical role that the field played in World War II and the firebombing of Japan.

**Historical and Architectural Overview of Aircraft Hangars of the Reserves and National Guard Installations from World War I through the Cold War, DoD Legacy Project.**

Ms. Aaron was the project manager for the development of a nationwide historical and architectural context for US Military Reserve and National Guard installations. The report provides a context for understanding the history and design of Reserve and National Guard hangars, an inventory of hangars, and methodology for applying the context to hangar evaluations.

**Regional Cold War History for Military Installations, Including Air Force, Navy, and Army in Guam and the Northern Mariana Islands, DoD Legacy Project.**

Ms. Aaron was the project manager for the development of a Regional Cold War Context for US military installations in Guam and the Commonwealth of the Northern Mariana Islands (CNMI). The report presents a framework for determining NRHP eligibility within the definitive context. This context focuses on the specific relevance of US military installations on Guam and CNMI, with emphasis on two primary events when the Cold War went “hot,” namely, the Korean and Vietnam Wars and the proximity of Guam and CNMI to these war fronts.

## **Steven Christopher Baker, PhD, Historian**

### **Education**

- Doctorate, History, University of Colorado, Boulder
- Master of Arts, New Mexico State University
- Bachelor of Arts, History, Texas Tech University

### **Summary**

Dr. Baker has over 15 years of experience as a professional historian. His proficiency spans several sub-disciplines, including traditional historical research and analysis, cultural resource management, and litigation support.

Dr. Baker has conducted specialized studies of water and agriculture in the Southwest, especially as it relates to the construction of reclamation (dam) projects. Other projects he has worked on include studies of the Manhattan Project and Nuclear West, migrant railroad labor during World War II, and the role of the United States / Mexico border and the US military during the Mexican Revolution.

Dr. Baker has also undertaken a wide range of projects related to the identification and management of historic resources. He has conducted cultural resource management documentation and impacts assessments; evaluated historic buildings, districts, and structures; developed cultural resource management plans and mitigation; and designed innovative strategies to integrate new and existing regulations, policies, guidance, and resource management activities into single planning and compliance programs. Dr. Baker has performed these tasks on projects in 19 states for NASA, the Army National Guard, US Army Corps of Engineers, Department of Defense, the US Fish and Wildlife Service, National Park Service, United States Forest Service, United States Geological Survey, General Services Administration, Air National Guard, US Coast Guard, US Air Force, Colorado Springs Utilities, and Denver Housing Authority. Dr. Baker's projects include a national context study of National Guard and Reserve aircraft hangars and statewide contexts and evaluations of Cold War assets of the Georgia and Washington State Army National Guard Installations. He has also worked with the National Park Service to determine the national significance of potential NPS sites in Colorado and Texas. Dr. Baker has conducted National Register of Historic Places eligibility determinations for single buildings, boats, water conveyance structures, districts of over 200 buildings, administrative facilities, and other buildings and structures.

Dr. Baker also has experience providing expert witness services in litigation associated with federal cases relating various aspects of public lands management, rights of way (especially RS 2477 disputes), water rights, mineral management, navigability determinations, mining, and Indian policy. In this capacity, he advises attorneys on the historic aspects of the questions that the litigation encompasses.

## **Project Experience**

**Vietnam War: Helicopter Training and Use on US Military Installations Vietnam Historic Context Subtheme, Legacy 14-739.** Dr. Baker was a contributing author to develop a historic context and typology for Vietnam War (1962–1975) helicopter-related resources on DoD installations in the United States. The report can be used to identify and evaluate Vietnam War helicopter-related facilities at DoD military installations in the United States. This report’s historic context provides military cultural resources professionals with a common understanding for determining the historical significance of Vietnam War helicopter-related facilities, greatly increasing efficiency and cost-savings for this necessary effort.

**Historical and Architectural Overview of Aircraft Hangars of the Reserves and National Guard Installations from World War I through the Cold War, Department of Defense Legacy Resource Management Program.** Dr. Baker is a historian on the development of a national historic context for aircraft hangars serving the Army National Guard, Air National Guard, and Army, Air Force, Navy and Marine Reserves. The project includes the development of a historic context related to the national guards and reserves, narrative of hangar and aircraft development over time, analysis of building forms, explanation of NRHP evaluation criteria, and a database of hangars that might fall under the context.

**Historian, Cultural Resources Evaluations Redmond and Camp Murray, WA.** Dr. Baker was the lead historian and conducted historic structures evaluations of buildings at Washington Army National Guard facilities at Camp Murray and in Redmond. The project involved record searches at the Washington State Historic Preservation Office and the Washington Army National Guard Headquarters. Thirty-three buildings were evaluated and recorded. Dr. Baker was also lead author of the Historic Structures Evaluation Report, which covered the results of the evaluations as historic properties and/or Cold War resources, photo-documentation, historic context, management recommendations, and applicable historic structure evaluation forms.

