Department of Defense
Legacy Resource Management Program

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Vietnam War: Pilot and Air Support Training on U.S. Military Installations
Vietnam Historic Context Subtheme

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EXECUTIVE SUMMARY

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 installations during this time (Hartman et al. 2014). The historic context provides common ground for understanding the need for construction on military installations in support of the conflict in Vietnam. It also identifies 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 pilot and air support training in the Vietnam War, identifies specific installations and resource types associated with pilot and air support training during the Vietnam War, and provides a context to evaluate the historical significance of these resources.

The Korean War provided a wake-up call to all military branches that reinforced the reality that small-scale warfare using aerial components like tactical bombers and fighters remained strategically important. Given this, during the Cold War-era, the Department of Defense (DoD) planners sought to shift military strategy away from conventional warfare and toward massive retaliation and air defense—a strategy known as New Look, that shaped the military and aviation strategy on the eve of the Vietnam War. The new posture resulted in further reductions of traditional ground and Navy forces in place of expanded air capabilities, especially in the U.S. Air Force.

The National Historic Preservation Act of 1966, as amended, requires federal agencies to inventory and evaluate their cultural resources as these resources near 50 years of age. Buildings, structures, and sites related to the buildup for and sustained fighting in the Vietnam War are turning 50 years old.

This report provides context and typology for Vietnam War (1962–1975) pilot and air support training-related resources on DoD installations in the United States. This report can be used for the identification and evaluation of Vietnam War pilot training facilities at DoD installations. This report's historic context provides military cultural resource professionals with a common understanding for determining the historical significance of Vietnam War pilot and air support training-related facilities, greatly increasing efficiency and cost-savings for this necessary effort.

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TABLE OF CONTENTS

Page

LIST OF FIGURES

1. INTRODUCTION

The Department of Defense (DoD) 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 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 can be found on the About Legacy tab on the Legacy website. These areas of emphasis include:

- 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. Legacy 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 United States (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.

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 spans all DoD branches and can be used across the nation.

1.1 OVERARCHING VIETNAM WAR CONTEXT

The DoD and its individual services must comply with the National Historic Preservation Act (NHPA) of 1966, as amended, by identifying and managing historic properties that are part of their assets. 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 resulting from the United States involvement in the conflict in Vietnam. The report

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

This project contributes to the broad Vietnam War context by addressing pilot and air support training and provides a framework for identifying and evaluating associated historic properties at DoD installations. This resulting report is intended to provide a basis from which to evaluate the DoD's pilot and air support training resources related to the Vietnam War. When evaluating pilot training-related resources, the information contained in this document should be augmented with installation-specific historic contexts to make an accurate and justified argument regarding historic significance. A separate subtheme context is provided for helicopter training and use during the Vietnam War in Legacy Project Number 14-739 *Helicopter Training and Use on U.S. Military Installations*.

1.2 PURPOSE AND METHODOLOGY

The purpose of this effort was to research and develop a historic context of pilot training and air support during the Vietnam War. Resource types associated with pilot training in the United States for the Vietnam War from 1962 to 1975 is also provided. Military action is summarized to strengthen the overall context describing pilot training in the war and how this affected the built environment on DoD installations in the United States. This information is documented in this report; however, this report is not a detailed history of military engagements and important battles of the war.

Researchers accessed primary and secondary sources and visited pilot training installations. Research was conducted at the National Archives and Records Administration (NARA) Archives I (Military Reference Branch); NARA, Archives II (Cartography and Architectural Records Branch); University of Colorado libraries; Maxwell Air Force Base (AFB), Air Force Historical Research Agency, Nellis AFB, and the Vietnam Center and Archive at Texas Tech University and other online sources.

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 pilot and air support training in the DoD.

The following individuals provided general guidance and installation-specific information:

- Kish LaPierre, Cultural Resource Manager, Nellis AFB, Nevada
- Gerald White Jr., Historian, 99th Air Base Wing, Nellis AFB, Nevada
- Dan Wheaton, Historian 57th Wing, Nellis AFB, Nevada

- Dr. Paul Green, retired, U.S. (USAF) Civil Engineering Center
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- Dr. James Wilde, Deputy Federal Preservation Officer, Cultural Resources Subject Matter Expert
- Ellen R. Hartman, Engineer Research and Development Center (ERDC)/ Construction Engineering Research Laboratories (CERL)
- Susan I. Enscore, ERDC/CERL
- Adam D. Smith, ERDC/CERL
- Carrie Williams, Pensacola Naval Air Station.

1.3 REPORT ORGANIZATION

This report is presented in 5 Chapters:

- ***Chapter 1 Introduction***—provides the introduction and methodology used to prepare this report.
- ***Chapter 2 Short History of the Vietnam War***— provides a summary of the Vietnam War, and a summary of pilot training and air support by each of the military service installations during the beginning, middle, and end of the Vietnam War.
- ***Chapter 3 On the Home Front***—provides a context for pilot training during the Vietnam War at U.S. installations.
- ***Chapter 4 Application of the Subcontext in the Identification and Evaluation of Historic Resources***—provides a description of the types of resources associated with pilot training during the war present on U.S. installations and an overview of evaluating resources under the NHPA with descriptions of evaluation criteria and integrity.
- ***Chapter 5 Selected References***—provides a list of references.

The appendixes include:

- **Appendix A Nellis Air Force Base**—provides installation-specific historic context for Nellis AFB
- **Appendix B Naval Fighters Weapons School (Top Gun) NAS Miramar**—provides installation-specific historic context for the former naval air station, now MCAS Miramar
- **Appendix C Contributors**—provides a list of report contributors
- **Appendix D Acronyms**—provides a list of acronyms.

2. 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 conflict played a significant role in American foreign policy during much of the Cold War. However, the foundations of unrest in Vietnam (a French possession since the 1800s) were laid during World War II and were 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 the war. 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. He asked the United States to recognize the newly independent country. American leaders; however, 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 the war, 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. 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 17th 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.[1]

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 U.S. agreed.[2] 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 U.S. 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 USAF 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.[3]

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 and the U.S. financial and material commitments to Vietnam at this time ran into the billions of dollars.

1 "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.
2 Walter LaFeber, America, Russia, and the Cold War, 1945–2002 (New York, NY: McGraw Hill, 2002): 170.
3 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 U.S. Marine Corps (USMC) 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.[4] While ostensibly there to train 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 South Vietnam. The intractability and oppression of 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. In November 1963, the president approved a plan to have the CIA overthrow the South Vietnamese government. The orchestrated overthrow coincided with an actual coup. Diem and his brother were arrested and assassinated. Three weeks later, President Kennedy was assassinated.

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 Lieutenant General 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 backseat to his domestic agenda, which 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

4 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.

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.

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 1964 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 *USS 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.[5] 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 percent of the 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 1964 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 the United States and allied forces and to prevent further aggression.[6]

President Johnson did not immediately use his new war-making powers in any comprehensive or aggressive way. He was, after all, running for re-election as the peace candidate in opposition to Barry Goldwater. President Johnson was re-elected in November 1964, and the war in Vietnam took precedence. He 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.

In February 1965, President Johnson approved a sustained aerial bombing of North Vietnam. The campaign was known as Operation Rolling Thunder. The USAF, Navy, and USMC 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 USMC and Army combat troops to Da Nang and Saigon, respectively. Helicopter units accompanied both the U.S. Army and USMC deployments. U.S. Navy vessels transported the troops, who were tasked with the defense of airbases. The deployments brought the United States presence in Vietnam to over 50,000. The United States' first major ground offensive occurred in

5 LaFeber, America, Russia, and the Cold War 1945–2002, 252–253.
6 "Gulf of Tonkin Resolution," Public Law 88-408, 88th Congress, August 7, 1964.

August 1965 when the USMC, 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. U.S. military presence had increased to 175,000 by the end of 1965. This included major Army divisions and units such as the 1st Cavalry Division, 1st Brigade, 101st Airborne Division, and 1st Infantry Division. The USMC 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. The war 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.

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, USMC 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 one year, the USMC gained 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 USMC 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 contradicted this assertion. 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 Wheeler 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 percent. President Johnson denied General Wheeler's request. Instead, he authorized a comparatively small increase of about 13,000 troops. President Johnson 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 re-election 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 that were 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 1973. The U.S. military remained in the region but reverted to its training and advisory role.[7] The United States' 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. President Nixon resigned in August 1974. His replacement, Gerald Ford, was greeted with continued crisis in Cambodia and Vietnam.

7 Meyerson, Images of a Lengthy War, 183.

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*). The U.S. Navy, USMC, and USAF units launched a rescue operation. They met heavy resistance from the Khmer Rouge. The USMC 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 operations and forces to continually innovate. It was also an increasingly unpopular war that reshaped the way U.S. civilians viewed warfare. Many U.S. civilians 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. Some threats were grave; others were illusory. There is no doubt that Communism shaped the war in Vietnam. It is also true that 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 19th century, was finally independent, albeit not on the terms the United States would have liked.

2.1 BRIEF HISTORY PILOT AND AIR SUPPORT TRAINING TO 1960

Military aviation history began in 1907 when President Theodore Roosevelt ordered the U.S. Army to purchase its first aircraft. Wilbur and Orville Wright delivered the aircraft in 1909 and the U.S. Army's newly created Aeronautical Division (within the Signal Corps) began experimenting with bomb dropping, strafing, and photography. In 1910, the first Army air installation was established at Fort Sam Houston, Texas and the first Army Aeronautical Division unit, dubbed the 1st Aero Squadron, was created in December 1912. By 1917, with the threat of war and increased congressional appropriations for the military, the Signal Corps created flight schools in San Diego,

California; Mineola, New York; Chicago, Illinois; Memphis, Tennessee; and Essington, Pennsylvania.[8]

The Navy expressed interest in aviation as early as 1898, but it was not until December 1910 that Lieutenant Theodore G. Ellyson, the first Navy aviator, received orders to report to Glenn H. Curtiss' aviation camp at North Island, San Diego, for training. The Curtiss Aviation Camp provided the Navy with their first aircraft in 1911.[9] The Navy established its own school for the training of flight and ground crews in Pensacola, Florida, in 1913. Four years later with the threat of war, the Navy expanded their training operations. They developed flight schools with the Army and at universities. Meanwhile, Marine aviator training, which initially took place at Navy aviation fields in Mineola, New York, Cape May, New Jersey, Lake Charles, Louisiana, and Coconut Grove, Florida, was relocated to the Curtiss Flying Field in Miami, Florida. The field was renamed the Marine Flying Field.

U.S. Army aircraft warfare activities expanded dramatically during World War I and by 11 November 1918, there were 45 aero-squadron units in Europe and another 140 training units in the United States. Naval and USMC aviation grew dramatically during the war from a small group of aviators to a Navy force of 1,100 officers, 18,000 enlisted men, a USMC force of 282 officers, and 2,180 enlisted men.[10]

The growth of military aviation languished for a time after World War I, mostly due to a lack of resources. However, Army leaders remained interested in the development of aerial capabilities, including pursuit and bombardment. They also stressed the need for organizational changes that allowed for the ability to carry out independent missions during wartime. These desires were codified in the Air Corps Act of 1926. The Act established the Air Corps as a more independent unit within the Army and proposed a five-year expansion program. While the organizational changes came to fruition, the expansion did not, due to a paucity of funds. Indeed, while aircraft and techniques evolved every year, aviation stagnated as a component of the Army until the United States began preparations for entry into World War II.

Like the Army, Navy and USMC, aviation grew steadily in the inter-war years despite a lack of adequate funding. Aircraft producers continually innovated and within a decade, the planes had efficient radial, air-cooled engines, better instrumentation, and modern bombsights. Aircraft developed incorporated foldable wings and oleo struts for carriers. By 1929, the Navy had three aircraft carriers, active-patrol squadrons, and even placed planes on battleships and cruisers. Aviation growth continued but slowed in the 1930s. World War II preparations resulted in a dramatic increase in training, funding, and resources.[11]

The United States implemented a broad program in preparation for eventual entry into World War II between 1939 and 1941. War planning focused on four interrelated areas: the expansion of the

8 Roger G. Miller, *A Preliminary to War: The 1st Aero Squadron and the Mexican Punitive Expedition of 191*6 (Washington, D.C: Air Force History and Museums Program, 2003) 4*; Stephen L. McFarland, A Concise History of the U.S. Air Forc*e (Washington, DC.: Air Force History and Museum Program, 1997): 2-3, 4; Juliette A. Hennessy, *The United States Army Air Arm, April 1861 to April 1917*. USAF Historical Study No. 98 (Washington DC.: USAF Historical Division, 1958) 39, 157-60.
9 Mike L. Evans and Roy A Grossnick, *United States Naval Aviation 1910-2010* (Washington D.C.: Navy History & Heritage Command, n.d.) 3
10 Maurer, ed. *The U.S. Air Service in World War I: Volume I* (Washington D.C.: The Office of Air Force History) 17.
11 Evans and Grossnick, *United States Naval Aviation*, 65

military, the development of new doctrine, aid to the allies, and the formulation of strategy. Air power played a central role in all these activities.[12]

President Roosevelt initiated dramatic growth in the Army Air Corps in 1939 when he requested a 300 million-dollar appropriation for the purchase of an Army aircraft. He also urged the Army Air Corps to expand their numbers. He complained that existing Air Corp capabilities were not adequate. In 1939, the Air Corp counted among their materiel approximately 1,700 planes for training and tactical use, 1,600 officers, and 18,000 enlisted men. The Navy and USMC had fewer than 1,500 aircraft and less than 1,600 non-pilot and pilot officers, and 1,300 enlisted personnel. Congress responded to President Roosevelt's concerns with an emergency Army air defense bill that authorized the purchase of over 3,000 aircraft and approved a total Air Corps strength of 5,500 planes, approximately 3,200 officers, and 45,000 enlisted men. Similar increases were envisioned for the Navy and USMC.[13] These figures were continually revised upward for both and Army and Navy leading up to the United States entry into the war and during the war itself.

The 1939 plans called for the training of 1,200 Army pilots per year. By 1941, the figure was increased to 30,000 and the Army Air Force anticipated that they would be training upwards of 50,00 pilots a year by mid-1942. In addition to pilot training, the Army projected that thousands of other aircrew and support personnel would need training.[14] Such an expansion of activities required a dramatic increase in training and support facilities. New airfields appeared all over the United States; the variety of facilities was astounding. Some were designated temporary facilities and others were permanent. Some airfields were highly developed, and others were primitive. This was the case even when airfields were near each other. For example, a number of airfields were developed in the San Antonio area. Randolph Field was a luxurious, highly developed facility; and nearby, the Aviation Cadet Center, which consisted of simple huts, presented the opposite conditions. Landing strips at the San Antonio facilities ranged from cow pasture to modern concrete taxiways. Finally, living quarters included everything from modern duplexes, permanent barracks, to World War I shacks, and a tent city.[15]

The Navy and USMC war preparations were similar to the Army's. The Navy converted twelve existing Naval Reserve Air Bases to training facilities and established eight more. Pilot cadets attended one of these schools for preliminary training before transferring to Naval Air Station (NAS) Pensacola, Florida, or NAS Corpus Christi, Texas for advanced training and certification.[16] Preliminary training also occurred at universities across the country. The number of trained USMC and Navy pilots mushroomed to 11,000 by June 1942. They were supported by a contingent of 7,000 non-pilot officers and 40,000 enlisted Navy Seamen and Marines.[17]

Pilot and air support training continued for Army, Navy, and USMC components at a vigorous rate until the end of World War II when the return to peacetime resulted in a downturn in such activity. Many of the airfields and air stations established during the war were decommissioned.

12 Evans and Grossnick, *United States Naval Aviation*, 103-4.
13 Wesley Frank Craven and James Lea Cate, *The Army Air Forces in World War II, Volume I Plans and Early Operations January 1939 to August 1942* (Washington DC, Office of Air Force History, 1983) 104-5; Matt Portz, "Aviation Training and Expansion," *Naval Aviation News*, July-August 1990: 23-4.
14 Craven and Cate, Army Air Forces in World War II, Volume I, 110-111.
15 Craven and Cate, Army Air Forces in World War II, Volume I, 113.
16Portz, "Aviation Training," 24.
17 Portz, "Aviation Training," 26

The demand for war materiel was also curtailed. However, advancements in training and equipment continued after the war into the Vietnam War era.

Perhaps the most pivotal event in the period between World War II and the Vietnam War was the creation of the USAF. There had long been discussion and debate about the status of the aircraft within the Army. Essentially, there was a difference in opinion as the amount of autonomy the aircraft components required. The Army Air Force leadership chafed at, and felt hamstrung by, their subordinate role to the ground forces. They wanted independence. Their desires became a reality between 1947 and 1951 when Congress passed two laws establishing and defining an independent USAF. The National Security Act of 1947 established the National Security Council, merged the War and Navy departments into the National Military Establishment, and created an independent USAF. The result was three independent military services; Army, Navy, and USAF under the National Military Establishment. The Act also allowed for the transfer of former Army Air Force units and property to the newly formed USAF. The USAF Organization Act of 1951 established the internal organizational framework for the USAF, defined who was regular USAF, and created three major air commands; Air Defense Command (ADC), Strategic Air Command (SAC), and Tactical Air Command (TAC). With the establishment of the USAF, the Army began a transition away from a fixed-wing aircraft to a rotary wing aircraft.[18]

The USAF was formed at a time when military budgets and personnel numbers were still reducing from their height in 1944. Tasked with carrying out a nuclear war, the USAF only had a handful of capable bombers as late as 1950.

The Korean War provided a dramatic wake-up call to all military branches, including the USAF. The war was the first conflict that prominently featured the use of a jet aircraft. It also forced the USAF to reconsider its original primary atomic warfare mission. Experience in Korea, reinforced the reality that small-scale warfare using aerial components, like tactical bombers and fighters, was still very important. At the same time, USAF leadership determined that such warfare should be avoided in place of large-scale attacks. This contradiction shaped military planning during the Cold War.[19]

Ultimately, in the short term, the large-scale attack perspective was favored. A year after the conclusion of the Korean War, DoD planners developed a new defensive strategy. Known as New Look, the plan shaped USAF activities for at least the next decade. New Look shifted military strategy away from conventional warfare to massive retaliation and air defense. The new posture resulted in further reductions of traditional ground and Navy forces in place of expanded air capabilities, especially in the USAF. This philosophy shaped military planning on the eve of the Vietnam war, even though Southeast Asia did not have the high value targets that such massive retaliation strategies required. Planners were undaunted and continued to assert that nuclear weapons would still be better than conventional weapons because they would produce greater

18 Helicopters are not specifically addressed in this context. Helicopter operations are covered 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.
19 Earl H. Tilford Jr. *Setup: What the Air Force Did in Vietnam and Why* (Maxwell Air Force Base, AL: Air University Press, 1991) 21.

destruction wherever they were used. This concept was contingent on the assumption that there were no ground troops involved; Vietnam would undermine such unsophisticated thinking.[20]

Navy and USMC aviation in the decade between the Korean War and 1960 was affected by the New Look paradigm but was characterized by continuity. Technological innovation remained a cornerstone of Navy and USMC operations. It was during this era that one of the most fabled fighter aircraft of the Vietnam War, the F-4 Phantom, was introduced to the Navy and USMC arsenal. The Navy and USMC also began flying the C-130 transport planes in the years before the Vietnam War. It was also during this period that the Navy began placing an emphasis on research and development at bases like Patuxent NAS in Maryland.

2.2 VIETNAM WAR AIR COMBAT

The USAF, Navy, and USMC used fixed-wing aircraft much more regularly than the Army throughout the war. USMC fixed-wing aircraft did not participate in the early years of the war, but they did play a role as the war escalated. Unlike the Army, all three branches used advanced jet aircraft in Vietnam.

2.2.1 U.S. Air Force

Direct USAF participation in the Vietnam region began in 1961. USAF leadership ordered the establishment of a new squadron, the 4400th Combat Crew Training Squadron, on 14 April 1961. Code named Jungle Jim, the squadron was tasked with covertly training South Vietnamese aviators using a World War II-era fixed-wing aircraft (C-47, B-26, T-28). Initially, there were plans to use helicopters, but this component fell to the Army and USMC.[21]

The squadron, which did not have a combat mission, was deployed in October 1961. Their 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. The airmen entered South Vietnam under the pretense of providing aid to flooded villages in the Mekong Delta. Once in Vietnam, they were expressly ordered keep a low profile and avoid the press.

Known as Operation Farm Gate, the Jungle Jim Squadron's activities in South Vietnam were supposed to be confined to training the South Vietnamese Air Force. It quickly became apparent, however, that the Vietnamese Air Force was overwhelmed, and the airmen found themselves flying into combat situations before the end of 1962. It was during this period that the USAF began using napalm against insurgents.[22]

Another USAF Unit, 2nd Advanced Echelon, was deployed to Vietnam and established at Tan San Nhut Airport near Saigon in the Fall of 1961. They supported Operation Farm Gate by providing reconnaissance and collecting intelligence, again under the guise of humanitarian relief on the Mekong Delta. Moreover, a contingent of five men arrived at Tan San Nhut Airport where they

20 Tilford Jr. *Setup*, 37-8.
21 Jacob Van Staaveren, "USAF Plans and Policies in South Vietnam, 1961-1963," (USAF Historical Division Liaison Office, 1965) 11, 14, 34. Accessed January 3, 2018, available at http://www2.gwu.edu/~nsarchiv/NSAEBB/NSAEBB248/.
22 William W. Womyer, Air Power in Three Wars (Washington, DC: Government Printing Office, No Date) 10; Van Staaveren, "USAF Plans and Policies," 34.

established Detachment 3, Pacific Air Rescue Center; a command and control center for search and rescue operations for downed aircraft in Southeast Asia. The detachment was hamstrung by the fact that there were no dedicated Search and Rescue units in Southeast Asia. When called upon, they had to cobble together available resources from the Army, USAF, USMC, and South Vietnamese Air Force.[23]

The USAF presence increased in January 1962 when two new squadrons arrived at Tan San Nhut.[24] The first, Ranch Hand, was a unit of 69 men and six C-123s. By 1964, the Ranch Hand mission had become a defoliation operation run by crews from the 309th Air Commando Squadron, a redesignated troop carrier unit out of Pope AFB, North Carolina. The defoliation missions also evolved from a program focusing on communication routes to one that also targeted transportation routes and enemy crops. The missions were modified to target Viet Cong safe havens in the Mekong Delta. Ranch Hand crews sprayed defoliant over nearly 100 square miles of jungle and destroyed over 15,000 acres of crops in 1964. The program grew in 1965 to include operations in neighboring Laos.[25] The second, nicknamed Mule Train, consisted of sixteen C-123 TAC transport aircraft and 123 men who performed airlift operations for U.S. Special Forces, airdropped supplies, and trained South Vietnamese Airmen. Finally, the USAF sent SC-47s to Tan San Nhut. The aircraft were equipped with loudspeakers and the ability to spread leaflets for psychological operations.[26] Additional aircraft and airmen were deployed throughout 1962 and 1963 as hostilities increased. The expansion of USAF operations in Vietnam was evident by the number of USAF aircraft deployed to South Vietnam which increased from 35 in 1961 to 117 by the end of 1963.[27]

Most USAF activity and infrastructure were concentrated at Tan Son Nhu Air Field, but facilities were established in other parts of South Vietnam to support the Vietnamese military and other branches of the U.S. military. The USAF established Air Support Operations facilities at Da Nang, Pleiku, Can Tho, and Saigon. Radar stations were established at Da Nang and Tan San Nhut and the USAF installed communication equipment at Saigon, Nha Trang, Pleiku, and Da Nang.[28] These outposts became important centers of activity throughout the war.