**Cultural Resource Specialist and Project Manager, Integrated Cultural Resource Management Plan, New Jersey Army National Guard, NJ.** Dr. Baker was the Cultural Resource Specialist and lead author on the integrated cultural resources management plan, which was developed using a newly developed integrated ICRMP template. The plan addressed all known cultural resources and inadvertent discoveries, including preservation, survey, and mitigation recommendations. This New Jersey project also included the development of a photographic database of character defining elements of the state’s ten historic armories. This photo database was eventually expanded to include all potentially historic properties and objects and was integrated into the New Jersey National Guard’s GIS database.

**Historian, Integrated Cultural Resource Management Plan, Alaska Air National Guard, AK, and Integrated Cultural Resource Management Plan, Oklahoma Air National Guard, OK.** Dr. Baker was responsible for the development of historic contexts for the management, conducted the historic structure evaluations and photo-documentation, and wrote pertinent portions of the management plans.

**Historian, Cultural Resources Evaluations, Washington Army National Guard, WA. Dr.**

Baker was the lead historian in a project with a team of cultural resource specialists that conducted a historic structures evaluation of Washington Army National Guard facilities throughout the state. The project involved record searches at the Washington State Historic Preservation Office and the Washington Army National Guard Headquarters. Fifty-six buildings were evaluated and recorded. Mr. Baker was also the lead author of the Historic Structures Evaluation Report, which covered the results of the structure evaluations as historic properties and/or Cold War resources, photo-documentation, historic context, management recommendations, and applicable historic structure evaluation forms.

**APPENDIX F:  
ACRONYMS**

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1 <sup>st</sup> LOG	Army 1 <sup>st</sup> Logistical Command
ACHP	Advisory Council on Historic Preservation
ACTOVLOG	Accelerated Turnover Program, Logistics
AFB	Air Force Base
AFCEC	Air Force Civil Engineer Center
AFMC	Air Force Materiel Command
AMA	Air Materiel Areas
ANG	Air National Guard
APG	Aberdeen Proving Ground
ARCS	Air Resupply and Communications Service
ARVN	Vietnamese Army Forces
BRAC	Base Realignment and Closure
CAP	Combined Action Platoon
CBC	Construction Battalion Center
CECOM	Communications-Electronics Command
CEG	Civil Engineer Group
CEIEA	Installation Management Division, Environmental Assets Section of the Environmental Branch
CERL	Construction Engineering Research Laboratories
CFR	Code of Federal Regulations
CIA	Central Intelligence Agency
CIDG	Civilian Irregular Defense Group
CONARC	Continental Army Command
CZO	Environmental Operations Division
DCAS	Defense Contract Administration Services
DCS/R	Deputy Chief of Staff, Requirements
DoD	Department of Defense
DSA	Defense Supply Agency
DZ	Drop Zone
ECOM	Electronics Command
ERDC	Engineer Research and Development Center
FLC	Force Logistics Command
FSA	Forward Support Areas
FSC	Federal Supply Class
FSLG	Force Logistics Support Group
GOER	Go-ability with Overall Economy and Reliability
GPES	Ground Proximity Extraction System
GSA	General Services Administration

HMM	Marine Medium Helicopter Squadron
HSAS	Headquarters Support Activity
ICP	Inventory Control Point
LAPES	Low Altitude Parachute Extraction System
LATAF	Logistics Activation Task Force
LCAAP	Lake City Army Ammunition Plant
LST	Landing Ship Tank
MAAG	Military Assistance Advisory Group
MAC	Military Airlift Command
MACV	Military Assistance Command, Vietnam
MATA	Military Assistance Training Advisors
MATS	Military Air Transport Service
MAW	62nd Military Airlift Wing
MCAS	Marine Corps Air Station
MCB	Marine Corps Base
MCLB	Marine Corps Logistics Bases
MICOM	U.S. Army Missile Command
MOS	Military Occupational Specialty
MSC	Military Sealift Command
MSTS	Military Sea Transportation Service
NARA	National Archives and Records Administration
NCO	Non-commissioned officer
NHPA	National Historic Preservation Act of 1966
NSA	Naval Support Activity
OCAMA	Oklahoma City Air Materiel Are
RAM	Rapid Area Maintenance
RASS	Rapid Area Supply Support
RATS	Rapid Area Transport Support
RPA	Registered Professional Archeologist
RVN	Republic of Vietnam
SAWC	Special Air Warfare Center
SHPO	State Historic Preservation Office
SSD	Specialized Support Depots
STAT	Seabee Technical Assistance Teams
TC	Transportation Corps
THPO	Tribal Historic Preservation Office

USACERL      U.S. Army Construction Engineering Research Laboratories  
USAF          U.S. Air Force  
USNS          U.S. Naval Ship

WRAMA      Warner Robins Air Materiel Area

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