The USAF training evolved in the early years of the war. There was a realization that USAF jets may need to provide Close Air Support (CAS) for Army ground units. Therefore, for 18 months in 1963 and 1964, the USAF and Army held 32 joint training exercises to hone CAS tactics. The USAF seemed somewhat ambivalent about the program; CAS capabilities were not integrated into official USAF training and certification requirements, which continued to focus on the delivery of nuclear weapons.[29]

23 Russell G. Ochs, "The Evolution of USAF Search and Rescue in Southeast Asia," (Maxwell Air Force Base, AL.) 4, accessed January 3, 2018, available at http://rotorheadsrus.us/documents/Ochs-7366-4.pdf; Van Staaveren, "USAF Plans and Policies," 18.
24 Project CHECO Southeast Asia Report # 171 - Ranch Hand Herbicide Operations in Southeast Asia - 01 July 1961 to 31 May 1971, 13 July 1971, Folder 0169, Box 0003, Vietnam Archive Collection, The Vietnam Center and Archive, Texas Tech University, 6; Van Staaveren, "USAF Plans and Policies," 18-19.
25 James R. Clary, "Ranch Hand Operations in SEA: 1961-1971, July 13 1971, 9-10, 11, 13. See also William Buckingham, Jr. The Air Force and Herbicides in Southeast Asia, 1961-1971 (Washington DC.: Office of Air Force History, 1982).
26 Van Staaveren, "USAF Plans and Policies," 18-19.
27 Van Staaveren, "USAF Plans and Policies," 104.
28 Van Staaveren, "USAF Plans and Policies," 20-21.
29 Jeremy W. Siegel, "The Debate is Over: Close Air Support in Korea and Vietnam," MA. Thesis, Marine Corps University, 2011:15.

Figure 2–1. Ranch Hand Aircraft Spreading Defoliant
Source: Record Group 342, National Archives

The USAF leadership resisted the use of jet aircraft in Vietnam until after the Gulf of Tonkin incident in August 1964. As it did for many aspects of the war, the incident changed the perspective of USAF planners. Several jet squadrons (F-100) quickly deployed to Da Nang and Thailand in 1964. The deployments, associated with a secret bombing campaign over Laos (Barrel Roll), were considered to be temporary. The use of jet aircraft in South Vietnam was still barred by the USAF at the time, though pilots did fly non-jet aircraft over South Vietnam on reconnaissance missions.[30]

The United States adopted an aggressive air war strategy called Operation Rolling Thunder in March 1965 as part of the escalation of the war. Under Operation Rolling Thunder, USAF, Navy, USMC, 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 USAF capabilities and training than the counterinsurgency (COIN) missions airmen participated in prior to 1965. The manpower requirements of the mission resulted in a dramatic increase in training in the United States. The number for airmen in basic training mushroomed from 29,000 to 73,000 in the second half of 1965.[31]

The specific goals of Operation Rolling Thunder were three-fold. First, the United States wanted to disrupt the North Vietnamese communication and supply lines into and from Laos and South Vietnam. American military planners also hoped to destroy North Vietnam's ability to support

30 John Schlight, *The United States Air Force in Southeast Asia*, (Washington D.C.: Air Force History and Museum Program, 1999), 7, Tilford Jr. *Setup*, 82.
31 Tilford Jr. *Setup*, 71; No Author, *Fifty Years of Training*, Fort Randolph, TX.: History and Research Office Air Training Command, 1993) 20.

the Viet Cong in the south. Finally, they sought to prevent external nations, especially the Chinese, from providing military support to North Vietnam.[32] The Operation Rolling Thunder's theater of operations extended from the Gulf of Tonkin inland to within 30 nautical miles of Hanoi and the Chinese border.

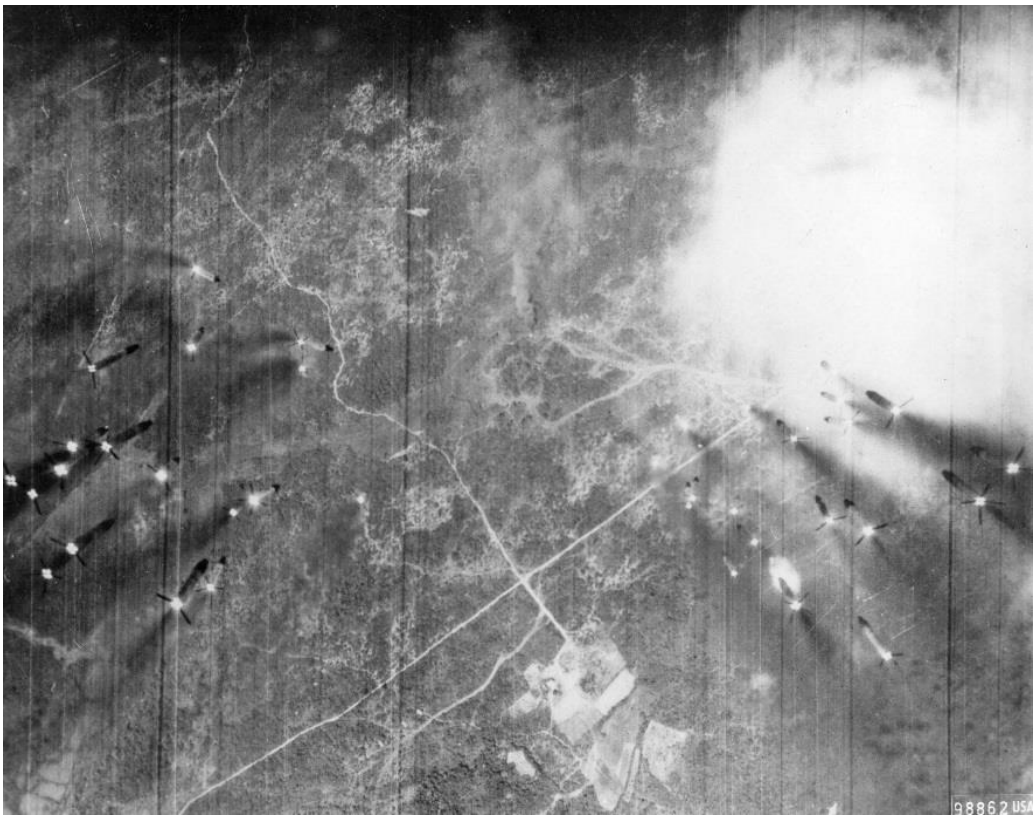

Figure 2–2 SAM Site Hit and Destroyed
Source: VA061478, George H. Kelling Collection, The Vietnam Center and Archive, Texas Tech University

South Vietnam did not have adequate airfields in 1965 that could support the number of USAF jet aircraft needed for the Operation Rolling Thunder missions. Therefore, USAF aircraft based out of Thailand flew sorties over North Vietnam. This caused some logistical problems as aircraft from three military services (Navy, USAF, and South Vietnam Air Force) operated in the same region. The USMC sometimes added a fourth service to the mix. Military leaders first adopted a plan in which each branch was responsible for sorties on specific days. However, the system was still not ideal and in April 1966, Operation Rolling Thunder was modified so that each service focused on a specific geographical area. The USAF was assigned the areas nearest their bases in Thailand. South Vietnamese aviators focused on the regions of North Vietnam that bordered South Vietnam. Navy sorties focused on the heavily populated coastal zones of North Vietnam.[33]

The end of 1965 did not bring good news to military leadership. Despite 55,000 sorties and the delivery of 33,000 tons of ordnance, North Vietnam was not significantly weakened. There was

32 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), 32.
33 Marolda and Pryce III, *United States Navy and the Southeast Asian Conflict,* 33.

no evidence of equipment shortages, even though bombing targets disproportionally focused on trucks, boats, trains, and other means of equipment transport.[34]

The scale of attacks on North Vietnamese targets continued at a high rate through 1966. Due to the frustration, USAF leaders pressed for a shift in strategy. Their focus was North Vietnam's oil storage sites. The request was granted in late June 1966 after considerable debate. Shortly thereafter, the most damaging assault on the enemy's capabilities to fight the war occurred when an American aircraft ordnance hit oil farms (storage tanks) in Hanoi, Haiphong, and Bac Giang. As a result, more than half of the North Vietnamese oil stores were destroyed in July and August 1966. The stores that remained were dispersed throughout the rest of the country. Aviators subsequently attacked the dispersal process by targeting fuel filled trucks, railroad cars, barges, and storage facilities. Meanwhile, aircraft assaulted North Vietnamese rail infrastructure.[35] These sorties dominated the air operations for the rest of the year.

In early 1967, some USAF operations briefly shifted from North Vietnam to Laos. Attacks were concentrated in the northern part of the country and in southern Laos where both Navy and USAF pilots were active. The divergence was short lived as operations shifted back to North Vietnam by February 1967. Navy and USAF fighters targeted critical infrastructure. They bombed railroad yards, bridges, and trains to cut off the flow of materiel from China and inland from the Port at Haiphong.[36]

By 1967, it became clear that Operation Rolling Thunder was not achieving its desired results, despite the destruction of North Vietnamese infrastructure. The ability of the North Vietnamese Army and Viet Cong to prosecute the war was not significantly diminished. Secretary of Defense, Robert McNamara, recommended the cancellation of the bombing campaign, but the Joint Chiefs of Staff (JCS) strenuously objected to the proposal. The USAF leadership, in particular, argued that the problem with Operation Rolling Thunder was that it was not aggressive enough, even though there were nearly 90,000 USAF personnel in Southeast Asia by the summer of 1967.[37]

President Johnson remained uncommitted on the future direction of the operation through the first half of 1967 and missions continued to operate as they did in 1966. The impetus for a more aggressive campaign finally came from another direction. The Senate Armed Services Committee held hearings on Operation Rolling Thunder in the summer and concluded that more intense bombing of North Vietnam was strategically desirable.[38] President Johnson gave the USAF and their partners in Operation Rolling Thunder the authority to expand the bombings over North Vietnam in October 1967. The next few months witnessed the most intense bombing campaigns of the war.

The USAF commanders continually asserted that the bombing campaign was having its desired effect, but the Tet Offensive in early 1968 belied their optimistic proclamations. Viet Cong insurgents with considerable assistance from the North Vietnamese, attacked targets throughout

34 Tilford Jr. *Setup*, 115-6
35 Marolda and Pryce III, *United States Navy and the Southeast Asian Conflict,* 33-4; Tilford Jr. *Setup*, 118.
36 Marolda and Pryce III, *United States Navy and the Southeast Asian Conflict,* 34-5
37 Tilford Jr. *Setup*,134-5; George F. Lemmer, "USAF Manpower in Limited War 1964-1967," USAF Historical Division Liaison Office, November 1968, On File at Maxwell AFB, AL: 6.
38 Tilford Jr. *Setup*,145

South Vietnam. How could such an attack occur if the American bombs were undermining the will, fighting capabilities, and infrastructure of the North Vietnamese? This was a question that vexed many in Washington D.C. Ultimately, the lack of confidence in the effectiveness of Operation Rolling Thunder and political pressure, resulted in President Johnson's decision on 1 November 1968 to halt bombing operations over North Vietnam. The USAF fighters shifted their focus to Laos. A large percentage of the 73 USAF squadrons based in Southeast Asia in 1968 were associated with Operation Rolling Thunder. The USAF also grew dramatically over the years of Operation Rolling Thunder. Over 123,000 Airmen took basic training and nearly 702,000 airmen participated in advanced technical courses in 1969.[39]

There were always differences of opinion on the goals of the Operation Rolling Thunder campaign. Many, like President Johnson himself, saw the bombings as a tool to bring the North Vietnamese to the negotiating table. It was seen as a persuasive mission using heavy, but restrained, bombardment. The USAF leadership, on the other hand, wanted the authority to conduct a wide-ranging, aggressive campaign that would undermine the stability of North Vietnam.[40] Over time, the USAF's perspective held more sway. In the end, neither approach was effective. The malleable North Vietnamese infrastructure proved to be incredibly difficult to destroy with any finality.

In addition to the bombing of North Vietnam and similar missions in Laos, the USAF provided combat support for Army ground troops in South Vietnam. This was a mission they undertook begrudgingly, that became more important in 1968. The USAF fighters and bombers supported U.S. Army and South Vietnamese Army forces in their successful repulsion of the Tet Offensive. Moreover, they played a pivotal role in turning back the siege at Khe Sanh. Over two months, USAF, Navy, and USMC pilots flew 24,000 fighter-bomber sorties, and B-52 bombers flew approximately 2,700 sorties. Together, they dropped 110,000 tons of bombs and inflicted significant casualties on the North Vietnamese.

Nonetheless, the end of Operation Rolling Thunder resulted in a period of operation malaise for the USAF. With no offensive mission, USAF planners searched for their next mission and it came quickly. Intelligence and reconnaissance revealed that Laos was becoming a major conduit for war materiel for the Viet Cong. As a result, the USAF implemented Commando Hunt, a bombing campaign centering on the Ho Chi Minh Trail as it crossed through Laos. The campaign lasted from 1968 until 1972. It was not as regular or constant as Operation Rolling Thunder. Attack missions were typically short-lived, lasting for as little as a day before concluding.[41] Commando Hunt was a cooperative mission, much like Rolling Thunder. Navy, USAF, and to a lesser extent, USMC aircraft all took part in the mission. Ultimately, Commando Hunt, suffered from the same frustrations as Operation Rolling Thunder. The attacks did not significantly reduce the North Vietnamese ability to move supplies and men into South Vietnam.

Meanwhile, the United States supported the 1970 South Vietnamese Army's incursion into Cambodia. The USAF B-52s had been secretly bombing Cambodia since 1969, but the program became public in 1970. Nonetheless the missions continued as ground troops moved into

39 Tilford Jr. *Setup*, 169; Lemmer, "USAF Manpower," 7; "*Fifty Years of Training*," 20.
40 Tilford Jr. *Setup*, 110
41 Tilford Jr. *Setup*, 171

Cambodia. Eight percent of the USAF's total combat sorties went into Cambodia in 1970 with the percentage nearly doubling the next year. The USAF sorties into Cambodia represented about 10 percent of annual sorties in 1972, the year the campaign ended.[42]

Another major operation, known as Lam Son 719, was undertaken in Laos in February 1971. Under Lam Son 719, South Vietnamese ground troops planned to destroy North Vietnamese bases along the Ho Chi Minh Trail in Laos. U.S. support centered on tactical air support and artillery support from fire support bases in South Vietnam. The USAF pilots, mostly based out of Thailand, flew sorties in support of South Vietnamese ground troops who quickly found themselves besieged by North Vietnamese counter assaults. Even with air support, Lam Son turned into an utter defeat for the South Vietnamese and their allies.[43]

Meanwhile, the USAF deployments out of Vietnam escalated as prescribed by Vietnamization. By the end of 1971, only three squadrons of F-4s and a single squadron of A-37s remained in South Vietnam. The squadrons accounted for a total of 76 fighter-bombers in the country. An additional 114 fighter-bombers were based with squadrons located in Thailand and 84 USAF jets were located at Andersen AFB in Guam. Since 1969, 400 American jets and other fixed-wing aircraft had deployed out of Vietnam.[44]

Offenses made by the North Vietnamese a few months later resulted in a reversal in the withdrawals. South Vietnam was under siege in late March 1972. The United States responded by sending aircraft back to Southeast Asia. From bases in the United States, Japan, and Korea, 189 F-4s, 12 F-105s, and eight EB-66s were deployed to South Vietnam and Thailand. By the end of May 1972, the United States had 210 B-52 bombers and 374 F-4s at bases in Thailand and South Vietnam.[45] The aircraft embarked on a sustained bombing campaign of North Vietnam in an effort to thwart the attack. Fighters and bombers from the USAF, Navy, and USMC flew 15,000 sorties between 1 April and the end of June 1972. Nearly 100,000 tons of ordnance were delivered.[46] Bombing missions continued through the rest of the year to prevent further incursions and to encourage the North Vietnamese to enter treaty negotiations. Bombing was especially intense in late December 1972. The American offensive had the desired effect. The North Vietnamese proposed that peace talks, which had been stalled, reconvene in Paris on 8 January 1973. A ceasefire was signed on 23 January 1973. The ceasefire resulted in some redeployments out of the region. However, the bombing campaign may have ended in Vietnam, but it did not halt the missions into Laos and Cambodia which continued until the end of the Summer 1973. The last USAF units left the region in January 1976.

2.2.2 Navy

Navy air operations in Vietnam began slowly and indirectly. Between 1960 and 1964, Navy instructors trained South Vietnamese Air Force personnel in the maintenance of 63 A1-H

42 Tilford Jr. *Setup*, 195, 197.
43 Tilford Jr. *Setup*, 201.
44 Tilford Jr. *Setup*, 222-3.
45 Tilford Jr. *Setup*, 227-8.
46 Tilford Jr. *Setup*, 231.

Skyraiders and T-28s the U.S. had furnished to the South Vietnamese. Carrier based aircraft also conducted reconnaissance in Southeast Asia in the early years of the war.[47]

Figure 2-3 Operation Rolling Thunder
Source: Operation Rolling Thunder

Direct Navy air operations in Vietnam first occurred during the 1964 Gulf of Tonkin Incident when carrier-based jet aircraft provided cover for Navy destroyers plying the waters of the gulf. The planes also sank enemy watercraft. However, this initial Navy mission was short-lived and ended almost as soon as it began in the summer of 1964.[48]

Conditions in Vietnam predicated increased Naval preparedness after the Gulf of Tonkin incident. This included aircraft and associated facilities and equipment. The Navy's aircraft fleet was immediately upgraded in early 1965 when it became clear that the United States' involvement in Vietnam would become more robust. The aircraft fleet replacement pool expanded, and the Seventh Fleet aircraft were equipped with Sidewinder and Sparrow air-to-air missiles, Shrike air-to-ground missile, and new 20-millimeter cannons. The Navy also replenished stocks of bombs, missiles, and other ordnances. Moreover, the Navy Construction Battalion (Seabees) constructed additional fuel storage tanks, ammunition magazines, warehouses and hangars in Okinawa, Guam, and Philippines.[49]

47 Marolda and Pryce III, *United States Navy and the Southeast Asian Conflict* ,9, 14, 16.
48 Marolda and Pryce III, *United States Navy and the Southeast Asian Conflict*, 19-20.
49 Marolda and Pryce III, *United States Navy and the Southeast Asian Conflict,* ,21.

Meanwhile, U.S. military planners implemented a two-pronged strategy wherein they began planning for an escalation in Southeast Asia then intensified their aerial reconnaissance efforts. In an operation code named Barrell Roll, armed Navy and USAF reconnaissance aircraft flew over Laos identifying potential infiltration areas and attacking targets of opportunity.[50]

The escalation of the war after March 1965 found Navy aviators taking part in two extended campaigns: Operation Rolling Thunder, the bombardment campaign discussed above under USAF operations, and Blue Tree. The latter was a tactical reconnaissance mission over North Vietnam and pilots were based with the Attack Carrier Strike Force of the Seventh Fleet. They also participated in numerous smaller reconnaissance and bombing missions. Prior to August 1966, the Strike Force consisted of two to three carriers. After August 1966, the Strike Force was typically composed of three to four carriers. Each ship held 70 to 100 Aircraft.[51]

The Navy fighter, strike, and reconnaissance aircraft included the A-4 Skyhawk, A-I Skyraider, A-1 Corsair II, and A-6 Intruder, F-4 Phantom II, F-6 Crusader, RA-5 Vigilante, and RA-3B Skywarrior. The E-2 Hawkeye provided airborne communications support. Finally, ship-based helicopters supported search and rescue missions and logistical transport.

The fleet aircraft carried a wide range of ordnance, ranging from Korean War-era bombs to modern guided missiles. Aircraft conducting strike missions in Vietnam and Laos had 250-, 500-, and 1,000-pound general purpose bombs, napalm bombs, and magnetic mines at their disposal. They also fired 5-inch and 2.75-inch rockets and Navy pilots had Bullpup air-to-ground weapons, Walleye TV-guided bombs, and anti-radar missiles. Fighter aircraft were equipped with Sidewinder and Sparrow air-to-air missiles and 20-millimeter machine guns.[52] This variety of ordnance helped the United States gain and maintain air superiority in Southeast Asia and limit the movements of North Vietnamese ground troops. As discussed above under the USAF operations, they were not able to effectively stem the flow of war materiel or effectively undermine the war making abilities of the Viet Cong.

Navy fighters engaged in their first air-to-air combat on 3 April 1965 when several MIG-15s attacked U.S. F-8 Crusaders flying near Thanh Hoa; however, the attack was unsuccessful. Just over two months later, 17 June 1965, two Navy F-8 Phantoms recorded the first kills of the war when they shot down two MIG-17s. By the time the Operation Rolling Thunder ended in November 1968, Navy pilots had downed over 30 MIGs.[53]

As noted above, the Rolling Thunder missions comprised Navy, USAF, and South Vietnamese Air Force aircraft. Navy operations consisted of large multi-carrier missions that focused strikes on 94 key military and transportation targets. Navy aviators also conducted strikes of opportunity along infiltration routes. These targets included trucks, trains, ferries, river craft, transportation and supply facilities, small bridges, radar installations, and anti-aircraft sites. In addition, carrier-based aircraft provided tactical reconnaissance support for these operations.[54]

50 Marolda and Pryce III, *United States Navy and the Southeast Asian Conflict,* 22-23.
51 Marolda and Pryce III, *United States Navy and the Southeast Asian Conflict,* 28.
52 Marolda and Pryce III, *United States Navy and the Southeast Asian Conflict,* 28
53 Marolda and Pryce III, *United States Navy and the Southeast Asian Conflict,* 31
54 Marolda and Pryce III, *United States Navy and the Southeast Asian Conflict,* 32.

The mission schedule early in Operation Rolling Thunder consisted of the following activities. Every day carriers launched strikes in alternating order every 12 hours. However, the scale of operations quickly expanded and the fact that three services were conducting missions in the same area led to complications and a change in this system. By the end of 1965, the Navy and USAF had designated six geographical target areas. Each service alternated strikes in each area on a weekly basis. Ostensibly, this prevented confusion and miscommunication. The mission was further refined in April 1966 when the Navy was assigned a geographic theater of focus in North Vietnam. Aviators concentrated their attacks and reconnaissance on the coastal areas, which held most of the North Vietnamese population.[55]

The scale of Operation Rolling Thunder was enormous. Seventh Fleet carrier-based units flew 31,000 combat and combat-support sorties, dropped 64,000 bombs, and fired 128,500 rockets in the first nine months of the operation, solely in the effort to interdict the lines-of-communication and supply between North Vietnam and the Viet Cong. While North Vietnam was the focus of the sorties, Navy pilots also flew one-third of their missions over South Vietnam in 1965 and 1966 due to the critical lack of jet serviceable onshore airfields for the USAF. South Vietnam sorties included air support for ground troops, strikes on Viet Cong rear areas, and reconnaissance for amphibious operations. South Vietnam sorties also served to prepare pilots for the more dangerous missions over North Vietnam.[56]

Briefly in early 1967, Navy Rolling Thunder operations shifted to southern Laos where there had been an increase in insurgent activity. However, the focus of air warfare soon shifted back to North Vietnam. By February 1967, the Navy and USAF received authorization to attack the heart of Vietnam. Navy air squadrons hit the industrial center of the country and damaged or destroyed iron and steel plants, thermal power plants, cement factories, ship and rail repair shops, ammunition depots, and warehouses. In April 1967, they crippled the North Vietnamese jet capable airfields at Kep and Hoa Lac. Navy aviators also spent considerable time targeting transportation routes radiating from Hanoi and Haiphong.[57]

The U.S. bombing campaign undermined North Vietnam's infrastructure and, as a result, the North Vietnamese Army began using coastal and inland waterways for movement and transport. The Navy responded by expanding their capabilities in February 1967. Aircraft began dropping bottom-lay mines in the mouths of North Vietnamese rivers, and as the year progressed, initiated a program to lay mines in inland waterways and on land near bridges and crossing points. Pilots also continued to attack traditional transportation routes.

Though not a typical target, some Navy sorties focused their attention on Hanoi in the Summer of 1967. They knocked out the Hanoi electrical power plant in May 1967 and disabled the city's thermal power plant in August 1967. Navy pilots also dropped bombs on a major bridge near the Chinese border the same month. In the late Summer and Fall 1967, Navy squadrons attacked the primary North Vietnamese Navy base at Van Hoa and knocked out several small ports.[58]

55 Marolda and Pryce III, *United States Navy and the Southeast Asian Conflict,* 32-3.
56 Marolda and Pryce III, *United States Navy and the Southeast Asian Conflict,* 32.
57 Marolda and Pryce III, *United States Navy and the Southeast Asian Conflict,* 34-5
58 Marolda and Pryce III, *United States Navy and the Southeast Asian Conflict,* 35

Other Navy air operations in early 1968 were undermined by weather conditions that hampered flying. Sorties became dictated by breaks in the weather. When pilots had the opportunity to conduct missions, they continued where they left off in 1967. Focusing their efforts south of Vinh, aircraft dropped mines at river mouths and choke points and attacked targets of opportunity and continued their assaults on infrastructure throughout North Vietnam.[59]

A significant change of mission occurred in April 1968 when President Johnson halted the bombing campaign in the northern two-thirds of North Vietnam. Therefore, the Navy refocused their interdiction campaign in a much smaller area, between the 18th and 19th Parallels. Operations were also strategically narrowed.[60]

By May 1968, Navy planners had identified three areas of focus. A carrier task group dedicated itself to each region and squadrons executed around-the-clock attacks on targets within each area. The campaign largely shut off the flow of North Vietnamese war assets to the south. By August 1968, enemy overland transport was curtailed to the point that they began to rely on limited coastal and inland waterways for movement. As a result, American aircraft targeted waterways in which the activity was centered, and in September 1968 alone, destroyed over 1,000 water craft.[61] Operation Rolling Thunder ceased two months later on 1 November 1968.

Figure 2-4 Navy Task Force 77 in Tonkin Gulf
Source: United States Naval Aviation 1910-1995

The cancellation of Operation Rolling Thunder and the implementation of Vietnamization resulted in a reduction of Navy fixed-wing assets in Southeast Asia. This was most apparent in the fact that the contingent of three carriers based in the Gulf of Tonkin was reduced to two by 1969. Navy squadrons flew approximately half the monthly average number of sorties in 1969 that they flew in 1968. The number of sorties declined further by the end of 1970 when pilots flew between 1,000 to 2,500 sorties over Laos and South Vietnam per month. This is compared to the 5,000

59 Marolda and Pryce III, *United States Navy and the Southeast Asian Conflict,* 35
60 Marolda and Pryce III, *United States Navy and the Southeast Asian Conflict,* 36
61 Marolda and Pryce III, *United States Navy and the Southeast Asian Conflict,* 37

sorties flown by the Navy in one month in support of the operation. The carrier-based aircraft also provided combat support to USMC and Army units still operating in South Vietnam.

Even though Vietnamization resulted in redeployments and reductions in bombing campaigns, the Navy established the Light Attack Squadron (VAL)-4 in April 1969. The squadron flew the OV-10 Bronco fixed-wing aircraft in support of Navy and Vietnamese combat support missions along the entire length of the Mekong River to the Cambodian border.

Figure 2-5 Three F-4D Phantom II Aircraft from the *USS Midway* and three Corsair II Aircraft from the *USS America* (CVA 66) drop Bombs
Source: General Color Photographic File of the Department of Navy, 1958 - 1981, Record Group 428, National Archives

A dramatic North Vietnamese attack into South Vietnam in March 1972 resulted in a temporary increase in Navy fixed-wing capabilities in the Gulf of Tonkin. The Navy dispatched three carriers to Southeast Asia in April 1972, bringing the total number of aircraft carriers to five. Navy air squadrons hit military and logistic facilities at Dong Hoi, Vinh, Thanh Hoa, Haiphong, and Hanoi. They also attacked enemy troop units, supply convoys, and headquarters in the areas around the Demilitarized Zone. Navy jet squadrons spent the rest of the year attacking targets in North Vietnam until combat operations halted in January 1973.

2.2.3 Marine Corps

Marine Corps fixed-wing aircraft did not participate in the Vietnam War until 1965. The first Marine jets and other airplanes arrived at Da Nang in April 1965 with the Marine Aircraft Group

(MAG)-11. The group eventually consisted of 14 attack squadrons, an observation squadron, and a reconnaissance squadron. They flew the F-8 Crusader, F-4 Phantom II, A-6 Intruder, and A-4 Skyhawk. Two smaller Marine fixed-wing aircraft groups arrived in Chu Lai in the Summer of 1965. MAG-12, which arrived in May 1965, consisted of three attack squadrons flying the Douglas A4E and one squadron flying the Grumman A-6A. MAG-13, which arrived in July 1965, consisted of three fighter-attack squadrons equipped with the McDonnell F-4B. Rotary and fixed-wing units arrived throughout the rest of 1965 until most elements of the USMC 1st Aircraft Wing was in Vietnam. By January 1968, the USMC had 11 of its 26 fixed-aircraft squadrons in Vietnam. All units were based Chu Lai or Da Nang. Some aircraft used auxiliary fields at Dong Ha, An Hoa, Tam Ky, and Khe Sanh.[62]

MAG-12, based at Chu Lai, operated out of a new Short Airfield Tactical Support (SATS) airfield. A newly developed concept, the SATS used pre-fabricated metal runways and taxi strips. The system was specifically designed to meet the USMC objective that required the rapid construction of expeditionary airfields. The SATS were essentially shore-based carrier decks. In fact, the short airfield even incorporated the catapults and arresting gear found on aircraft carriers. In contrast, the other USMC airfield, located at Da Nang, was a traditional design. Most USMC fixed-wing units were land based, operating out of Chu Lai or Da Nang. However, one squadron, VMF-212 was based on a Navy carrier.[63] The SATS and Da Nang airfield were constructed by Navy Seabees and USMC Engineers.

Marine aviators did not participate in Operation Rolling Thunder as their primary mission. Their missions focused on CAS of infantry troops. The air support strikes were both pre-planned and on-call. The pre-planned missions, which were requested by battalion commanders approximately 24 hours prior to the operation, required complex planning. A single request would be sent to the wing's direct air support center and tactical air direction center. All incoming requests would be compiled and distributed to the fixed-wing groups. The wing groups subsequently scheduled flights for the next day and issued orders to specific squadrons. The entire process from scheduling to the actual mission took approximately 20 hours. Preplanned missions focused on specific predetermined strategic targets.[64]

On-call missions, designed to be processed and executed immediately, followed a different pattern and could be processed and executed almost instantaneously. The missions were flown in direct support of troops that were in contact with the enemy or against targets of opportunity. The aviators, which were on an around the clock alert status, could act on controller requests at a moment's notice.[65]

62 Command Chronology [MAG - 13], 01 July 1965, Folder 076, Box __, US Marine Corps History Division Vietnam War Documents Collection, The Vietnam Center and Archive, Texas Tech University. Accessed 29 Mar. 2018 https://www.vietnam.ttu.edu/virtualarchive/items.php? item=1201076303; COMMAND CHRONOLOGY [MAG - 13], 01 July 1965, Folder 076, Box __, US Marine Corps History Division Vietnam War Documents Collection, The Vietnam Center and Archive, Texas Tech University. Accessed 29 Mar. 2018 https://www.vietnam.ttu.edu/virtualarchive/items.php? item=1201076303; 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): 150; Jack Shulimson, Leonard A. Balsiol, Charles R. Smith and David A. Dawson, *U.S. Marines in Vietnam: The Defining Year, 1968,* (Washington D.C.: History and Museums Division, U.S. Marine Corps, 1997),458, 463
63 Shulimson and Jones, *Landing and the Buildup,* 30, 39, 158
64 Shulimson and Jones, *Landing and the Buildup,* 153.
65 Shulimson and Jones, *Landing and the Buildup,* 153

These air support missions played a prominent role in USMC fixed-wing activities in the first year of the war, for example, Marine aircraft flew 4,614 sorties in support of American infantry units and 1,656 sorties in support of South Vietnamese units in the last four months of 1965.[66]

While the majority of USMC fixed-wing missions centered on CAS, other duties were performed. For example, they flew some traditional air assault missions on enemy bases of operation, and airplane pilots also supported rotary-wing operations. Jet aircraft prepared helicopter landing zones (LZ) by covering the landing area and surrounding region with bombs, napalm, rockets, and cannon fire in advance of the transport helicopters. Once the helicopters approached the LZ, armed helicopters would take over suppression of the LZ. The fixed-wing aircraft; however, orbited above the helicopters in position to provide attack capabilities in the event of heavy enemy resistance.[67]

The vast majority of USMC fixed-wing missions were in South Vietnam, but pilots did occasionally infiltrate North Vietnam often in support of rescue operations. At the end of 1965, land-based Marine Aviators briefly took part in Operation Steel Tiger with USAF and Navy pilots. Operation Steel Tiger was a bombing mission and long-standing component of Operation Rolling Thunder in which American pilots assaulted North Vietnamese supply lines in Laos. However, USMC involvement in the operation lasted less than one month.[68]

The USMC jet aircraft were also used for reconnaissance and countermeasures in support of Operation Rolling Thunder. The Marine Composite Reconnaissance Squadron 1 performed electronic and photo reconnaissance over North Vietnam. They also provided electronic countermeasures to locate and jam enemy radar systems.[69]

Finally, the Marine Aerial Refueler Transport Squadron 152 (VMGR-152), based at Marine Air Station, Futema, Okinawa with a detachment located at Da Nang, provided refueling support using Lockheed KC-130 Hercules aircraft. They flew above the South China Sea and were available for emergency refueling. This was particularly important during monsoon season when aircraft might not be able to return to their airfields due to inclement weather. The USMC also used KC-130s extensively for resupply in South Vietnam and the transport of personnel and material between South Vietnam, Japan, and Okinawa.[70]

The USMC aviation operations remained active and expanded throughout the middle years of the war. There were eight fixed-wing squadrons in Vietnam at the end of 1965. A year later, there were 11 squadrons. There were more Marine fixed-wing squadrons deployed to the war than rotary-wing squadrons.[71] All units were based at either Da Nang or Chu Lai.

The middle of the war also brought air support units. For example, the 1st and 2nd Light Antiaircraft Missile Battalions arrived in at Da Nang and Chu Lai in 1965. They came equipped with HAWK

66 Shulimson and Jones, *Landing and the Buildup*, 154
67 Shulimson and Jones, *Landing and the Buildup* ,154
68 Shulimson and Jones, *Landing and the Buildup,* 154
69 Shulimson and Jones, *Landing and the Buildup*, 156
70 Shulimson and Jones, *Landing and the Buildup*, 157
71 Jack Shulimson, *U.S. Marines in Vietnam: An Expanding War, 1966* (Washington D.C.: History and Museums Division, U.S. Marine Corps, 1982) 261.

missile firing batteries and based operations out of their own Antiaircraft Operations Center. The USMC air defense control was coordinated by the USAF at the Monkey Mountain facility.[72]

The expansion of USMC aviation commitments in 1966 resulted in an acute pilot shortage. While the shortage was most apparent among helicopter units, it also affected fixed-wing units. Pilots themselves began to resent the fact that they were already being asked to complete multiple deployments in Vietnam. Moreover, the USMC extended the period of time pilots were deployed to the war. It was clear that the situation was becoming untenable. In order to address the crisis, USMC leadership increased the number of USMC pilots admitted to the Naval Pilot school at NAS Pensacola, shortened training programs, and requested the USAF assistance in training.[73]

The pilot shortage was not the only problem facing USMC leaders in 1966. The USAF and USMC planners were in direct conflict over the management of the war. Specifically, they disagreed over responsibilities that had been agreed to in May 1965. The 1965 Agreement provided the USAF with authority to coordinate tactical air support in South Vietnam but did not grant operational control of Marine aircraft. The Commander of the Marine's 1st Aircraft Wing held operational control of the aircraft. As such, the aircraft squadrons prioritized operations in support of USMC ground troops. The fixed-wing squadrons were only available to other branches if they were not needed of USMC missions. The USAF leadership believed that they should have the use of USMC assets in larger cooperative air combat missions. This disagreement over authority and control continued until 1968 when the USMC Aircraft squadrons were placed under a single authority, the USAF. The USMC leadership complained that the arrangement complicated their operations and by 1970, the USMC regained considerable control over their own operations.[74]

Air operations between 1966 and 1968 mirrored those of 1965. Marine jets flew over 60,000 sorties in 1966; approximately 43,000, supported USMC operations. The remaining supported USAF missions over North Vietnam, South Vietnam, Cambodia, and especially Laos. The USMC jets attacked targets of opportunity in Laos, but provided combat air patrols, countermeasures, and electronic surveillance in North Vietnam, South Vietnam, and Cambodia. Indeed, Marine Composite Reconnaissance Squadron (VMCJ-1) flew 3,720 sorties supporting the USAF and Navy Rolling Thunder operations in 1966. They provided photographic reconnaissance and located and jammed enemy radars and communication networks over North Vietnam. These missions; however, continually concerned USMC commanders who wanted all USMC air assets directed to Marine activities and ground troop support. In 1967, operations included a large number of air support sorties in the northern portion of South Vietnam where USMC infantry encountered heavy resistance. The jets also continued providing assault support for rotary-wing aircraft. Finally, fixed-wing units continued to fly missions over North Vietnam in support of Operation Rolling Thunder in 1967.[75] The USMC pilots supporting other military branches had a busy year in 1968. In January 1968, USMC fighter and attack aircraft flew nearly 7,000 sorties and dropped 900 tons of bombs supporting Navy and USAF missions. By the end of 1968, the

72 Shulimson, *U.S. Marines in Vietnam: An Expanding War*, 270.
73 Shulimson, *U.S. Marines in Vietnam: An Expanding War,* 262.
74 Shulimson, *U.S. Marines in Vietnam: An Expanding War,* 267, Shulimson, et. al. *The Defining Year,* 493, 515; 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), 224
75 Shulimson, *U.S. Marines in Vietnam: An Expanding War,* 272, 275; 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): 203, 204; Shulimson, et. al. *The Defining Year,* 470.

Marine jet pilots had flown almost 17,500 attack sorties and other missions in support of Operation Rolling Thunder.[76]

The end of Operation Rolling Thunder and the drawdown of U.S. involvement in Vietnam that began in late 1968 did not immediately affect USMC fixed-wing activities in any significant way. The majority of flights in the first eight months of 1969 were daily tactical strikes and combat support missions in the northern portion of South Vietnam. Pilots averaged over 6,000 such sorties per month. The other USMC fixed-wing missions included interdiction and reconnaissance.[77]

However, two events occurred by the end of August 1969 to significantly alter USMC fixed-wing operations; the level of combat in the region was waning and the 9th Marine Regiment, the primary force in northern South Vietnam, was redeployed to Okinawa. The remainder of the 3rd Marine Division redeployed by the end of 1969. Predictably, these changes resulted in a dramatic decrease in sorties flown. Three fixed-wing squadrons left Vietnam by the end of the year. By this time, the sorties dropped to approximately 2,500 per month with less than half of them being combat support. The remaining USMC missions were attacks on enemy communication networks and bases of operation in the South Vietnam/North Vietnam border region. The USMC pilots also flew more than 1,700 sorties in support of the USAF's interdiction campaigns along the Ho Chi Minh Trail in Laos in 1969. This activity became the focus of Marine jet missions in 1970 until final redeployments in 1971.[78]

In January and February 1970, two fixed-wing squadrons returned to the United States. By the end of March, only 174 USMC fixed-wing aircraft were in Vietnam. Reductions continued throughout the year. There were only 81 Marine airplanes in Vietnam by August and the Chu Lai facility was vacated in October 1970. The last Marine aviation units left Vietnam in June 1971. Marine fighter jets sporadically returned to Southeast Asia in 1972 and 1973 in support of USAF missions, but did not remain in the region for extended periods of time.[79]

2.2.4 U.S. Army

As noted above, the establishment of the USAF resulted in a transition for the Army from fixed-wing aircraft to rotary wing aircraft.[80] Nonetheless, the Army did employ some small (OH-1 Bird Dog, OV-1 Mohawk) fixed-wing non-jet aircraft for reconnaissance and observation, usually in support of Special Operations. The aircraft were flown by several small units from 1963 through the early 1970s. The units included the 73rd ,74th, 114th, 145th, 183rd, 184th, 185th, 199th, 203rd, 219th, 220th, and 221st Aviation Companies.

A separate subtheme context is provided for helicopter training and use during the Vietnam War in Legacy Project Number 14-739 *Helicopter Training and Use on U.S. Military Installations*.

76 Shulimson, et. al. *The Defining Year,* 464-5, 515.
77 Smith, *High Mobility and Standdown,* 224.
78 Smith, *High Mobility and Standdown,* 229, 231, 234; 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) 283-4.
79 Cosmas and Murray, *Vietnamization and Redeployment*, 272-3; 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):153, 157, 166, 184.
80 Helicopters are not specifically addressed in this context. Helicopter operations are covered 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.

3. ON THE HOME FRONT

3.1 INTRODUCTION

Pilots were needed to fly a myriad of aircraft for the war effort. Missions involving aircraft included defending villages and outposts, attacking enemy troops and convoys, escorting road convoys and bombing strikes, dropping flares for attacking fighters, flying armed reconnaissance, search and rescue, transporting troops and equipment, refueling, interdicting the movement of enemy forces and supplies, directing air strikes and bombing runs, spraying defoliants, and psychological warfare.[81]

Throughout the Vietnam War, tactical aircraft were called upon to carry the primary strike burden against highly-defended targets in North Vietnam. Many of the combat missions could be considered strategic bombardment rather than tactical interdiction because of the type of targets attacked, the desired long-range effects, and the aerial refueling required for deep penetration. However, the extremely hostile environment in and around the important North Vietnamese targets and the political reservations about committing strategic bombers made the use of fighters necessary.[82]

The two primary strike aircraft used by the USAF against targets in North Vietnam were the F-105 Thunderchief and the F-4 Phantom. The F-105 first entered the USAF tactical inventory in 1959. In Operation Wild Weasel, a F-105 pilot was combined with an electronic warfare officer in a tactical aircraft to ferret out and destroy the enemy's surface-to-air missiles (SAM) and automatic weapons installations. By 1972, most of the F-105s were replaced by the F-4 Phantoms.[83] The F-4 Phantom was the most versatile aircraft employed during the Vietnam War. It could perform the diverse roles of air superiority, CAS, interdiction, air defense and long-range bombardment with devastating effectiveness. With this flexibility, the F-4 Phantom was used for practically every purpose in Southeast Asia; from delivering weapons with pin-point accuracy to performing the critical and demanding strike role.[84]

The Navy started using the F-4 Phantom in 1958, the USAF version, the F-4C, was acquired by TAC in 1962.[85] Six different aircraft were used by the Navy for bridge busting, including the A-4, A-6, A-7, F-4, and F-8. The Navy's work horse was the A-4 Skyhawk.[86]

The USAF that deployed in Southeast Asia in 1964 consisted of highly-qualified personnel. The United States had better trained pilots than North Vietnam though most were not combat experienced. Approximately 27 percent of the U.S. pilots were under 30; nearly half were over 36; therefore, the average pilot was well-seasoned with approximately eight to 10 years of flying experience.[87]

81 Schlight, John, *A War Too Long, The USAF in Southeast Asia 1961-1975,* 1996 (Air Force History and Museums Program).
82 Middleton, Drew, Introduction to *Air War – Vietnam*, 1978 (Multiple authors and editors. Arno Press, Inc. New York US.), p. 12
83 Middleton, *Air War – Vietnam,* p. 16
84 Middleton, *Air War – Vietnam,* p. 21
85 Middleton, *Air War – Vietnam,* p. 22
86 Middleton, *Air War – Vietnam,* p. 26
87 Middleton, *Air War – Vietnam,* p. 222

Air refueling (primarily with the KC-135 Stratotanker) also played an important role during the air war over Southeast Asia. With distances of 7,100 nautical miles from Travis AFB, California, to Andersen AFB, Guam, and another 2,251 nautical miles to Saigon, South Vietnam, all tactical aircraft sent from the United States to Southeast Asia required air refueling. The B-52 Stratofortress also received a precautionary refueling on its way to Guam.[88]

Figure 3-1. USAF Pilots Refueling Enroute to a Bombing Target in North Vietnam
Source: Miscellaneous Vietnam Photographs, 1958 - 1974, Record Group 306, National Archives

3.2 AIR FORCE

3.2.1 Overview

Air Training Command (ATC) was organized on 1 July 1946 as a re-designation of the Army Air Forces Training Command as part of the reorganization of the U.S. Army Air Force after World War II. For nearly 50 years, ATC was the primary training organization of the USAF, following its inception as an independent service in September 1947. It provided pilot and aircrew training;

88 Wallwork, Ellery E., *Vietnam the First 'Tanker War'*, 2009, http://www.amc.af.mil/News/Article-Display/Article/147242/vietnam-the-first-tanker-war/. 1 June.

technical training and enlisted and officer basic training.[89] ATC gained a new mission – survival training, when it assumed control of Stead AFB, Nevada, from SAC on 1 September 1954.[90]

In 1953, following the end of the Korean War, many ATC training facilities transferred to the strategic and tactical forces. From a high of 43 bases, ATC began a gradual downward trend. Personnel strength also dropped from 271,849 on 30 June 1953 to 79,272 by the end of 1963.[91] In the early 1960s, the Air Force had entered a long period of pilot reductions. In 1961, ATC operated a total of 21 major bases; two-thirds conducted flying training and the remainder conducted basic and technical training.[92]

During the Vietnam War, although training production did rise, ATC did not drastically increase its base structure or permanent staff personnel, unlike its previous wartime experience. When President Johnson escalated American military involvement in Vietnam in 1965, individual technical and military training centers experienced a significant increase in student population. The war in Southeast Asia siphoned off most of the commands' best instructors, leaving it with a lack of experienced qualified personnel. Pilot production almost tripled from 1963 to 1969. The number of graduates from basic military training increased dramatically, with 29,000 graduates in the first half of 1965 compared to 73,000 in the second half. To accommodate the increased production, ATC reverted to a split-phase basic training program; four weeks at Lackland AFB, Texas, and two weeks at one of the technical training centers.[93]

Other requirements added to the training burden. In early 1962, the number of South Vietnamese students entering the Foreign Training Program at Moody AFB in Georgia increased sharply.[94] In September 1965, the United States agreed to train 170 Germans annually, with a goal of reaching this rate by the June 1968. The USAF planned to reach 112 per year by June 1967, but the first class of 22 did not graduate until September 1968. Although the Germans agreed to pay most of the expenses, including the purchase of T-37 and T-38 planes, this effort was a strain because of the lack of available instructors and aircraft.[95]

Of the major USAF commands, TAC felt the greatest pressure from the buildup in the western Pacific and the escalation of military operations in Southeast Asia. In addition to fighter and airlift units, it had to conduct a large training program and prepare forces for possible contingencies elsewhere in the world.[96] Flight training for tactical and airlift forces saw dramatic growth during the early 1960s. In 1962, approximately 1,300 pilots were trained and by 1967, the number more than doubled to 2,700 pilots trained.[97]

89 Manning, Thomas, Dr. Bruce A Ashcroft, Richard Emmons, Ann Hussey, Dr. Joseph L. Mason, *History of Air Education and Training Command 1942-2002, 2005 (*Office of History and Research, Headquarters, Air Education and Training Command, Randolph Air Force Base, TX).
90 Air Training Command (ATC), Fifty Years of Training. Randolph Air Force Base, Texas, 1993 (Maxwell AFHRA)
91 ATC, *Fifty Years of Training*. Randolph Air Force Base, Texas, 1993
92 Shaw, Frederick J., *Locating Air Force Base Sites History's Legacy.* 2004. (U.S. Air Force, Air Force History and Museums Program, Archived Air Force Historical Research Agency (AFHRA), Maxwell Air Force Base.
93 ATC, *Fifty Years of Training*. Randolph Air Force Base, Texas, 1993
94 Manning et al., History of Air Education and Training Command 1942-2002, 2005
95 Lemmer, George F., *USAF Manpower in Limited War 1964 – 1967,* 1968 (USAF Historical Division Liaison Office, Archived Air Force Historical Research Agency (AFHRA), Maxwell Air Force Base (K168.01-34)
96 Lemmer, USAF Manpower in Limited War 1964 – 1967, 1968
97 Hartman, Ellen R., Susan I. Enscore, and Adam D. Smith, "Vietnam on the Homefront*:* How DoD Installations Adapted, 1962–1975," 2014 (Department of Defense Legacy Resource Management Program, Report ERDC/CERL TR-14-7).

The pace of the Vietnam war accelerated so rapidly that more than half of TAC forces were in the western Pacific by the end of 1965. The initial phase of deployment required more than one half of TAC's operational squadrons; 68 percent of the tactical forces and 64 percent of the airlift fleet. Before the end of 1966, the deployments reached 76 and 73 percent, respectively. At the same time, there were frequent rotations of aircrews, maintenance men, and other technicians. To provide men for both the units and as individual replacements, TAC had to greatly expand its training program.[98]

By June 1966, TAC was still far from solving its manpower problems. Units sent to the combat theater had a 1.5 crew ratio, but training units in the United States were short of qualified pilots. The F-4C sortie rate had jumped from 1,337 in May to 3,015 in July 1966. In addition, F-I05 pilot losses were high in July and August 1966. Both TAC and U.S. Air Forces in Europe (USAFE) were obligated to send more units to Southeast Asia, regardless of the effect on other missions. TAC was also forced to deploy many instructor pilots. TAC's planning figures, used to establish replacement training unit (RTU) student loads, quickly became obsolete.[99]

Between July and October 1965, Headquarters USAF accelerated reduction of SAC units to free 3,200 rated officers for the burgeoning airlift force that was flying men and supplies across the Pacific. In November 1966, two B-52 squadrons were de-activated to obtain 300 jet mechanics for the Military Airlift Command (MAC). In February 1967, due to the demand for jet pilots, Headquarters USAF informed SAC that, beginning in September 1965, it would have to provide as many as 150 jet pilots per month. This required SAC combat crew training school (CCTS) at Castle AFB, California, to increase the number of its graduates from 96 to 137 pilots per month. The demand placed a severe strain on the school, which had only just raised its training rate to 96 from 64 per month. The first of these pilots, mostly KC-135 crewmen, reached tactical units in January 1968.[100]

On 12 November 1965, Secretary McNamara inquired about the effect of a large-scale dispatch of forces to Southeast Asia on U.S. commitments to the North Atlantic Treaty Organization (NATO). The Air Force replied that such deployments might result in a lack of active fighter squadrons in the United States. While formal commitments would be met, a promised augmentation of NATO forces would not be possible without recalling fighter squadrons from Southeast Asia and mobilizing units of the Air National Guard (ANG). In October 1966, the JCS informed Secretary McNamara that the withdrawal of qualified pilots from Europe for use in Vietnam had reduced the capacity of the USAFE to a point where that command could barely meet requirements should an invasion of western Europe take place, and that any further withdrawals would worsen an already critical situation.[101]

Pilot training gradually increased; but officials reassigned many of ATC's best instructor pilots to the operational commands, creating severe flying training difficulties. In 1969, ATC's involvement in a program of training and equipping the Republic of Vietnam Air Force to become

98 Lemmer, USAF Manpower in Limited War 1964 – 1967, 1968
99 Lemmer, USAF Manpower in Limited War 1964 – 1967, 1968
100 Lemmer, USAF Manpower in Limited War 1964 – 1967, 1968
101 Lemmer, USAF Manpower in Limited War 1964 – 1967, 1968

a self-sufficient, 40-squadron air force caused technical training production to surge by approximately 50 percent, to over 310,000.[102]

3.2.2 U.S. Air Force Training

Pilot Training

After World War II, the peacetime pilot training program was 52 weeks (12 months) in length and involved primary, basic, and advanced training phases. The primary phase included 80 hours of flying time; basic had 105 hours; and advanced had 100 hours in a single-engine and 90 hours in a two-engine aircraft (B-25). By June 1947, advanced training included 100 hours flying each on single, 2- and 4-engine aircraft. By October 1947, primary and basic were integrated into an eight-month program with 170 hours of flying.[103]

After the Korean War ended, primary training was six months with 140 flying hours and basic was five months with between 105 to 135 hours in a single-engine, and 110 to 120 in a multiple-engine aircraft. By the early 1960s, undergraduate pilot training (UPT) was 55 weeks in length with 132 hours of flying time in the primary phase and 130 hours of flying time in the basic phase.[104]

In the early 1960s, ATC converted from specialized to generalized UPT. Under generalized UPT, all pilots received the same training, regardless of what type of operational aircraft they would ultimately fly. The ATC acquired the North American T-38 Talon jet and it became the primary advanced trainer aircraft for all student pilots.[105]

Before the unique demands of the Vietnam War, non-commando-based USAF pilot training was typically conducted at Lackland AFB, Texas. However, as the Vietnam War escalated throughout the 1960s, the demand for pilots increased, resulting in overcrowding at Lackland AFB. Although pilot training overcrowding never reached the critical levels experienced during the Korean War, by September 1966 the trainee population had jumped to over 20,000 at Lackland AFB; a base that was designed to support 17,700 personnel.[106]

Part of the overcrowding at Lackland AFB was a result of the restructuring of the USAF undergraduate flight training programs. Beginning in 1961, pilot training was at a low point, and the USAF had closed the last of its contracted primary flight-training facilities. Undergraduate pilot training was then distributed between eight ATC bases. Lackland AFB and Vance AFB, Oklahoma, were two of these and typified installations that merged pre-flight training, primary training, and basic flight training. Amarillo AFB, Texas, also served as a site for basic training after an outbreak of spinal meningitis killed an airman at Lackland AFB. Although Amarillo AFB had been slated for closure, it was rushed back into service in February 1966 to accommodate airmen from Lackland AFB. The base then provided basic training until November 1968, to reduce the impacts of increased training at Lackland AFB. During that time, Lackland AFB experienced a building boom that increased its capacity to process and train new recruits.[107]

102 ATC, *Fifty Years of Training*. Randolph Air Force Base, Texas, 1993
103 Air Training Command (ATC), Major changes in Undergraduate Pilot Training 1939-1990, 1990, (Maxwell AFHRA).
104 Air Training Command (ATC), Major changes in Undergraduate Pilot Training 1939-1990, 1990, (Maxwell AFHRA).
105 Manning et al., History of Air Education and Training Command 1942-2002, 2005
106 Hartman et al., "Vietnam on the Homefront*:* How DoD Installations Adapted, 1962–1975," 2014
107 Hartman et al., "Vietnam on the Homefront*:* How DoD Installations Adapted, 1962–1975," 2014

In the first half 1963, the office of the Secretary of Defense approved Laredo AFB, Texas as the eighth UPT ATC base. The command had first decided to add Laredo to the list of UPT bases in 1960, though money was needed to repair the aging airfield. It took almost two years for the DoD to release limited funds for runway repair. Other changes in pilot training included relocation of the foreign pilot training from Moody AFB, Georgia to Randolph AFB, Texas, which gave Moody AFB the ability to support jet pilot training. SAC also moved its U-2 wing from Laughlin AFB, Texas to Davis-Monthan AFB, Arizona, giving ATC the additional space it needed to conduct pilot training more effectively at Laughlin AFB. During 1963, ATC reported a shortage of captains assigned. Because the majority of officer instructor authorizations called for captains, this meant the command was unable to fill its officer instructor slots with skilled personnel. Flying training missions confronted similar manning difficulties because most pilots and navigators lacked field experience. As a result, training quality suffered.[108] Other UPT training bases included Reese AFB, Texas, Williams AFB, Arizona, Webb AFB Texas, and Craig AFB Alabama.[109]

At the end of 1963, General Curtis LeMay, Air Force Chief of Staff, advised all major commands that the Air Force had to intensify economy measures because of budget reductions, decreases in manpower, and ever-increasing fixed costs. The plan was called Project ICE (increased combat effectiveness). Its purpose was to cut costs elsewhere so that greater emphasis could be placed on combat effectiveness. Among the cuts ATC identified in 1964 were reducing the number of women in the Air Force, consolidating medical training, reducing activities in the Office of Information, and consolidating common training for the services.[110]

The USAF response to the emergency indicated that the Air Force had not been able to expand its training system with sufficient rapidity because of too much emphasis on economy in peacetime plus an inadequate appreciation of the diverse demands of a limited war conducted 10,000 miles away. Some of the lack of training capacity could be attributed to Office of the Secretary of Defense disapproval of USAF plans for UPT basic technical instruction and for more facilities. Since the USAF quickly expanded all phases of training without enough facilities and instructors, many undesirable innovations resulted: (1) a six-day work-week; (2) three and four-shift, round-the-clock operation in many technical schools, CCTSs and RTUs; (3) cuts in basic military training from 30 to 24 days; (4) reduction in airman housing space below established health standards; and (5) a hurried build-up of the Amarillo Technical Training Center (scheduled to close by 30 June 1968) to accommodate overflow students from Lackland AFB, and others taking jet aircraft mechanics courses. In 1967, these crash operations in basic military and technical schools return to normal. The CCTSs, RTUs, and advanced technical courses continued to function at an unusually high tempo.[111]

To some degree, these economy measures were practical (i.e., the USAF increased its use of flight simulators to train pilots and navigators). As part of the instruments first method, flight simulators gave beginning students practical knowledge and familiarity with high-speed training planes before flying them. The greater use of simulators, plus the greater-than-expected savings of time and money in operating the T-38, probably induced the USAF to cut procurement of this plane too

108 Manning et al., History of Air Education and Training Command 1942-2002, 2005
109 ATC, *Fifty Years of Training*. Randolph Air Force Base, Texas, 1993
110 Manning et al., History of Air Education and Training Command 1942-2002, 2005
111 Lemmer, USAF Manpower in Limited War 1964 – 1967, 1968

drastically in 1965 and plans to increase flying training were hampered in 1966 and 1967 by a shortage of aircraft as well as instructors.[112]

After 1964, due to the short tour of duty in the combat theater, heavy turnover of qualified technicians who had to be replaced there with raw recruits, and the great expansion of most USAF activities placed an excessively heavy burden on the ATC and caused a near breakdown in some of its functions. The heavy emphasis on tactical operations, special air warfare, and related applications of airpower required a great deal of training in the types of aircraft, weapons, and procedures that the USAF had largely neglected during the previous decade.[113]

As early as October 1963, Secretary McNamara had approved a gradual increase in the UPT rate to 2,760 per year.[114] In July 1965, to train more men without adding new bases, the USAF shortened the UPT. In early 1965, ATC replaced its 55-week, 252 flying-hour training program with a new course known as the 30/90/120-hour program; the new class was 53 weeks long and included 240 flying hours. A civilian contractor now provided 30 hours of light plane (T-41) flying, while the USAF gave 90 hours instead of the previous 132 in the T-37 and 120 in place of 130 hours in the supersonic T-38.[115]

The main difference between the previous UPT program and the 30/90/120 program was the addition of a light-plane phase, in which civilian contractors provided 27 days of instruction and 30 hours of flying in the T-41. To provide flying hours for the T-41, ATC reduced the primary phase to 90 hours and left the basic phase unchanged at 120 hours. The flight screen program began in July 1965 when ATC revised its flying training program, cutting two weeks from the course. Jet flying hours dropped from 252 to 210 hours. Civilian contractors conducted the training near each of the UPT bases.[116]

During the last half of 1965, flying training showed a small increase; however, the military and technical training units showed a large expansion, primarily because of the situation in Southeast Asia. At Sheppard AFB, the average daily student load grew from 4,000 in July to almost 9,500 in December 1965. Keesler AFB's student load jumped from 12,675 at mid-year to 16,495 at the end of the year, and Chanute AFB more than doubled its load climbing to almost 9,200.

As the war in Vietnam escalated, the number of trainees the USAF needed to produce also increased. To address the demand, in 1965 USAF indoctrination training adopted a split-phase basic military training program that consisted of 22 days at Lackland AFB followed by eight days at a technical school. In 1966, the training schedule was switched to a single phase that lasted for 24 days but was switched back to a six-week period by the end of the year.[117]

In June 1966, the USAF proposed an increase in the annual pilot training rate to 3,868 (3,360 for the active USAF, 299 for the ANG, 70 for the Air Force Reserve [AFR], and 139 for the Military Assistance Program [MAP]). In November 1966, Secretary McNamara cut the total by nearly 400,

112 Lemmer, USAF Manpower in Limited War 1964 – 1967, 1968
113 Lemmer, USAF Manpower in Limited War 1964 – 1967, 1968
114 Lemmer, USAF Manpower in Limited War 1964 – 1967, 1968
115 Manning et al., History of Air Education and Training Command 1942-2002, 2005
116 Manning et al., History of Air Education and Training Command 1942-2002, 2005
117 Hartman et al., "Vietnam on the Homefront: How DoD Installations Adapted, 1962–1975," 2014

approving 3,481 (3,247 for the USAF, 145 for the ANG, none for the AFR, and 89 for MAP.) The USAF then calculated that it could graduate 3,067 pilots for the USAF by the end of June 1968 and the full rate of 3,247 by June 1969. Concurrently, the Secretary of Defense approved a flying training school at Randolph AFB, Texas. ATC opened a ninth pilot training center at this historic West Point of the Air in March 1967 and training got under way in the summer. The use of Randolph AFB for flying training required the movement of two instructor schools to Tyndall AFB, Florida and Perrin AFB, Texas and MAP T-28 training to Keesler AFB, Mississippi.[118]

Pilot shortages continued for much of 1966. Official USAF projections placed the fiscal year (FY) 1967 deficit in pilots at more than 3,000, although immediate demand for pilots was being satisfied by the UPT program and by assigning desk-bound rated officers to primary flying positions.[119]

In November 1966, TAC requested ATC to prepare specialized training for F-4 pilots assigned to the important Wild Weasel project, which was designed to counter and destroy SAM and other radar-guided antiaircraft weapons in North Vietnam. This project included developing training equipment as well as instructing aircrews in anti-radar techniques and the use of Shrike missiles. Both commands cooperated in developing the curriculum. In December 1966, ATC proposed that this training be integrated with F-4 combat training at Nellis AFB, Nevada and that a detachment be established at that base for the specialized instruction. Headquarters USAF and TAC agreed to begin the course in October 1967 at Nellis AFB, and expected it to be completed by October 1968.[120]

Manning TAC CCTSs and RTUs posed a major problem for the USAF after mid-1966. The CCTS's taught the use of a particular aircraft as a military weapon to recent graduates of undergraduate schools and to older pilots returning to cockpits from staff jobs. The RTUs trained replacements for the fliers returning from Southeast Asia. The magnitude of these tasks was complicated by the large variety of tactical aircraft used in the war. The CCTS's of MAC and SAC also had a difficult job because of the great increase in airlift and aerial refueling and the steady rise in B-52 operations.[121]

Frequently, TAC had to remove instructors from the CCTSs and RTU's aircrew training and send them to Southeast Asia. During the first half of 1966, TAC lost approximately 64 percent of its instructor pilots at a time when its CCTSs needed approximately 50 percent more of them. As combat sorties increased, pilots completed their tours in Southeast Asia more quickly and replacements were sent from the United States.

The situation became critical in October 1965 and General McConnell authorized TAC to gradually transfer 13 fighter squadrons, three C-130 airlift squadrons, nine RB-66 reconnaissance aircraft, and 12 F-102s to crew replacement training. Demand in the combat theater remained high, and near the end of 1966, TAC converted three squadrons of its last operational F-4 wing to replacement training. Some of the men were ready for deployment to Southeast Asia, and the remainder established an RTU designed to turn out 170 combat-ready pilots by July 1967. As the demand for forward air controllers, air liaison officers, and tactical

118 Lemmer, USAF Manpower in Limited War 1964 – 1967, 1968
119 Manning et al., History of Air Education and Training Command 1942-2002, 2005
120 Lemmer, USAF Manpower in Limited War 1964 – 1967, 1968
121 Lemmer, USAF Manpower in Limited War 1964 – 1967, 1968

aircrews grew, many combat squadrons were converted into RTUs and located wherever available airspace would permit more training.[122]

These measures stripped TAC's combat units of a large portion of their trained people. In July 1966, the USAF staff believed the solution was to expand CCTSs and RTUs so they could provide virtually all replacements. The policy that no pilot should serve a second combat tour until all had served one added immensely to the training load. The F-4 pilots returning from combat manned the F-4D RTUs, which had to be expanded, but the USAF staff thought that this would barely provide enough qualified pilots for squadrons already in Southeast Asia. Men for new F-4 squadrons would have to be obtained when the training base was further expanded, possibly in early 1968.[123]

In late June 1967, Secretary McNamara asked the USAF to train 50 pilots for the USMC by 1969 and 175 per year thereafter. This additional demand would push the UPT capacity almost to its limit through June 1969, for it would require about 350 additional instructors, all available facilities, and an undetermined number of new planes. Many extra instructors could be obtained from pilots returning from Southeast Asia, but facilities and training aircraft could not be expanded farther until after June 1969.[124]

Because the USAF had the largest UPT program in the DoD, it made sense to use the ATC program as a means to fill unexpected pilot requirements. Such as the case in 1967 when DoD requested USAF assistance to meet USMC training needs. On 21 June 1968, Class 68-08 graduated at Laredo AFB and Vance AFB; the first group of USAF-trained USMC pilots to receive USAF wings.[125] By 1968, ATC had enough instructors for pilot training. However, other areas such as navigator and electronic warfare, had less than 80 percent of required instructors. The ATC added another pilot training base – Columbus AFB, Mississippi bringing the total to 10 pilot training bases. In February 1969, the USAF began working with the Vietnamese Air Force to help it become a self-sufficient, 40-squadron air arm.[126]

In its continuing effort to cut costs, the command made some major changes in the UPT program. From 1965 to 1970, UPT was reduced to 53 weeks and 240 hours of flying time. In 1971, UPT was reduced to 48 weeks with 208.5 hours of flying time.[127] In the shorter program, student pilots received 16 hours flying hours in a light plane and only 192.5 hours in jet trainers. At the same time, ATC introduced an experimental UPT curriculum at Moody AFB, which provided just 188 hours of flying time and cut more deeply into the T-37 and T-38 phases of instruction. Two years later, ATC would abandon the experimental program at Moody AFB and returned to a syllabus that provided for 210 flying hours in jet trainers; 90 in the T-37 and 120 in the T-38.[128]

By 1967, the demand for replacement aircrews in Southeast Asia made it necessary for TAC units in the United States to concentrate on training combat crews. The training TAC provided occurred at several bases:

122 Lemmer, USAF Manpower in Limited War 1964 – 1967, 1968
123 Lemmer, USAF Manpower in Limited War 1964 – 1967, 1968
124 Lemmer, USAF Manpower in Limited War 1964 – 1967, 1968
125 Manning et al., History of Air Education and Training Command 1942-2002, 2005
126 Manning et al., History of Air Education and Training Command 1942-2002, 2005
127 ATC, Major changes in Undergraduate Pilot Training 1939-1990, 1990
128 Manning et al., History of Air Education and Training Command 1942-2002, 2005

- F-100 training at Luke AFB, Arizona
- F-100 training at Cannon AFB, New Mexico
- F-105 training at Nellis AFB, Nevada
- F-105 training at McConnell AFB, Kansas
- F-4 training at Davis-Monthan AFB, Arizona.

Combat crew training also opened at Shaw AFB, South Carolina; Bergstrom AFB, Texas; and Mountain Home AFB, Idaho.[129]

Although each service had specialized training to meet unique operational demands, there were common training facilities used by all services for some specialists. The Air Force sent approximately 4,465 students to Army and Navy schools, and 2,347 Army and Navy personnel entered Air Force schools during 1965.[130]

Air Force training also included simulated conditions. In 1966, the Air Force established a training range at the Army's White Sands Missile Range, New Mexico, to replicate hunt-and-kill missions directed at SAM as well as radar-directed antiaircraft guns. Both skills were critical to the Air Force's air combat missions in Southeast Asia.[131]

The TAC also had to furnish a steady stream of reconnaissance aircrews, special air warfare forces, and support troops.[132] The TAC consisted of three specialized centers; Tactical Air Warfare, Tactical Air Reconnaissance, and Special Air Warfare. These centers maintained close ties with all of USAF operational organizations, but especially with the 7th Air Force that commanded Southeast Asia. The centers focused on meeting the tactical demands of changing warfare by devising new tactics and techniques from lessons learned from combat.[133]

Because of the growing costs of weapons and support systems, additional specialized training devices were implemented to simplify training and to save time and money. Flight simulators were used to train pilots and navigators, and other devices were applied to teach maintenance and operation of missiles and electronic countermeasures.[134]

Technical Training

In addition to pilot training, flight crew and support training also increased. During the first half of 1965, the aviation cadet program ended at James Connally AFB, Texas. All navigator training relocated to Mather AFB, California along with a number of T-29s.[135] In October 1965, the Air Force adopted an undergraduate navigator course that was five weeks shorter than its predecessor, and it streamlined the navigator-bombardier and electronic warfare officer courses.[136]

129 Hartman et al., "Vietnam on the Homefront: How DoD Installations Adapted, 1962–1975," 2014
130 Hartman et al., "Vietnam on the Homefront: How DoD Installations Adapted, 1962–1975," 2014
131 Hartman et al., "Vietnam on the Homefront: How DoD Installations Adapted, 1962–1975," 2014
132 Lemmer, USAF Manpower in Limited War 1964 – 1967, 1968
133 Hartman et al., "Vietnam on the Homefront: How DoD Installations Adapted, 1962–1975," 2014
134 Hartman et al., "Vietnam on the Homefront: How DoD Installations Adapted, 1962–1975," 2014
135 Manning et al., History of Air Education and Training Command 1942-2002, 2005
136 Lemmer, USAF Manpower in Limited War 1964 – 1967, 1968

A dramatic rise took place in the number of airmen graduating from technical schools–from 116,965 in 1964 to 157,350 in 1967. In 1967, approximately 13,600 officers completed technical courses. In 1966, graduations increased by 41,180, nearly tripling the increase of any year of this period and placing the greatest strain on facilities and personnel in nearly 15 years. The growth during 1967 was 12,350 airmen graduates. On-the-job training proved a large and difficult task, for most of the graduates had little more than apprentice-level skills and were far from ready to assume the intricate tasks demanded of them in a combat unit.[137]

In July 1965, the USAF laid out plans for a two-year expansion of technical training to meet wartime demands. Subsequently, the Secretaries of Defense and USAF decided to telescope it into one year. The increase required the recruiting of approximately 127,600 men without previous service, the largest number since FY 1955, when 158,180 had been recruited.

To support Southeast Asia operations, ATC hastily expanded or modified several technical courses. The course for munition specialists could not provide the large number of the five-skill level men required for Vietnam, and men with related specialties were trained in a special six-week course instead of the normal 12-week. Weapon mechanics were in such great demand that they were given courses in three shifts, six days a week, and then assigned to stateside units, which in turn sent their experienced men to the combat theater. For a time, weapon mechanics in F-I00, F-105, and B-57 units had to take four weeks of special training in-route to the theater.

Figure 3-2. A student navigator at Mather AFB, California, plots his course while seated at the T45 simulator
Source: History of Air Education and Training Command 1942-2002, Thomas A. Manning

137 Manning et al., History of Air Education and Training Command 1942-2002, 2005

Ammunition officers with only limited experience in conventional weapons received a four-week refresher course at Lowry Technical Training center, Colorado, before deployment. By October 1965, demand for conventional weapon mechanics was so great that ATC stopped dual (i.e., conventional and nuclear) instruction for men going to Southeast Asia. When several commands objected, the course was changed again to include dual training during the first seven weeks and specialized training thereafter. Technicians for SAC and ADC were fully instructed on nuclear weapons.[138]

In October 1965, the shortage of maintenance technicians in F-105 and F-4 units became acute. USAF Headquarters directed ATC and TAC to set up a coordinated training program. By December 1965, ATC field training detachments were operating jointly with TAC to provide enough replacement technicians for the fighter units in Southeast Asia. Operational units were often short of equipment, and ATC schools and detachments had difficulty obtaining up-to-date equipment of certain types with which to instruct technicians. In October 1965, ATC wanted a C-130 for training purposes pointing out that if its schools could not give instruction on late-model planes, TAC would have to do it later and TAC could not train a large number of C-130 mechanics for Southeast Asia in addition to those for its own units. Nevertheless, Headquarters USAF ruled that no C-130s were available for ATC.[139]

From 1964 through 1967, a significant portion of USAF technical training was devoted to re-training and upgrade training, primarily on the job. Retraining consisted of instructing airmen in new skills, and upgrade training in work at a higher skill level. During FY 1965, 10,370 airmen completed their re-training and 13,870 were engaged on 30 June. In FY 1965, approximately 113,000 airmen completed upgrade training, and at one time 121,000 were receiving training. As the Vietnam war grew in intensity, a high point was reached when 213,680 received upgrade instruction during December 1966. On-the-job training placed an almost intolerable burden on commands whose primary commitments lay elsewhere.[140]

The ATC had to provide unscheduled re-training to meet unanticipated demands. Between January and June 1966, nearly 8,000 airmen entered either formal courses or on-the-job training to fulfill unforeseen requirements, and approximately 2,500 completed courses. More than half the men volunteered to take advantage of an opportunity to move into technical skills in great demand, and approximately 3,000 Noncommissioned Officers (NCOs) were selected individually. In September 1966, Pacific USAF complained that many men in Southeast Asia did not have recent training or experience in high explosives. In October 1966, ATC prepared a short course to familiarize men with the munitions they would have to handle, but the men continued to arrive without sufficient knowledge; placing an unjustified training burden on units in the theater. In December 1966, ATC announced that a special munition-handling course would be established at Lowry AFB, Colorado in February 1967. The managers of the Lowry AFB course would maintain a close liaison with Eglin AFB, Florida, where tactical combat training was concentrated. In addition, the USAF directed that munition technicians get special job knowledge tests to ensure that they possessed the necessary skills.[141]

138 Lemmer, USAF Manpower in Limited War 1964 – 1967, 1968
139 Lemmer, USAF Manpower in Limited War 1964 – 1967, 1968
140 Lemmer, USAF Manpower in Limited War 1964 – 1967, 1968
141 Lemmer, USAF Manpower in Limited War 1964 – 1967, 1968

The ATC had problems keeping qualified, experienced instructors for needed crew training. The problem worsened as more and more personnel received assignments to Southeast Asia just as ATC's training requirements increased. Weapons systems supported training; aircraft and motor vehicle maintenance courses at Chanute AFB, Kansas; administrative and supply courses at Amarillo AFB, Texas; electronics training at Keesler AFB, Mississippi; a variety of other courses at Lowry AFB, Colorado; and Sheppard AFB, Texas did not have the number of experienced instructors needed to provide quality instruction. Even some flying training units reported shortages of instructor pilots, maintenance and supply specialists, and survival instructors. To alleviate these problems, ATC increased formal instructor training, and shifted some instructors from well-manned fields to those with chronic shortages, froze military instructor assignments, hired more civilian instructors, and filled many instructor slots with new graduates.[142]

Figure 3-3. An instructor at Lowry AFB, Colorado, Explains Some of the Vital Elements in the F-4C Offensive Fire Control System
Source: History of Air Education and Training Command 1942-2002, Thomas A. Manning

The continued budget reductions caused the ATC to test a multi-track system of graduating navigator students on a proficiency basis to cut down on instructor workload, reduce pipeline time and cut training costs. Continuing shortages of navigators coupled with budgetary constraints,

142 Manning et al., History of Air Education and Training Command 1942-2002, 2005

made it necessary to increase production at the least possible cost. The ATC developed a 30-week (previously 38-week) training course for implementation in 1971, which accelerated students.[143]

In January 1966, ATC started preparing a 10-week course for FB-111 crewmen in navigation, bombing, and electronic warfare. This course would precede their attendance at SAC's CCTS. The ATC planned a less comprehensive course, mainly emphasizing radar techniques, for Australian pilots who were expected to fly the F-111.[144]

On 27 January 1973, the Vietnam peace agreement was signed. President Nixon announced that the draft would end. The peace agreement meant lower recruiting goals and greater emphasis on acquiring and maintaining a quality force to ATC and its USAF Recruiting Service. In 1973, there were considerable activities in the world of flying training. The command centralized its flight screening program at Honda Texas; consolidated helicopter UPT at Fort Rucker, and as part of the post-Vietnam draw down, closed Laredo AFB.[145]

In April 1973, ATC published a Pilot Requalification Training Guide for use in training prisoners of war who returned during Project Homecoming. At Randolph AFB, ATC conducted pilot requalification training in T-37, T-38, and T-39. Mather AFB provided navigator requalification training in T-39. The program concluded in 1976.

3.2.3 U.S. Air Force Installations

The following are brief descriptions of most of the fixed-wing UPT and technical training bases; however, training did occur at additional bases.

Vance AFB, Oklahoma

Multi-engine pilot training has occurred at this base since World War II. With the conclusion of the Korean War, the training pace at Vance AFB slowed but beginning in 1961, Vance AFB hosted UPT. A flight simulator training building was completed in 1963. A Vance AFB experiment to train students with instrument flying prior to contact flying was adopted throughout ATC. In the mid-1960s, training operations converted from T-33s to T-38s. In 1972, base operations were assumed by the 71st Flying Training Wing. Administrative and housing structures were completed in the 1970s.[146]

Lackland AFB, Texas

This base was opened in 1941 to serve as the nation's largest aviation cadet training school during World War II and in 1946, the ATC established the USAF Basic Military School. The outbreak of the Korean War overwhelmed the facility forcing basic military training to move to other bases and influencing building projects on the site. Additional academic buildings, barracks, dining halls, and recreational facilities were added during the 1960s to replace World War II-era

143 Manning et al., History of Air Education and Training Command 1942-2002, 2005
144 Lemmer, USAF Manpower in Limited War 1964 – 1967, 1968
145 Manning et al., History of Air Education and Training Command 1942-2002, 2005
146 Winkler, David F.,*Training to Fight: Training and Education During the Cold War*, 1997, (DoD Legacy Project 95-10092 for U.S. Army Environmental Center, Aberdeen Proving Ground, MD.) 169

structures. Once again, with the escalation in Vietnam, overcrowding forced ATC to move some basic training to Amarillo AFB from 1966–1968.[147]

Before the unique demands of the Vietnam War, non-commando-based USAF pilot training was typically conducted at Lackland AFB, Texas. However, as the Vietnam War escalated throughout the 1960s, the demand for pilots increased, resulting in overcrowding at Lackland AFB. Although pilot training overcrowding never reached the critical levels experienced during the Korean War, by September 1966 the trainee population had jumped to over 20,000 at Lackland AFB; a base that was designed to support 17,700 personnel.[148]

The overcrowding at Lackland AFB in part was a result of the restructuring of the USAF undergraduate flight training programs. In 1961, pilot training was at a low point, and the USAF had closed the last of its contracted primary flight training facilities. The UPT was then distributed between eight ATC bases. Lackland AFB and Vance AFB, Oklahoma, were two of these and typified an installation that merged pre-flight training, primary training, and basic flight training. Amarillo AFB, Texas, also served as a site for basic training after an outbreak of spinal meningitis killed an airman at Lackland AFB. Although Amarillo AFB had been slated for closure, it was rushed back into service to accommodate airmen from Lackland AFB in February 1966. The base provided basic training until November 1968 in an effort at reducing the impacts of increased training at Lackland AFB. During that time, Lackland AFB experienced a building boom that increased its capacity to process and train new recruits.[149]

Nellis AFB, Nevada

The Weapons Tactic Center (WTC) was initially formed in 1966 as the USAF Tactical Fighter Weapons Center while under the control of TAC. There are many centers within the USAF each addressing specific areas of operations ranging from counter insurgency, reconnaissance, and logistics to maintain a staff of highly specialized personnel at individual bases to fulfill very specific requirements. The Tactical Fighter Weapons Center was logically located at Nellis AFB due to the base's reputation as the "Home of the Fighter Pilot" and the large ranges attached to the base. The driving force behind the creation of the center was an USAF study titled Project Sand Dune. This study was initiated to meet the demands placed on tactical aviation during the Vietnam War. Prior to the study, there was significant lack of realistic air combat training for crews involved in the Vietnam War. The kill ratios of USAF fighters to North Vietnamese Air Force fighters was roughly 2:1. It was also evident that a great number of the losses incurred took place during the aircrews first 10 missions. If aircrews could be taught to survive the initial period of combat, studies showed that their chances of completing their combat tours was much greater. This became the foundation for the Red Baron training program, which ultimately grew into today's Red Flag series of composite force training programs.[150]

The Project Sand Dune study identified nine specific requirements that addressed these problems and would have far reaching implications on the USAF for years to come. These requirements

147 Winkler, Training to Fight: Training and Education During the Cold War. 182-3
148 Hartman et al., "Vietnam on the Homefront: How DoD Installations Adapted, 1962–1975," 2014
149 Hartman et al., "Vietnam on the Homefront: How DoD Installations Adapted, 1962–1975," 2014
150 Llinares, Rick and Chuck Lloyd. Warfighters, The Story of the USAF Weapons School & the 57th Wing. Schiffer Publishing Ltd. Atglen, PA. 1996, p 25 - 26

impacted almost every facet of the USAF and were directly responsible for the creation of centers like the Weapons and Tactic Center. The study also highlighted areas of weakness, which led to the creation of the following:

- A dedicated air superiority fighter, which was filled by the McDonnell Douglas F-15 Eagle
- Meeting the CAS requirements of the Army without disrupting other USAF assets, this led to the development of the A-10 dedicated tank killer
- The ability to conduct air operations at night led to the development of the F-15E Strike Eagle and F-117 Nighthawk
- The development of USAF Special Forces units.[151]

The WTC manages the operation and development of the huge Nellis AFB range complex, which is the largest, most advanced range in the world encompassing almost three-million acres in the southern portion of Nevada. During the 1960s, Nellis AFB played a vital role in aircrew combat training. The base's units training those airmen going into combat. Since the 1950s, Nellis AFB had maintained its reputation as "Home of the Fighter Pilot." Nellis AFB units trained pilots and air combatants for Vietnam throughout the 1960s and early 1970 supporting F-100, F-105, and F-4 airplanes. One special element was the Aggressor squadrons, experts in Soviet-style adversary tactics, who exposed combat crew to hostile tactics. The Aggressors became an institution at Nellis AFB and provided over two decades of experienced instruction. The Aggressors functioned as part of Red Flag exercises.[152]

As the Vietnam War ended, the USAF confronted improving pilot survivability. One of the major problems challenging pilots in Southeast Asia (SEA) had been that the United States had to send essentially green pilots into combat. Those who trained at Nellis AFB were intended as instructor pilots. Statistics from the war indicated that pilots with 10 combat missions had a much higher survival rate than those with fewer combat missions. The USAF decided to train the pilots before entering deadly combat to increase their survival; Red Flag was the result. Red Flag was created in 1975 and has provided the most realistic combat training exercise in the world for nearly two decades. Today it trains combat pilots and crews for the United States, its major allies, and even some non-aligned countries (i.e. Venezuela).[153]

Nellis AFB and its affiliated property grew substantially in the 1950s and 1960s. By 1962, its three million-plus acres formed the largest base-range complex in the country. The base itself consists of the Main Base, Area II (known as the Lake Mead Base), and Area III. These three areas alone encompass 11,193 acres of land. The Nevada Test Site, managed by Department of Energy (DOE), operates in the middle of Nellis AFB ranges.[154]

151 Llinares, page 26
152 Llinares, page 34
153 Llinares, page 34
154 Llinares, page 34

Perhaps the most widely recognized exercise conducted by the 57th Wing is the Red Flag program held several times a year at Nellis AFB. Initially, a small office space provided by Tactical Fighters Weapon School and was assigned five personnel in charge of running the exercise in 1975.[155]

Laredo AFB, Texas

Laredo AFB is an inactive USAF installation that was first activated in 1942. During World War II, it served as a flying and gunnery training base and was deactivated following the war in December 1945. The base was reopened in 1952 by ATC and was operated by the 3640th Pilot Training Wing as a basic single-engine flight school. In the 1960s, it served as a UPT base where pilots took all flight training from basic to advanced at a single base.[156] The USMC fixed-wing pilots were also trained at Laredo during the Vietnam War and in June 1968, the first class of Marine fixed-wing aviators graduated from Laredo and Vance AFBs.[157] The base closed in 1973.[158] Upon its closure, Laredo AFB was viewed as the "most expensive pilot training base because of marginally adequate facilities, increasing encroachment problems, and geographic limitations."[159]

Figure 3-4. Air Training Command T-37 Assigned to the 3640th Pilot Training Wing at Laredo AFB, Texas
Source: History of Air Education and Training Command 1942-2002, Thomas A. Manning

155 Llinares, page 51
156 Winkler, Training to Fight: Training and Education During the Cold War. 183
157 Winkler, Training to Fight: Training and Education During the Cold War. 69
158 Winkler, Training to Fight: Training and Education During the Cold War. 183
159 Shaw, Locating Air Force Base Sites History's Legacy

Columbus AFB, Mississippi

This airfield was established in 1941 as an Army Air Forces Pilot school and was deactivated in 1946. The field was returned to active status in 1950 to provide basic training to air cadets during the Korean War. At this time, pilot training was contracted. In 1955, the airfield became a SAC base to support efforts to lessen the vulnerability of the U.S.'s bomber fleet to nuclear attack. During the 1960s, B-52s from Columbus AFB saw service in Southeast Asia. In 1969, ATC assumed control of the base and converted it into a fighter pilot training facility; the 3650th Pilot Training Wing was activated to operate the base and flight school. Throughout the 1970s and 1980s, Columbus AFB continued as a major UPT facility.[160]

Laughlin AFB, Texas

Laughlin AFB opened in 1942 as an advanced flight training base for B-26 Marauders. The base was closed following World War II but was reopened during the Korean War after significant construction was undertaken to support F-84 combat training. In 1955, the base began to host basic single-engine pilot training; two years later, SAC assumed control of the base and upgraded the facility to support U-2 and RB-57 operations. In 1962, ATC resumed command of the base and the 3646th Pilot Training Wing operated Laughlin AFB as a UPT base. In 1972, the 3647th was deactivated and replaced by the 47th Flying Training Wing.[161]

McConnell AFB, Kansas

This base was activated in 1951 by ATC to provide crew training for B-47 bombers. In 1954, 12,000-foot runways were completed, and over the next two years, $22 million was spent to transform the base into one of USAF's premier training installations. The SAC assumed responsibility of the base in 1958, and with the phaseout of the B-47, TAC assumed control in 1963. Eventually, the 23rd Tactical Fighter Wing assumed many training missions including preparing F-105 pilots and maintenance crews for combat in Southeast Asia. The SAC resumed control of the base in 1972.[162]

Reese AFB, Texas

Originally called Lubbock Field, Reese AFB began as an Air Corps Advanced Flying School during World War II. After the war, it was deactivated, reactivated in November 1949, and renamed Reese AFB. The 3500th Pilot Training Wing moved from Barksdale AFB, Louisiana, to operate the base and its advanced multi-engine school. Facilities were upgraded to support all-jet training beginning in 1951. During the 1960s, training with T-38 and T-41 aircraft began with several types of aircraft. Reese AFB expanded to offer preflight, primary, and basic flight training.[163]

160 Winkler, Training to Fight: Training and Education During the Cold War. 152
161 Winkler, Training to Fight: Training and Education During the Cold War. 184
162 Winkler, Training to Fight: Training and Education During the Cold War. 143-4
163 Winkler, Training to Fight: Training and Education During the Cold War. 186

Williams AFB, Arizona

Established in 1941, this base served as a pilot training facility during World War II. In 1945, its primary mission became fighter pilot training, and 1946 marked the arrival of the first jet fighter transition course. By 1949 and through the Korean War, the base was operated by the 3525th Pilot Training Wing as an advanced single-engine school. Fighter-gunnery school was added in 1953–1954 as the base assumed a crew training mission. In 1960, after TAC had briefly assumed control of the base, ATC again took command and the 3525th was reorganized to run the base as part of ATC's consolidated pilot training program. The base served exclusively as a UPT site from 1961 until its 1993 closure.[164]

Keesler AFB, Mississippi

Due to the increasing demand for pilots in Vietnam, the base provided training to foreign pilots from 1967 to 1973. An aircraft weapons training facility was completed in 1969. By the 1970s, Keesler AFB had become the largest training base within ATC.[165]

Lowry AFB, Colorado

Construction of this base began in 1937 and during World War II, it served as a major technical training facility and flying school. Following the war, it continued as a technical training facility operated by the 3415th Technical Training Wing. The Lowry Technical Training Center was established in 1959. During this time, the base remained under ATC jurisdiction and SAC deployed 18 Titan I missiles to the base. By 1962, the Guided Missiles Department provided the USAF with 1,000 trained missile specialists per year. The base closed in 1994.[166]

Mather AFB, California

In 1953, the redesignated 3535th Observer Training Wing operated this base. By 1960, the 3535th had been designated a Navigator Training Wing. Construction of housing and training facilities was completed during the 1960s. The base closed in 1993.[167]

Moody AFB, Georgia

Moody AFB was reactivated at the outbreak of the Korean conflict in 1951. ATC took control of Moody AFB in September 1951. Moody AFB was officially declared a permanent installation on 24 September 1954. In the early years of the Vietnam period, several training schools were transferred away from Moody AFB, dropping the base population to the pre-Korea level of 3,500. Conversely, in 1961, the USAF's Consolidated Pilot Training Program combined all pilot training (pre-flight, primary, and basic) into one element. This meant that students remained at Moody AFB for 55 weeks instead of six months as under the former training program.[168] Longer stays meant another increase in installment population. Between 1961 and 1975, 4,432 pilots trained

164 Winkler, Training to Fight: Training and Education During the Cold War. 106
165 Winkler, Training to Fight: Training and Education During the Cold War. 153-4
166 Winkler, Training to Fight: Training and Education During the Cold War. 122
167 Winkler, Training to Fight: Training and Education During the Cold War. 112
168 Messick, Survey of Historic Buildings and Structures at Moody Air Force Base p. 35, 1999.

and received their wings the base's school. From 1965–1973, T-41, T-37 and T-38 aircraft were used in training.[169]

Figure 3- 5. Aerial view of Lowry AFB, Colorado, in 1962
At the center is the headquarters for Lowry Technical Training Center
Source: History of Air Education and Training Command 1942-2002, Thomas A. Manning

Moody AFB continued upgrading residential facilities throughout the 1960s, while most of the remaining temporary World War II structures were demolished. A new gymnasium, pool, base theater, hospital, and 40 new bachelor officers' quarters were constructed. Mission-related facilities, including shops, warehouses, an aircraft corrosion control facility, two flight-training buildings, and a fire station were also updated or built. Following the end of the conflict in Vietnam, command of Moody AFB was transferred from the ATC to the TAC. Training was no longer the installation's primary mission.[170]

Excluding housing, 189 buildings at Moody AFB were constructed between 1946 and 1989. The following property types included: warehouse and storage facilities (26); water/power/fuel/sewer infrastructure (23); hangar/aircraft maintenance facilities (22); weapons/munitions facilities (22); recreation facilities (19); headquarters/administration/ operations office (15); and motor pool/vehicle.

169 Messick, p. 36, 1999
170 Messick, p. 36, 1999

Randolph AFB, Texas

This base was established in 1928 and was once called the "West Point of the Air" and served as a basic pilot and instructor training base during World War II. In 1959, jet qualification training became a primary mission. The first USAF T-38 operations began in 1961. The USAF Military Personnel Center arrived in 1963. The USAF Headquarters Recruiting Service arrived in 1965 and a UPT program was established in 1967. Pilot instructor training programs commenced for the T-37 and T-38 in 1971. In 1972, the 3510th Flying Training Wing was replaced with the 12th, which provided pilot requalification to former prisoners of war.[171]

Other AFBs

This base served as a UPT and navigator training base. Webb AFB, Texas, was a pilot training base, and provided a pilot instructor training course for Vietnamese Air Force instructors. Craig AFB, Alabama served as a pilot training base during the war. All three of these bases are closed.

3.3 NAVY

3.3.1 Overview

Naval aviators figured prominently in air operations in Vietnam and Laos. Besides requiring more sailors to man the fleet in Vietnam, the Navy required more pilots to fly missions over Southeast Asia. The number of naval aviators flowing through the Chief of Naval Aviation Training pipeline dramatically increased. At Naval Air Auxiliary Station (NAAS), Meridian Mississippi, the number of aviators graduating jet training jumped from 293 in 1962 to 950 in 1969.[172]

Navy aviators were trained at locations around the United States including NAS Pensacola, Florida; NAS Whiting, Florida; and NAAS Meridian, Mississippi. Pilot training was increased at these locations during the Vietnam War-era due to the demands of the war. The NAS Pensacola hosted three training squadrons and numerous training units and became the headquarters for the Chief of Naval Education and Training. In 1971, NAS Whiting, Florida, hosted two Navy training squadrons that trained Navy, Marine, and South Vietnamese pilots. In 1961, NAAS Meridian was commissioned to support naval training activities. Jet training increased at NAAS Meridian because of the war, and in 1968 NAS Meridian hosted two jet-training squadrons. The station became a full naval air station in 1968.[173]

Navy and USMC pilot training was conducted at NAS Pensacola, Florida, for primary and basic flight training and NAS Kingsville, Texas for advanced jet training. Basic flight school included ground school which was eight hours a day for 16 weeks. Ground school covered engines, airframes, aerodynamics, meteorology, navigation, aviation safety, Morse code, aviation communications, instruments, etc. in a three-story class room. Students underwent aquatic lessons for extensive safety and survival training. Students were tested on their ability to swim, tread

171 Winkler, Training to Fight: Training and Education During the Cold War. 185-6
172 Winkler, Training to Fight: Training and Education During the Cold War.
173 Hartman et al., "Vietnam on the Homefront*:* How DoD Installations Adapted, 1962–1975," 2014

Figure 3-6. Navy Aircraft Aboard the USS Kitty Hawk Poised to Attack the Haiphong Power Plant in North Vietnam
Photographer: J.W. Parker. Vis-Aid Index to the General Photographic Files of the Department of the Navy, 1958 - 1981, Record Group 428, National Archives

water, save another downed pilot, board a life raft, be picked up by a helicopter rescue team, and escape the Dilbert dunker. Dilbert dunker was an aircraft cockpit on a set of rails mounted at 45-degrees angle along the edge of the pool. The Dilbert dunker would slide down the rails into the water simulating a sea landing. When it reached 12 feet into the water, the dunker turned upside down and while upside down, the would-be pilot had to release himself and swim to the surface, unaided.[174]

After ground school, students attended Primary flight school at Saufley Field at NAS Pensacola. Primary flight school had two phases, classroom work and flight training in the T-34B. The classroom work lasted six weeks and primarily focused on the aircraft to be flown. The basic philosophy of naval aviation was to make the student learn everything they could about the aircraft they were going to fly; engines, airframe, flight characteristics, and safety were studied.[175]

Basic jet training was held at NAS Meridian and Whiting Field at NAS Pensacola. After basic jet training, pilots returned to Pensacola for air-to-air gunnery and carrier qualification; the final phase

174 Dorr, Robert F., Marine Air - The History of the Flying Leathernecks in Words and Photos, 2007 (Berkley Publishing Group, NY).
175 Dorr, Marine Air - The History of the Flying Leathernecks in Words and Photos

of primary flight training. Advanced flight training was at NAS Kingsville, Texas, and included six months of ground school and flight.[176]

Navy and USAF fighter pilots suffered staggering losses in Vietnam during Operation Rolling Thunder. Their kill ratio, when compared to American dominance in the skies over Europe and Japan in World War II and in the Korean War, was low. With the development of beyond-visual-range missile technology, it was believed by top military officials that the close-range aerial style of combat (dog fighting) had ended. As a result, an entire generation of pilots received almost no training in aerial-combat maneuvering. The only experts were either World War II and Korea veterans or those who secretly engaged in mock battles on weekends above the Southern California desert with other pilots and reservists from nearby bases. Training strategy focused on quickly shooting down Soviet nuclear bombers and quick get-a-ways.[177]

During the Vietnam War, U.S. military pilots found themselves on bombing runs and facing smaller and more maneuverable subsonic, Russian-built MiG-17, -19 and -21 jet fighters. In addition to being underprepared, U.S. military pilots also found themselves bound by unrealistic rules of engagement. The U.S. fighters and bombers were armed with Sidewinder missiles with a range of 13 miles but rules called for visual identification, so by the time they could identify the target, they were inside the missile's minimum range. The loss rate was alarmingly high. The Navy's kill ratio was 2:1 (compared to 10:1 in World War II and Korea), at times dipping below that, while the USAF fared no better, at times, only breaking even.[178]

Commander Frank Ault, a World War II attack pilot, wrote the Air-to-Air Missile System Capability Review, known as the Ault Report, and sent it to the Pentagon in 1968. The report detailed the problems with aerial engagement in Vietnam. Commander Ault identified 242 problem areas that included maintenance and improvement of the faulty Sidewinder and Sparrow missiles. Commander Ault also provided solutions, which included a recommendation for the formation of a school specializing in aerial combat.[179]

The school was conducted by VF-121, a squadron based at, what was then, NAS Miramar, California. The VF-121 Lieutenant Commander Dan "Yank" Pedersen, 33 at the time, was ordered to make it happen. His F-4 Phantom Replacement Air Group (RAG) was responsible for training and providing air and maintenance crews to the front line in the Navy's Pacific Fleet. Eight men (pilots plus backseat Radar Intercept Officers [RIO]) in the RAG, along with Pedersen, created the direction for the school, gathered intelligence and aircraft, and devised a bulletproof operating procedure that endures to this day.[180]

With a mandate to create the U.S. Navy Fighter Weapons School but with scant funding, Pedersen asked RIO J.C. Smith to locate a building. The VF-121, the largest squadron in the Navy, was already bursting at the seams. With no rooms or buildings available, Smith appropriated a portable trailer from elsewhere on the base. As a result, the Navy Fighter Weapons School, also known as

176 Dorr, Marine Air - The History of the Flying Leathernecks in Words and Photos
177 Elder, Adam, *Top Gun: 40 Years of Higher Learning,* 2009, http://www.sandiegomagazine.com/San-Diego-Magazine/October-2009/Top-un-40-Years-of-Higher-Learning/
178 Elder, Top Gun: 40 Years of Higher Learning
179 Elder, Top Gun: 40 Years of Higher Learning
180 Elder, Top Gun: 40 Years of Higher Learning

Top Gun, started out in a single metal trailer in which offices, classes, and research were all conducted. In the first several weeks, the instructors digested the findings of the Ault Report, from missile maintenance to crew and machine problems in flight.[181]

The government obtained MiG-17 and -21 jets. Instructors went to the desert to a top-secret location where they were kept, and experienced firsthand the aircraft's strengths, weaknesses, and performance envelope. Coupled with more time in the F-4s, the instructors discovered that while the older Russian jets were indeed more maneuverable, the F-4 could be pushed and flown in ways previously unimagined by pilots and its engineers. Since exploiting strengths and weaknesses is the strategic essence of air combat, instructors experimented with tactics not part of the doctrine of the time. Eventually, a formula was devised that would prove highly effective against MiGs and rigid North Vietnamese fighting strategy.[182]

When President Nixon resumed mining the harbors and bombing campaigns on 15 April 1972, air-to-air combat results against the North Vietnamese were night and day from four years earlier. Navy pilots were registering kill ratios of 13:1, while the USAF, with no change in strategy or approach to combat, saw its kill ratios worsen for a time.

3.3.2 Navy Installations

NAS Miramar, California

This installation served as an auxiliary airfield (AAF) for North Island Naval Air Station during World War II. In an effort to enhance military preparedness, Congress passed the Woods Plan in 1949, appropriating funds for the development of a Master Jet Air Station at Miramar. Major construction and rehabilitation of the runways soon followed and on 1 April 1952, the site received the official designation NAS Miramar. By 1955, the station housed nearly 400 jets, the principal fleet support air station of the Navy. In 1961, NAS Miramar acquired former Camp Elliot, nearly doubling its size. In December 1972, NASA transferred Sycamore Annex to the Navy, further increasing the size of the Station.[183]

The Navy operated NAS Miramar until October 1997 when the property was transferred to the Marines as a result of the Base Realignment and Closure Act of 1990, and the TOPGUN school was relocated to NAS Fallon, Nevada.[184] Appendix B has additional information on this installation.

NAS Pensacola, Florida

Since World War II, this station has served as a major naval aviation training center. Following World War II, Pensacola served as headquarters to the Naval ATC. Naval Air Basic Training Command also moved here. Pilot training increased during the Korean War and increased again during the Vietnam War era as the air station hosted three training squadrons and numerous other

181 Elder, Top Gun: 40 Years of Higher Learning
182 Elder, Top Gun: 40 Years of Higher Learning
183 Elder, Top Gun: 40 Years of Higher Learning
184 Winkler, Training to Fight: Training and Education During the Cold War. 112

training units. In 1971, this installation became headquarters for the Chief of Naval Education and Training.[185]

Figure 3-7 Top Gun Trailer at NAS Miramar
Source: Photorecon.net

As U.S. forces played an increasingly important and active combat role in Vietnam, NAS Pensacola and other state-side military installations contributed to the effort, providing critical training in support of the mission. In support of operations in Vietnam, NAS Pensacola increased training operations, an expansion of programs reminiscent of those conducted during World War II. A record 2,552 pilots graduated from NAS Pensacola in 1968, almost all of which were transferred directly to the flight decks off Southeast Asia. To accommodate this huge influx, NAS Pensacola dedicated millions of dollars to improve officer housing and training facilities. In 1968, the Cabaniss Crescent neighborhood was expanded following the construction of seven new duplexes for married officers and their families. NAS Pensacola also constructed the Lighthouse Terrace neighborhood that same year. The neighborhood contained 54 multi-family townhomes for married enlisted personnel and junior officers. Due to the rapid increase in training, by 1972 Naval Communications Training Center Corry Field expanded astronomically with the construction of Corry Village Housing. In addition to these housing additions, NAS Pensacola, added a new classroom for the Basic Training Squadron in Griffith Hall at Forrest Sherman Field in 1969. The classroom provided advanced technological instruction facilities and included a radar trainer and two digital computer demonstrators, totaling a cost of over $1 million.[186]

Aviation training continued to dominate station activity, as NAS Pensacola absorbed activity from closing activities. To handle the increase in pilot training, numerous auxiliary airfields around Pensacola, Florida, were developed.[187]

185 Winkler, Training to Fight: Training and Education During the Cold War. 132-3
186 Elder, Top Gun: 40 Years of Higher Learning
187 Elder, Top Gun: 40 Years of Higher Learning

NAS Whiting, Florida

The field at Whiting was established as an auxiliary airfield for NAS Pensacola during World War II. During the 1960s, Whiting was redesignated a NAS and hosted two training squadrons to train Navy, Military, and Allied pilots. With consolidation following the Vietnam War, NAS Whiting picked up an additional training squadrons during the 1970s making it one of the busiest Naval aviation training facilities.[188]

Figure 3-8. Sherman Field, ca. 1967
Buildings 1852 and 1878 at center of photograph, Building 2600 at lower center
Public Affairs Office, NAS Pensacola

NAS Meridian, Mississippi

The Meridian station was commissioned in 1961 to support training activities. Due to the demands of the Vietnam War, jet training increased at Meridian, and as a result, it was redesignated as a Naval Air Station in 1968. At that time, the station hosted two jet training squadrons. In 1971, Training Air Wing ONE was established, incorporating an additional squadron and the TA-4J Skyhawk trainer arrived. The wing implemented a single base concept to train naval jet aviators

188 Winkler, Training to Fight: Training and Education During the Cold War. 134

through intermediate and advanced training at one base. In 1973, the new Naval Technical Training Center was dedicated. The Training Center featured many Class A schools for supply and administrative ratings for sailors and marines.[189] NAS Meridian was commissioned to support naval training activities. Jet training increased at Meridian because of the war and in 1968, NAS Meridian hosted two jet-training squadrons. When the station became a full naval air station in 1968, there was an increase in building development and the construction of additional housing units.[190]

3.4 MARINE CORPS

The New Look strategy, which emphasized massive retaliation, the Marines struggled to remain a robust fighting force throughout the 1950s.[191] The USMC table of organization rapidly dropped from 248,000 at the end of Korea to 170,621 by 1960. In addition to manpower problems, Marine aviation underwent modifications in light of a new 1,050 aircraft cap. Approximately 500 fighter-attack aircraft were cut from the inventory.[192] In 1956, a military board met to review the USMC roles and missions. U.S. Marine Corps doctrine regarding amphibious warfare and vertical envelopment were declared sound. However, plans of having Marines confronting Soviet forces on nuclear battlefields were deemed unrealistic. Instead, a more likely scenario pitted Marines against forces of communist proxy states located away from Europe. Consequently, the Marines reorganized to better meet this contingency. Heavy armor was shed in favor of more air mobility.[193] The USMC planned for new low-cost ways to advance CAS due to the budget cuts. Leaving the rifleman without air support was not an option and the USMC began research and development on several CAS-related programs. Advancements were made in jet aircraft procurement, all-weather bombing, expeditionary airfield construction, and helicopter gunship technology.[194]

The Kennedy Administration marked a new beginning for the USMC in its struggle to be the nation's force in readiness. The USMC won several small victories in 1960. President Kennedy believed the military services were unprepared for conventional warfare and took measures to boost the conventional forces. The administration increased the size of the USMC to 190,000 and increased its budget by $67 million within six months of entering office. Marine aviation saw benefits due to its planning efforts; Secretary McNamara approved the plan to upgrade the USMC aging CAS aircraft. Training in conjunction with modernization efforts dramatically increased Marine readiness. The USMC ensured the air combat element was well trained and equipped prior to deploying to Vietnam. In Vietnam, the USMC transitioned from the war proven propeller driven CAS aircraft to jets. Although jets had endurance limitations and typically required improved airfields, the USMC reasoned the jet's increased airspeed enhanced responsiveness and survivability. The A-4 Skyhawk quickly became the workhorse in the USMC Installations.

During the Vietnam war, USMC strength grew significantly. In addition to producing more infantry officers, the Marines required more aviators. With the Navy pilot pipeline filled for

189 Winkler, Training to Fight: Training and Education During the Cold War. 155
190 Hartman et al., "Vietnam on the Homefront: How DoD Installations Adapted, 1962–1975," 2014
191 Winkler, Training to Fight: Training and Education During the Cold War. 57
192 Siegel, Jeremy W., *The Debate is Over: Close Air Support in North Korea and Vietnam*, 2010, (Thesis. Master of Military Studies. Command and Staff College. Marine Corps University. Quantico, Virginia)
193 Winkler, Training to Fight: Training and Education During the Cold War. 57
194 Siegel, The Debate is Over: Close Air Support in North Korea and Vietnam

Marine aviator training early in the war, the USMC called on the USAF and Army. In June 1968, the first class of Marine fixed-wing aviators graduated from UPT courses conducted at Vance and Laredo AFBs to earn USAF wings. At Fort Rucker, the Army trained Marine helicopter pilots.[195]

Figure 3-9. USMC Jets Enroute to Provide Combat Support to USMC Ground Troops
Source: General Photograph File of the USMC, 1927 - 1981, Record Group 127, National Archives

MCAS Yuma, Arizona

MCAS Yuma, Arizona was operationalized by the Marines in 1962. The airfield featured aerial gunnery ranges spread over three million acres. It also had three bomb and rocket targets, three remote strafing targets, and eight banner strafing targets that were used for training by aviators from all services for missions in Vietnam. Other air stations provided training as well, such as Air Station El Toro.[196] Formerly designated Yuma Army Air Base and later Vincent AFB, this installation was designated a MCAS in July 1962. From the 1960s to the early 1980s, MCAS Yuma was home to VMFAT-101, the USMC Fleet Replacement Squadron for the F-4 Phantom II, training U.S. USMC, U.S. Navy, and NATO/Allied flight crews and maintenance personnel in the F-4V, F-4J, F-4N, and F-4S.[197]

195 Winkler, Training to Fight: Training and Education During the Cold War. 68-9
196 Hartman et al., "Vietnam on the Homefront: How DoD Installations Adapted, 1962–1975," 2014
197 Winkler, Training to Fight: Training and Education During the Cold War. 107

3.5 ARMY

3.5.1 Overview

In 1940, the U.S. Army Air Forces began concentrating on building a strategic air force. The Army Artillery Corps feared that the Ground Forces' tactical needs would not be met under the Air Forces' new mission goals. Therefore, an agreement was established in which the Artillery Corps would train their own Forward Observer pilots.

The Air Training Department at Fort Sill, Oklahoma, were originally trained from 1942 to 1954. Preliminary (or pre-flight) training for pilot candidates was held at facilities at Kansas State Teachers College of Pittsburg (Pittsburg, Kansas) and North Texas State Teachers College (Denton, Texas). Primary pilot training was at Wolters AFB, Texas; Basic pilot training was at Post Army Airfield, Oklahoma; and Advanced pilot training was at Gary AFB, Texas.

The Army Air Force had a 60-day Liaison Pilot program for Aviation Cadets who had passed Primary training but had failed Basic or Advanced training. They flew the agile L-4 Grasshopper and L-5 Sentinel, light single-engine aircraft similar to the ones they flew in Primary.

After the USAF became independent of the U.S. Army in 1947, the U.S. Army's Aviation assets were placed under the control of the Army's Transportation Corps. Army Aviation did not become their own service branch until 12 April 1983.

The *Key West Agreement of 21 April 1948* created distinct spheres of control among the military services, which were divided between the Department of War (which oversaw the Army and USAF) and the Department of the Navy (which oversaw the Navy and USMC).[198] Procurement of Army aircraft was initially done by the USAF, who did not relinquish this power until 1954. The USAF also forbade the Army from operating armed aircraft that could drop bombs and fire rockets and missiles, which usurped their privilege. The Army were only allowed to retain fixed-wing aircraft for reconnaissance and casualty evacuation duties.

The Army was very interested in acquiring, testing and using helicopters but the USAF was too conservative to adopt them in large numbers. The *Pace-Finletter Memorandum of Understanding of 1952* created strict limitations on the Army's fixed-wing aircraft, but in return, the USAF removed its objections to the Army's procurement of helicopters. [199]

Friction between the two service arms intensified in the mid-1950s and early 1960s when the Army began arming helicopters and observation aircraft and acquiring tactical fixed-wing transport aircraft. This was resolved with the *Johnson-McConnell Agreement of 1966*. [200] The Army relinquished its tactical fixed-wing transport fleet (transferring them and their personnel to USAF control) and would stop arming its observation aircraft. In return the USAF relinquished restrictions placed on the Army's helicopter fleet.

198 The Key West Agreement is the colloquial name for the policy paper "Function of the Armed Forces and the Joint Chiefs of Staff" drafted by James V. Forrestal, the first United States Secretary of Defense.
199 Vietnam 1965, Pilots. Army Aviation History. Accessed https://revised-recon.obsidianportal.com/wikis/pilots
200 Vietnam 1965, Pilots. Army Aviation History. Accessed https://revised-recon.obsidianportal.com/wikis/pilots

Prospective Army pilots had to be between the ages of 18 and 28, had to pass an advanced physical exam, and have uncorrected 20/20 vision. Warrant Officer Candidates had to have at least a high school diploma, and Warrant Officer Candidates had to be attending college or have a four-year college degree. Pilots had to sign a commitment for at least four years active service, followed by two years in the Army Reserves or National Guard.

The Warrant Officer Flight Program was started in 1949 and the candidates were drawn from qualified enlisted or civilian personnel. The first helicopter pilots graduated from the six-month Army Helicopter Pilot Course in December 1951. Candidates were originally promised a promotion from Warrant Officer to Chief Warrant Officer within 12 months. The first promotions to Chief Warrant Officer weren't until 1955; after 39 months in grade. The Warrant Officer Pilot program was discontinued in 1959 but restarted in 1963 to meet the increasing demand. They did not receive the same flight pay as Officers until 1974. Warrant Officer pilots usually flew missions and had little to no command experience.

The few Commissioned Officer pilots were recruited from the Reserve Officers' Training Corps (ROTC) and Officer Candidate School (OCS) programs. Commissioned pilots were usually rotated to command, staff, or support billets and had trouble logging enough flight hours to keep up their flight status.

In 1973, the Vietnam War was winding down. As part of a reduction in force, there was a draw down in the number of Army pilots. Some Army Chief Warrant Officer pilots were granted the opportunity to gain commissions as Army First Lieutenants as a means of retaining experienced pilots. After the withdrawal from Vietnam in 1973, Fort Wolters and Fort Stewart/Hunter AAF were shut down. All Army Aviation training was then re-absorbed and consolidated at Fort Rucker.

3.5.2 Army Installations

After Basic Combat Training and Advanced Individual Training, some soldiers were selected to undergo a seven-month pilot training. During the Vietnam war, pilot training was split into primary flight school and advanced flight school.[201]

Fort Rucker, Alabama

In 1954, the Army moved its Aviation School from Fort Sill, Oklahoma to Fort Rucker. Changes in Army doctrine during the 1960s elevated the tempo at Fort Rucker, Alabama. With the advent of the Air Calvary Division and their deployment during the Vietnam War, pilot training increased dramatically.[202]

During the Vietnam War, Army aviators were sent to either Fort Rucker, Alabama, for fixed-wing training or Fort Wolters, Texas, for U.S. Army Primary Helicopter School. Although rotary-wing training had initially been located at Fort Rucker, the growing importance of helicopters in the

201 Hartman et al., "Vietnam on the Homefront: How DoD Installations Adapted, 1962–1975," 2014
202 Winkler, Training to Fight: Training and Education During the Cold War. 102

Vietnam conflict soon saw the program outgrowing its Fort Rucker space at Hanchey Army Airfield, Alabama, as well as Shell Army Airfield, Alabama, until the program was transferred to Fort Wolters. To accommodate the fixed-wing training at Fort Rucker, Alabama, a new hanger was built at the east end of Cairns Army Airfield.[203]

Figure 3-10 Cairns Army Airfield, 1969
Source: U.S. Army Aviation Center, Fort Rucker, Alabama 1969 Annual Historical Supplement

Fort Stewart, Georgia

The area for Fort Stewart was constructed in the late 1960s when Stewart became part of the Advanced Flight Training Center (FTC). Buildings are found at the site, but their numbers are not known. Wright AAF is within the boundaries of Fort Stewart. Originally called Liberty Field, Wright AAF was used by the Women's Airforce Service Pilots, and later by the 1980s by the Georgia ANG. The field was closed in the 1990s because the small size of the runways and the need of repair. Wright AAF has a control tower, two sets of parallel main runways that intersect in the shape of an X (i.e., "XX"), three hangars, administrative buildings, a fire station, and a cantonment area.[204]

The undemanding schedule at the fort during the period of the Cold War encouraged construction and facility updates. The boom hit its peak both during the Berlin Crisis of 1961 and the Cuban Missile Crisis, when the 1st Armored Division, from Fort Hood, arrived to receive training at the installation. By 1963; however, Fort Stewart had another lull in activities.[205]

203 Hartman et al., "Vietnam on the Homefront: How DoD Installations Adapted, 1962–1975," 2014
204 Pan American Consultants Inc. Installations in the State of Georgia Military Historic Context Emphasizing the Cold War Including the Identification and Evaluation of Above-Ground Cultural Resources for Thirteen Department of Defense, 2006, (DoD Legacy PROJECT NUMBER (03-175).
205 Pan American Consultants Inc. Installations in the State of Georgia Military Historic Context Emphasizing the Cold War Including the Identification and Evaluation of Above-Ground Cultural Resources for Thirteen Department of Defense

The Vietnam conflict brought Fort Stewart back to life in 1966. Together with Hunter AAF and Liberty Field, Fort Stewart became the U.S. Army Flight FTC in 1967; Hunter AAF was made a permanent sub-installation of Fort Stewart in 1969. By the end of 1968, 999 aviators had graduated from the consolidated FTC. In 1970; however, fewer Americans went through the school; in favor of training Vietnamese pilots at the installation. Americans forcers were preparing to pull out of Vietnam, and by 1973, Fort Stewart's future was once again unclear.[206]

206 Pan American Consultants Inc. Installations in the State of Georgia Military Historic Context Emphasizing the Cold War Including the Identification and Evaluation of Above-Ground Cultural Resources for Thirteen Department of Defense

4. APPLICATION OF THE SUBCONTEXT IN THE IDENTIFICATION AND EVALUATION OF HISTORIC RESOURCES

This chapter presents how to apply this historic sub-context in the identification and evaluation of historic resources and describes the property types on U.S. military installations associated with pilot and air support training during the Vietnam War. The selection of these property types was based on research and prior installation surveys (Appendixes A and B). The prior surveys help identify real property types associated with pilot and crew training.

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 NRHP publications are useful guides when evaluating Vietnam War resources:

- How to Apply National Register Criteria for Evaluation
- Guidelines for Completing National Register for Historic Places Forms
- Researching a Historic Property
- Guidelines for Evaluating and Documenting Historic Aviation Properties
- 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 National Historic Preservation Act (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 NRHP eligibility, and plan for the protection of the listed or eligible historic properties.

The NHPA established the National Register of Historic Places (NRHP). The NRHP 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 NRHP is maintained by the Secretary of the Interior and is managed by the National Park Service (NPS) Keeper of the Register. Regulations for listing a property on the NRHP 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 NRHP.

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 (THPO) 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 NRHP. It 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 SHPO 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 ACHP to the head of the federal agency of foreclosure of the ACHP's 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 NRHP 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 sub-context are designed to assist professionals in the field of cultural resources in identifying significant U.S. military Vietnam War pilot and air crew 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 include: 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 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 pilot and air crew training 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 pilot and air crew training.

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 NRHP.

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, special warfare training, housing, medical facilities, and logistical facilities. Subthemes for each of these thematic areas include an in-depth historic context, determination of associated property types, and character-defining features, if any. 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;* Legacy project 14-739, *Vietnam War: Helicopter Training and Use on U.S. Military Installations, Vietnam Historic Context Subtheme;* Legacy project 16-518, *Vietnam War-Era Logistics Support on U.S. Military Installations Historic Context Subtheme* and *Vietnam War Special Operation Forces and Warfare Training on U.S. Military Installations Historic Context Subtheme* are developed.

An association with air warfare, including pilot training and air support training during the 1960s and 1970s at an installation, does not automatically imply a relationship to the Vietnam War. Some

aviation units may not have been trained to serve in Vietnam, but other parts of the world. In other cases, facilities that were built previously may have served an important role during the Vietnam War; and therefore, 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 NRHP. The NPS 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 NRHP, a property must have significance and retain historic integrity. Significance for U.S. military Vietnam War fixed-wing-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 NRHP, a cultural resource must meet at least one of the four criteria that follow:

1. ***Criteria A***—Associated with events that have made a significant contribution to the broad patterns of our history

2. ***Criteria B—***Associated with the lives of persons significant in our past

3. ***Criteria 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

4. ***Criteria 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 pilot and air support training constructed from 1961 to 1975 are significant under this subcontext. The historic property(ies) being considered must have an important and specific association with events directly associated with the Vietnam war, such as Operation Rolling Thunder. During the Cold War, some fixed-wing units were trained and readied for situations in other parts of the world.

Military properties associated with pilot and air support training 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:

- 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).

- Determine if the property is associated specifically with fixed-wing training unit training and missions, events, or trends.

- 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 NRHP 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 pilot and air support training in the Vietnam War. To determine if a property is significant within this sub-context under Criterion B:

- Determine the importance of the individual.

- Determine the length and nature of the person's association with the property.

- Determine if the person is individually significant within history.

- Determine if the property is associated with the time period during which the individual made significant contributions to history.

- 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.

The *National Register Bulletin 32: Guidelines for Evaluating and Documenting Properties Associated with Significant Persons* (National Park Service) provides additional information.

4.4.3 Criterion C: Design/Construction

To be eligible for listing on the NRHP 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.

National Register Bulletin 15: *How to Apply the National Register Criteria for Evaluation* (NPS 1991) 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 NRHP 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 refer 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 pilot and air support training may fall under this criterion (and may also fall under Criterion A) in determining if a property is significant as an important example of distinctive characteristics of a building type or as a significant and distinguishable district:

- 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.

- Determine the distinctive characteristics of the property type represented by the property in question.

- Compare the property with other examples of the property type and determine if it possesses the distinctive characteristics of a specific building type construction.

- 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, USMC, and USAF facilities were reopened, expanded, or adapted, there was no identifying architectural style used during that time. The reuse of World War II 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 World War II effort to establish and fully construct working installations in a few months. As a result, there was no major overarching construction program across the DoD as a response to the U.S. 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).

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 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) to determine if eligible and for character defining features for the various architectural movements. These buildings may be significant architecture under a mid-century modern design theme or a style of the time period, and not significant to the Vietnam War.

4.4.4 Criterion D: Information Potential

Properties may be listed on the NRHP 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. 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.

4.5 INTEGRITY

A historic property determined to be significant under the criteria for evaluation for the NRHP 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 NRHP 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 (NPS 1991)* 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: *How to Apply the National Register Criteria for Evaluation* (NPS 1991) describes the following steps in assessing historical integrity:

- Determine the essential physical features that must be present for a property to represent its significance.

- Determine whether the essential physical features are sufficiently visible to convey significance.

- Compare the property with similar properties if the physical features necessary to convey significance are not well-defined.

- 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 pilot and air support training during the Vietnam War on U.S. military installations, the properties 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. 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.

4.6 CRITERION CONSIDERATIONS

Certain kinds of properties are not usually considered for listing on the NRHP, include:

- Religious properties (criteria consideration A)
- Moved properties (criteria consideration B)
- Birthplaces or graves (criteria consideration C)
- Cemeteries (criteria consideration D)
- Reconstructed properties (criteria consideration E)
- Commemorative properties (criteria consideration F)
- 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 NRHP to allow time to develop sufficient historical perspective. However, under criteria consideration G, a property may be eligible for the NRHP 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 42 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 and 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 NRHP, and the finding of exceptional importance must be made within the specific history associated with the property. National Park Service's 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 NRHP Criteria A through D.

4.7 SIGNIFICANCE

To qualify for the NRHP, 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 (NPS 1991)*, 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 NRHP 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 NRHP, the level of integrity of those features necessary to convey the resource's significance must then be examined.

For this subcontext, resources associated with pilot and air crew training for specific tactics and strategies, sustained missions, supporting aircraft and missions, and improving a or developing skills fall under this criterion.

4.8 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 NRHP 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.

4.9 INDIVIDUAL ELIGIBILITY VS. HISTORIC DISTRICT

While pilot and air support training installations, as a class of resources, may be significant, not every structure associated with training and use during the Vietnam War is eligible for listing on the NRHP. The framework established by the historic context focuses on the role of fixed-wing warfare during the Vietnam War to assess its significance and the significance of its component resources. In general, training installation and facilities should first be evaluated as potential districts. These facilities typically had both classroom and field training components that

contributed to the training mission. In some cases, research and development also played a role in training.

For component structures and buildings to be individually eligible for listing on the NRHP with the context of Vietnam War pilot and air support training, they should individually embody a significant event associated with the development of fixed-wing warfare, pilot, or air support training; or represent an example of a specialized type of building, structure, area, or equipment necessary to pilot and air support training. Infrastructure and support buildings typically are not individually eligible.

For example, NAS Whiting, like several other air training installations of the era, underwent major renovations to WWII-era infrastructure to accommodate the augmented pilot training rate required of the Vietnam War. In 1965, the field underwent a major facelift as new housing replaced WWII-era "splintervilles." A new air training building was constructed, and upgrades were made to both fields' runways and ramp areas. The individual buildings or air field upgrades may not be individually significant. However, considered together, they represent specialized Vietnam War training site and could be a significant historic district.

The dramatic increase in base populations and the number of units may have resulted in the need for additional housing and recreational amenities. Housing complexes may be a part of a pilot and/or air support historic district, especially if the unit was sequestered from other units on the base. However, the housing would not be eligible under this context without the training resources.

4.10 INDIVIDUAL PROPERTIES

Individual properties are those whose physical attributes singularly represent or embody the Vietnam War pilot and air support 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 NRHP, they should:

- Clearly and explicitly reflect the important pilot and air support activities of the installation. Examples include a pilot school building or building where new equipment used for air support were developed.

- 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 for a specific military tactic, strategy, or event.

- Infrastructure and support buildings are not typically individually eligible unless they were:

    - The site of a particular event,
    - Directly associated with a significant individual, or
    - Of exceptional note as an example of architectural or engineering design.

4.11 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) the majority of 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 NRHP criteria. Since the Vietnam War and corresponding construction span a period of time that stretches from 56 to 42 years ago, there may be districts or features of districts that will fall into this category.

4.12 ONE-OF-A-KIND PROPERTIES

These are properties whose character-defining features singularly embody the pilot and air support 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 pilot and air support 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.

4.13 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 pilot and air support 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 NRHP 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) as available.

4.14 PROPERTY TYPES ASSOCIATED WITH PILOT AND AIR SUPPORT TRAINING DURING THE VIETNAM WAR ON U.S. MILITARY INSTALLATIONS

Training was required for a large number of military personnel to fly and maintain fixed-wing aircraft. Large influxes of military personnel to these training installations during the war resulted in the need for buildings and structures to support pilot and air support training and logistics. The property types selected for inclusion illustrate building and structure types directly related to fixed-wing aircraft training on U.S. military installations during the Vietnam War. Property types also include classrooms, laboratories, fields, air strips, hangars, and support buildings. 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. For example, many Vietnam-era construction projects augmented existing WWII-era infrastructure that became heavily reutilized in support of the Vietnam War. Additionally, the financial demands of the Vietnam War came to overshadow most military decisions and operations. Therefore, mobilizing and supporting the war slowed state-side military construction and led to a piecemeal approach of reactive construction efforts that corresponded to the immediate and ever-changing demands of combat requirements (Hartman et al. 2014).

The Vietnam War resulted in a dramatic increase of trainees on installations. Therefore, building types important under this context include those constructed as a reaction to overcrowding during the buildup of the war and to the need for more pilots and other air support personnel. Building types that accommodated this need included barracks and other housing as well as recreation buildings and administrative buildings. Additionally, the restructuring of training programs that occurred throughout DoD installations during the Vietnam era led to not only the influx of trainees, but also to the influx of aircraft. Additional trainees and aircraft, especially the modern jet aircraft that was distinctive of the Vietnam War, necessitated adding or renovating storage and maintenance hangars, aprons, tarmacs, shops, runways, and control towers. An influx of trainees paired with the unique tactical demands and technological advancements associated with fixed-

wing aircraft use in Vietnam War (e.g., tactical bombing, CAS, use of defoliants, urgent need to increase kill ratios) also influenced the construction and renovation of classroom, laboratory, simulator, and other indoor training spaces as well as outdoor tactical training spaces (Hartman et al. 2014).

The following sections provide a brief description of building, structure, and landscape features that are associated with pilot and air support training and use 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 Vietnam 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 as fixed-wing mission, Vietnam-era structures. Instead, new construction was often part of larger modernizing initiatives (Hartman et al. 2014). For example, if a pilot or air support unit was stationed in a separate area of a base, the housing and support buildings (i.e., mess, offices, etc.) may have been similar in design to other housing built around the same time. Because there is no identifying architectural style that defines pilot training during the Vietnam War, buildings would not be evaluated for listing on the NRHP under Criterion C (see section 4.4.3). As stated previously, 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 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) to determine if eligible and for character defining features for the various architectural movements.

Figure 4-1. Station Training Building - Marine Corps Air Station El Toro, California, 1972
Source: Hartman et al. 2014

Three broad types of training installations are presented in this subcontext report including basic pilot training, advanced pilot training, and technical training. Training required both indoor and outdoor areas. Primary property types associated with this historic context subtheme include academic buildings and classrooms, outdoor training ranges, and support facilities.

Individual properties need to be investigated at the installation level. Additionally, the omission of a property type in the following list does not automatically exclude it from potentially having significance under this subtheme as a contributing resource of a historic district.

4.14.1 Academic Buildings

Academic buildings could be directly associated with basic and advanced pilot and technical training. The classrooms provided venues for lectures on various military operations and strategies, skills, and applications of these skills and theories. Ground school lecture topics addressed engines, airframes, aerodynamics, meteorology, navigation, aviation safety, Morse code, aviation communications, instruments, and aircraft maintenance. Other buildings or rooms provided locations for hands-on training and included simulators, equipment operations laboratories, and shops for equipment repair. Other buildings may contain pools for aquatic lessons for extensive safety and survival training.

Figure 4-2. Nellis AFB Building 282: U.S. Air Force Fighter Weapons School
Source: JRP Historical Consulting, LLC, Survey and Evaluation of 121 Buildings at Nellis AFB. 2014

Character Defining Features

These facilities include those constructed or adapted and heavily used during 1962–1975 and were directly related to providing pilot and air support technical 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 and close circuit televisions; radio and other communication equipment; simulators; and rescue equipment.

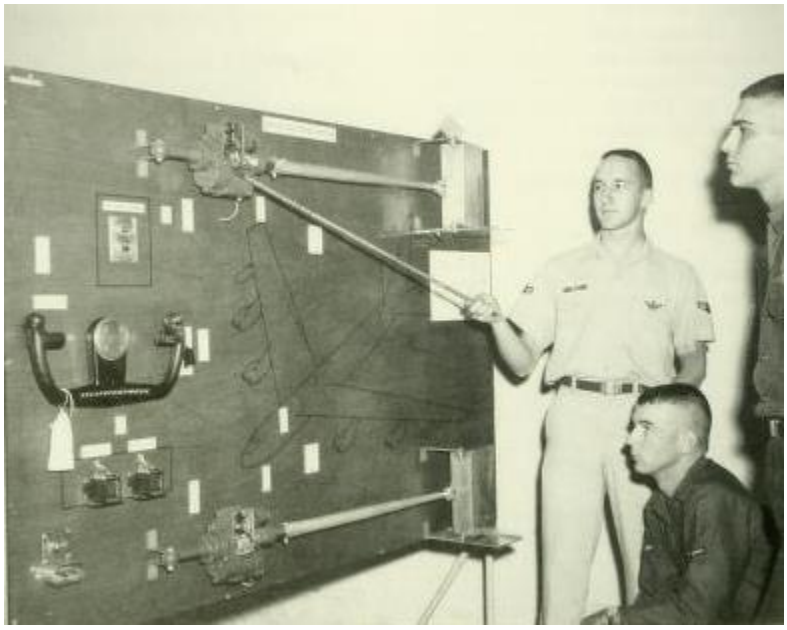

Figure 4-3. B-52 Electrical System Training Aid
Source: History of Air Education and Training Command 1942-2002, Thomas A. Manning

Evaluation and Integrity

As discussed in section 4.4.3, 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 architectural movements.

Properties may be eligible under Criteria A (see section 4.4.1). Installations may have supported special training programs. For example, the expansion at some installations was driven by the demand for improvements in tactical aviation and training as a result of low kill ratios in Vietnam. Buildings, especially those containing laboratories and other specialized testing facilities, were constructed to test, develop, evaluate, and demonstrate tactical fighter systems and weapons and

tactics. Due to low kill ratios, the Navy, decided that it needed to make drastic improvements to its aviator training programs, and in late 1968 inaugurated a special training program to improve the air-to-air combat skills of its fighter crews. This program ultimately became "Top Gun" aviation combat school established at Miramar Naval Station (San Diego) in 1972. This represents a significant military mission under Criteria A.

Figure 4-4. Trainees Operate the Controls of T-45 Navigator Simulators
Source: Source: History of Air Education and Training Command 1942-2002, Thomas A. Manning

Other buildings may have housed important equipment or may have been used to conduct specialized training that supported pilots or air support personnel. For example, a flight simulator training building was constructed at Vance AFB in 1963 to test the use of instrumentation for training undergraduate pilots prior to flight training. Due to this experiment, use of flight simulators was implemented throughout ATC. At Sherman Field on NAS Pensacola, classrooms included radar trainers and computer demonstrator equipment. This represents a significant military event under Criteria A.

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 to 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 such as the radar trainers shown above. 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 4.9).

4.14.2 Outdoor Training Areas

Outdoor training areas include tactical instrument training courses, aerial firing ranges and targets, bombing ranges, aircraft carrier landing deck simulators, catapults, and tactical training sites. Property types for training could also include natural or hardscapes, clearings or forested areas, ranges and targets, landing zones, or mock villages.

Character Defining Features

Ranges and training areas were designed to served different training programs, therefore features from one range to another may vary. Some ranges were designed as replicas of the military infrastructure of Vietnam.

Air-to-ground firing ranges may have bombing circles, bombing rocketry targets, specialized targets, napalm circles, weapon emplacements, spotting towers, and range control buildings. Some tactical air-to-ground training ranges in gunnery, bombing, and rocketry included elaborate networks of parallel roads with moveable target arrays and simulated bivouac bunkers. Some training areas may have included a dam and spillway to add water-target arrays.

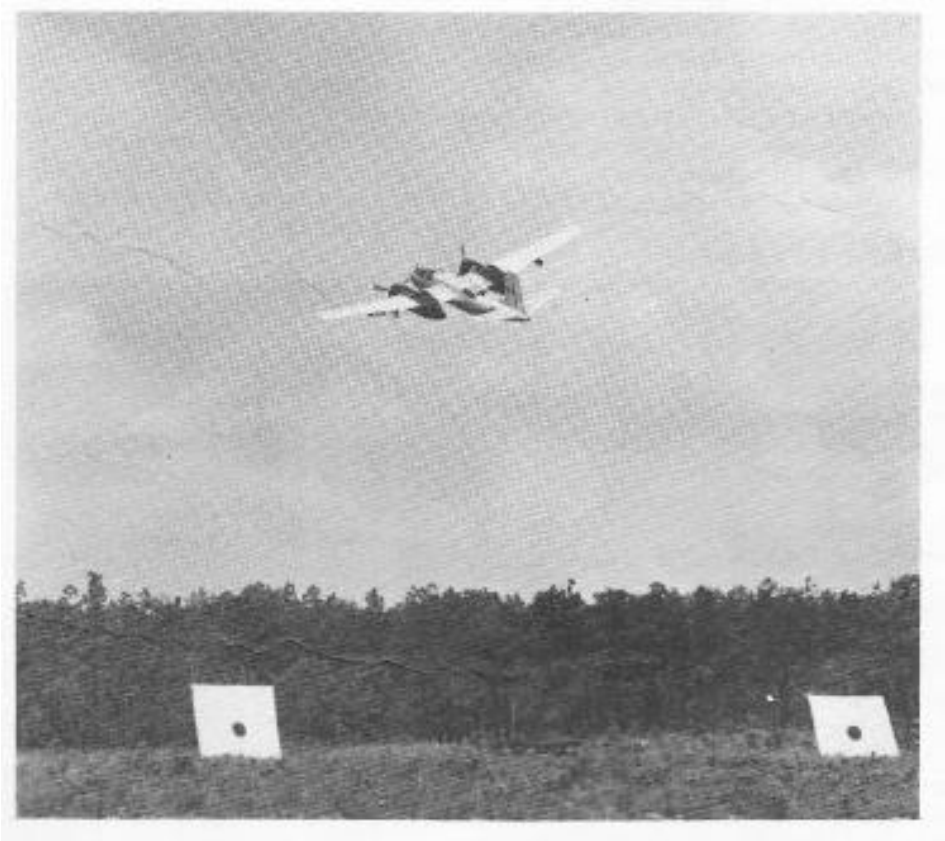

Figure 4-5. Air-to-Ground Firing Range, Eglin AFB
Source: Hurlburt Hilites, Vol. II, No. 12, June 27, 1963

Evaluation and Integrity

Installations may have supported special training programs. However, these features would not likely be individually eligible. The U.S. Army Corps of Engineer (USACE) guidance (Archibald et al. 2010) regarding the significance of individual features states:

> *No individual building/structure/element [within a training range] will ever be significant. … Military training ranges need to be researched and evaluated as a whole landscape, including all the buildings/structures, firing lines, target mechanisms, etc. and not evaluated as individual elements that that sit on the range. Military training ranges were originally designed and intended to be utilized as a whole complex.*

Properties may be eligible under Criteria A (see section 4.4.13) as a historic district. 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).

4.14.3 Other Support Facilities

To support the pilot and air support training mission, additional buildings may have been built or renovated to house additional and necessary functions. These buildings may have included headquarters and offices, flight line facilities, housing, and morale/welfare/recreation facilities. A swimming pool may have been used for survival training in addition to recreation. Installations like Lackland AFB saw major building booms that were initiated specifically in response to an influx of pilot trainees.

Figure 4-6. Water Survival Training at NAS Pensacola
Source: NAS Pensacola ICRMP 2007

Flight-line resources in support of aircraft training include storage and maintenance hangars, aprons, tarmacs, operations buildings, fire stations, control towers, fabrication shops, avionic shops, paint shops, storage, fueling systems, and wash racks. In addition to units, aircraft were also moved between installations during this time to accommodate training. One example includes the movement of thirty T-28 aircraft to Moody AFB to supplement the training of South Vietnamese pilots. The added storage and hangar space created to accommodate this movement may convey this Vietnam War subcontext. A new hangar was constructed at Fort Rucker to accommodate fixed-wing training.

Nellis AFB and NAS Whiting also underwent major renovations and new construction during this time in order to support the transition to modern aircraft, aerial warfare and tactics, and for the increased number of pilots being trained. Renovations included enlarging runways and improving hangars.

Character Defining Features

These facilities include those that were constructed or adapted and heavily used during 1962–1975 and were directly related to supporting pilot and air support technical training. This property type will vary in size, shape, and design and may include entire buildings, portions of buildings, or man-made features.

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, and exterior features including finishes, and construction materials. Equipment may include audio visual equipment and close circuit televisions; radio and other communication equipment; simulators; and rescue equipment.

Figure 4-7. Dilbert Dunker, Pensacola NAS
Source: http://www.navalaviationmuseum.org/history-up-close/objects-of-history/birth-dilbert-dunker/

As discussed above under Academic Buildings and in section 4.4.3, 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. Hangars were designed based on the type of aircraft that was housed. Hangars are addressed in *Historical and Architectural Overview of Aircraft Hangars of the Reserves and National Guard Installations from World War I through the Cold War* (Aaron 2011) and *Historical and Architectural Overview of Military Aircraft Hangars: A General History, Thematic Typology, and Inventory of Aircraft Hangars Constructed on Department of Defense Installations* (Webster 1998).

Evaluation and Integrity

Properties may be eligible under Criteria A (see section 4.4.1). Installations may have supported special training programs. 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 4.9).

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 they have not been significantly altered since the end of the Vietnam War.

4.15 CONCLUSION

This work developed a context to evaluate the historical significance of resources constructed on military installations as they pertained to fixed-wing pilot and air support 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 pilot and air support training that occurred in the USAF, Navy, USMC, and U.S. Army as necessitated by the Vietnam War and provides examples of installations where this training was conducted. Finally, it provides a means for applying the pilot and air support subcontext for the identification and evaluation of historic resources at these and other military installations. As stated, these building types could include those constructed as a reaction to overcrowding including barracks and other housing as well as recreation buildings and administrative buildings. They could include structures and buildings built and renovated based on the need to house and maintain aircraft, especially modern jet aircraft. Additionally, construction was also based on the changing training requirements, unique tactical demands, technological advancements, and environmental conditions and

geography demands of Vietnam and Southeast Asia. These could include laboratories, class rooms, simulators, and outdoor tactical training ranges.

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Appendix A

Nellis Air Force Base

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Case Study – Nellis Air Force Base

Nellis Air Force Base (AFB) had an inventory and evaluation of 121 buildings with the potential to be affected by a proposed construction project. Of these, 100 were ammunition storage buildings. The residual study population consists mostly of aircraft maintenance hangars, with a few administrative buildings, a chapel annex, a school, and some maintenance shops. There were five buildings evaluated in this study that are relevant to this historic context and considered eligible for the National Register of Historical Places (NRHP), all under Criterion A:

- Buildings 222 State Historic Preservation Office [SHPO] #B13548), 224 (SHPO #B13549), 226 (SHPO #B13550), and 228 (SHPO #B13551), as contributors to an as-yet undefined "Red Flag" historic district (though not individually eligible)
- Building 282 (SHPO #B13558), Waxman Hall, individually eligible as home of the Air Force Fighter Weapons School
- Building 292 (SHPO #B13561), an aircraft hangar, individually eligible as the "Home of the Thunderbirds"

The following context and evaluation is copied directly from the *Survey and Evaluation of 121 Buildings at Nellis Air Force Base*, by JRP Historical Consulting, LLC, December 2014.

1964 – 1973: The Vietnam War and Arrival of the Fighter Weapons School

The conflict in Southeast Asia required the participation of all U.S. Air Force (USAF) facilities on the West Coast and elsewhere. By the mid-1960s U.S. military was committed to the war in Vietnam, and the training programs at Nellis AFB had to prepare fighter pilots for combat in new terrain. Aerial combat strategies specific to the geography of Vietnam were not sitting on the shelf, ready to be taught. Tactics had to be developed to best train pilots for this war's aerial combat and that development involved experimentation, and trial and error. In late 1964 and early 1965, Nellis AFB operated the "Night Owl" program designed to train for night reconnaissance. Nellis AFB also contributed to the war effort with increased testing, much of which had direct applicability to the Vietnam War. By the end of the 1960s, Nellis AFB had become the USAF's nucleus of tactical fighter expertise and it would remain so throughout the remainder of the Cold War, and beyond.

With the facilities substantially upgraded in the first half of the 1960s, Nellis AFB was well prepared for the important changes that took place on base in 1965–1966. In response to the intensifying war in Vietnam, and the USAF's need to improve technical and operational skills for the war, the USAF overhauled the training program at Nellis AFB and reorganized the command structure of the whole base. In late 1965, Tactical Air Command (TAC) re-organized the Fighter Weapons School by shifting the Combat Analysis Division (and designating it the Combat Effectiveness and Analysis Division) from TAC headquarters to the Fighter Weapons School at Nellis AFB. This division consisted of highly-qualified officers who worked to improve tactical air capabilities in support of the war in Southeast Asia as well as for the future more generally.

Major changes in the training program at Nellis AFB took place in 1965–66. The Fighter Weapons School began its first F-105 Fighter Weapons Instructor Course, which emphasized air-to-ground training. The first F-4C Phantom fighter jet arrived at Nellis AFB in April 1965 and instructors began preparing courses on air combat tactics, ground attack, and nuclear weapons delivery. The inception of the F-4 school represented the transition from early jet fighters to modern aerial warfare and tactics. In 1966, the Wild Weasel Training Program used modified F-4C and F-105F jets equipped with new radar homing and warning equipment designed to support surface-to-air missile defense. The F-105F Wild Weasel, later designated the F-105G, and the F-4C Wild Weasels earned a superlative reputation based on their service in Vietnam. Construction in the mid-1960s was geared toward supporting these aircraft and included enlarging runways and improving hangars. The expansion of the training programs at Nellis AFB sharply shifted the program away from combat crew training to more advanced fighter weapons instructor and electronic warfare instruction, a shift that was echoed by the major reorganization that occurred in September 1966.

On 1 September 1966, TAC organized a Tactical Fighter Weapons Center (TFWC) and established it at Nellis AFB. Simultaneously, TAC established the 4525th Fighter Weapon Wing from the old Fighter Weapons School at the base. TAC organized five centers in the 1960s to "provide centralized operational expertise and resources within the various tactical mission areas." The original mission statement of TFWC was: "Central authoritative agency fully knowledgeable in all matters pertaining to the employment of USAF Tactical Fighter Forces worldwide. Conducts operational tests and evaluations of Tactical Air Warfare Weapons Systems, supervises Fighter Weapons School, Combat Control Training Wing (CCTW)/ Replacement Training Unit (RTU) programs as directed." Locating each center was driven by the existing function of each base. TAC assigned TFWC to Nellis AFB for four principal reasons: 1) because it was already considered the "home of the fighter pilot," 2) post-graduate training and operation testing and evaluation were already strongly established, 3) the Nellis Range complex complemented the mission, and 4) TAC owned the base and range facilities. The new TFWC at Nellis AFB transformed the base from a one-wing to a two-wing base consisting of the 4520th Combat Crew Training Wing and the 4525th Fighter Weapons Wing.

The new 4525th Fighter Weapons Wing, consisting of three Fighter Weapons Squadrons offering instruction in the F-100, F-4, and F-105, eventually received their own squadron maintenance capability. The expansion of the school and division into three squadrons has been said to have contributed to a lessening of a cohesive "one school" spirit that had characterized the school previously.

In the first years after TAC established TFWC at Nellis AFB, the organizational structure went through a series of successive changes. Almost immediately after TFWC opened at Nellis AFB, the Center Commander recognized that the TFWC staff structure needed to be re-aligned to better support the Center's mission. In January 1968, TAC inactivated the 4520th Combat Crew Training Wing. In March 1968, the TFWC became a tenant at Nellis AFB, reporting directly to TAC and the 474th TFW became the host wing. This change in structure was designed to relive the TFWC of its routine administrative tasks.

In October 1969, 4525th Fighter Weapons Wing that had been established at Nellis AFB in 1966 was inactivated and the 57th Fighter Weapons Wing activated to assume its functions, personnel, and equipment. The USAF had first established the 57th Fighter Wing in March 1948 at Elmendorf AFB, Alaska. The Fighter Weapons Schools at Nellis AFB were attached to the new wing whose primary mission was graduate-level training and testing, development, evaluation, and demonstration of tactical fighter weapons systems and tactics. Early in the war in Southeast Asia, the F-4 Fighter Weapons School had contributed to the war by dispatching liaison officers. Major Saul Waxman, one of the first F-4 Fighter Weapons School instructors died while on duty in Thailand in September 1966. In 1969, the new building for the 57th Fighter Weapons Wing Headquarters (Building 282/SHPO #B13558) was dedicated Waxman Hall in his memory. The Nellis AFB mission continued to support the war effort in Vietnam through the end of hostilities in 1973.

Building 282 – U.S. Air Force Fighter Weapons School

Description

Building 282 (SHPO #B13558), Waxman Hall, is home to the USAF Fighter Weapons School. The 44,274 square-foot building has a one-story element on the north built in 1969 and two-story addition on the south built in 1985. The single-story element has a rectangular footprint and a flat reinforced concrete roof with three small sawtooth skylights near the main entrance. The walls are made of concrete blocks covered by pebbledash scored into sections. On the façade, the pebbledash sections along the upper part of the wall are darker in color; this wall finish continues on the side and rear of the single-story element. On the north end of the single-story element is a large, two-story addition with an irregular footprint. The walls are comprised different types and colors of concrete block set in wide horizontal bands. Across the facade are regularly spaced concrete block pilasters with narrow top elements made of split face concrete block.

Evaluation

This evaluation concludes that Building 282, built in 1969, has a direct and important association with the fundamental mission of Nellis AFB, and recommends it as eligible for listing in the NRHP

under Criterion A. The USAF Fighter Weapons School had its origins in the Aerial Gunnery School established on the base in 1949. Since that time, the Fighter Weapons School (redesignated in 1954) has carried out the crucial mission of advanced pilot training. It is the only school of its type in the USAF and since the 1950s it has been a sought-after destination for squadrons throughout the USAF and in other branches of the military. This building appears eligible at the national level of significance, with a period of significance beginning with its date of construction, 1969, and extending to the end of the Cold War, 1989. The character-defining features of this building are its footprint, scale and massing, flat roof, projecting entries, exterior cladding (both the coarse aggregate of Waxman Hall, and the veneers of the 1985 addition), all original doors and windows, including the row of fixed-pane windows with scored concrete panels beneath on the original portion of the building, and the size and shape of original window and door openings. The period of significance for Building 282 is from its date of construction, 1969, to the end of the Cold War, 1989. Building 282 does not appear eligible under Criteria B, C, and D.

Note: This building was evaluated under a broader Cold War context. This building would likely be eligible under this Vietnam historic context for its use for training tactical air capabilities specifically for the Vietnam War.

1974 – 1989: Nellis AFB in the Late Cold War Period

As the U.S. began scaling back its involvement in Vietnam in the early 1970s, Nellis AFB shifted its programs from focusing on jungle warfare back to the Cold War staple: possible confrontation with the Soviet Union. Nellis AFB liaison staff traveled to Europe to investigate how to prepare for aerial combat in the region. In 1975, to harness the lessons learned in Vietnam and prepare for future combat, Nellis AFB established Red Flag training exercises that simulated combat conditions.

The Red Flag program at Nellis AFB was established to maximize the combat readiness, capability and survivability of participating units by providing realistic training in a combined air, ground, space and electronic threat environment while providing for a free exchange of ideas between forces. This program was meant to season new combat pilots to increase their combat capability and effectiveness, which was found to significantly increase after completing ten missions. Red Flag also addressed problems encountered during the Vietnam War by F-4 Phantom and F-105 Thunderchief aircrews.

During the Vietnam War, the USAF and Navy operated controversial air offensives against North Vietnam as part of President Lyndon B. Johnson's "graduated response" strategy, which, through controlled military escalation, was intended to weaken the resolve of Ho Chi Minh's communist forces. In 1965, the Johnson administration authorized Operation Rolling Thunder, a three-year bombing campaign against selected military and industrial targets in North Vietnam.

Supporters of Operation Rolling Thunder, and the broader strategy of aggressive, sustained aerial assaults on the communist enemy, saw these operations as a necessary pathway to force the enemy to surrender, or at least to engage in peace talks. Opponents viewed the air offensive as too limited in scope, and too risky to pilots and aviators, without much hope of achieving its objective. Operation Rolling Thunder ultimately came up short in securing victory over North Vietnam, and

in 1968 the Johnson administration discontinued the operation. In the aftermath of this decision, the USAF and Navy both assessed their tactics during the campaign, and both drew different conclusions about their shortcomings in aerial combat. The USAF concluded that its tactics and training were sound, so instead focused energy and resources on making technological advances to its aircraft and ground support systems. The Navy, on the other hand, decided that it needed to make drastic improvements to its aviator training programs, and in late 1968 inaugurated a special training program to improve the air-to-air combat skills of its fighter crews.

This program ultimately morphed into the Navy's "Top Gun" aviation combat school established at Miramar Naval Air Station (San Diego) in 1972. This renewed focus on training paid dividends; by 1972, when the Nixon administration resumed bombing in North Vietnam, the Navy downed 12 enemy aircraft for each one lost; the USAF, by contrast, was operating at a "kill ratio" of approximately 2:1.

By 1972, the USAF also acknowledged that inadequate fighter pilot training and ineffective tactics were serious problems that urgently needed to be addressed. In that year, USAF headquarters selected the TFWC at Nellis AFB to conduct studies known as "Project Red Baron" whose purpose it was to identify the causes of decreased air proficiency between the Korean War and the Vietnam War. The studies identified three primary problems: 1) the breadth of missions that fighter units were expected to accomplish sacrificed proficiency; 2) most pilots who were shot down in Vietnam never saw their attacker; this was attributed to training with members of their own squadrons rather than smaller, more agile enemy aircraft like the Soviet MiGs; and 3) pilots were not adequately trained to exploit their adversary's weaknesses. Once these areas of weakness were identified, the USAF made dramatic changes to training programs, beginning at Nellis AFB, where special "aggressor" squadrons that mimicked Soviet maneuver tactics (and used aircraft painted to resemble enemy aircraft) were created and deployed in training exercises.

The Red Flag program at Nellis AFB was the direct outgrowth of the Red Baron studies. A group of Vietnam veteran fighter pilots worked together with the Directorate of Operations of Headquarters USAF to develop abstract principles into real-world practice doctrine for air-to-air and air-to-ground tactical training. At the heart of the program were the principles that combat training needs to be as intense and realistic as possible, and that realistic training can only be gained though study of, and actual engagements with, possessed enemy aircraft or realistic substitutes. In April 1975, the team presented a brief, "Red Flag: Employment Readiness Training," at TAC's Fighter Weapons Symposium that laid out the concept of operations for a new program. The concept was to use the resources available at Nellis AFB, two aggressor squadrons, targets, and instrumentation on the range complex, to create a program in which "…pilots could experience the rigors of air combat and try out new tactics in a realistic but safe training environment." The first Red Flag exercise began at Nellis AFB on 27 November 1975.

Red Flag was created from a continuing effort to provide realistic training and was specifically designed to intensively train new pilots by using already available resources. Red Flag is a two-week simulation program conducted five to ten times a year and has only been assigned to Nellis AFB. Visiting pilots participate as "Blue Forces" flying day and evening sorties (air combat attack missions), which are electronically monitored by "White Force." Red Flag provides realistic training for air interdiction, combat search and rescue, CAS, dynamic targeting and defensive

counter air missions. Aggressor pilots are tasked with flying adversary aircraft during Red Flag exercises and must be world-class fighter pilots for Red Flag participants to improve their air combat maneuvering capabilities. Aggressor units operated at Nellis AFB until 1990, when budget restrictions called for their deactivation. The aggressor program was reinstated in a limited form with the assignment of nine F-16s to the predecessor group of the 414th Combat Training Squadron whom is currently responsible for organizing Red Flag exercises. After 12 years, the demands of Red Flag exceeded the reduced Aggressor charter and the 64th and 65th Aggressor Squadrons were reactivated in 2003 and 2005, respectively.

Red Flag began in an office within the Tactical Fighter Weapons School (Building 282/SHPO #B13558), and the first Red Flag exercise began 27 November 1975. During the first year, 671 flight hours were flown with a limited number of aircraft participating in 552 sorties. Red Flag expanded, and in the late 1970s, a new central control facility was constructed for Red Flag at cost of $4.4 million. By 1995, Red Flag exercises included 250 different units from U.S. and allied air forces with over 21,000 flight hours flown in 12,500 sorties. Between 1975 and 2012, twenty-eight countries joined the U.S. in participating in Red Flag exercises, and the program trained 440,000 military personnel including more than 145,000 aircrew members flying 385,000 sorties and logging 660,000 hours. Some of the hangars used to support this mission today include Buildings 222, 224, and 226 (SHPO #B13548, B13549, B13550). Building 228 (SHPO #B13551), built in 1989, is an Aircraft Maintenance Unit/Aerospace Ground Equipment maintenance shop used for Red Flag.

In addition to Red Flag, the mid-1970s to the mid-1980s proved to be a busy period for the Nellis AFB Fighter Weapons School. The war in Vietnam had delayed the inception of the F-111 Fighter Weapons School that was first conceived in 1968. TAC did not make the school a priority until 1974 when the first cadre began their training at Nellis AFB. Shortly after 57th Fighter Weapons Wing began operating the combat-ready wing of F-111s, the local newspaper boasted that Nellis AFB was the "Largest TAC Base in Free World." In October 1976, Nellis AFB received its first F-15 and in 1978 the A-10 school formed on base.

The 57th Fighter Weapons Wing, which had taken over host responsibilities from the 474th Tactical Fighter Wing in 1970 was redesignated in April 1977 as the 57th Tactical Training Wing (57 TWW). In March 1980, the USAF relieved 57 TTW of its host wing responsibilities when they activated the 554th Operations Support Wing. Simultaneously, 57 TTW was redesignated the 57th Fighter Weapons Wing (57 FWW). The newly designated wing continued with the work of graduate-level training, testing, development, and demonstration of tactical fighter weapons systems and tactics. The evolution of the wing's training activities during the 1980s, particularly the Red Flag activities, provided pilots with invaluable realistic training. During the 1980s, the training activities at Nellis AFB kept the base the busiest in the USAF.

During Winter 1986, the USAF Engineering and Services Center surveyed the Nellis AFB runways and found that they had very poor drainage. Upgrades to the runways, a crucial aspect of Nellis AFB, were performed to improve both function and safety. In 1988, the USAF chose Nellis AFB to unveil their newest aircraft, the F-117A Stealth Fighter.

Buildings 222, 224, 226, and 228: Red Flag Complex

Description

These four buildings, located on Tyndall Avenue near the southern end of the flight-line, have served the Red Flag operation that arrived at Nellis AFB in 1975.

Buildings 222, 224, and 226 (SHPO #B13548, #B13549, #B13550) are aircraft maintenance hangars. They were built in 1972 from the same standardized plans. Each building is made up of two prefabricated hangars, each consisting of a roughly square-in-plan aircraft dock flanked by maintenance shop wings. The two hangars are connected by a central row of rooms devoted primarily to administrative and office purposes. Each of the hangar buildings has a front gable roof that extends to cover the maintenance shop wings and administrative area. The framework is a steel-girder system consisting of cantilevered trusses supported by interior I-beam buttresses. The walls and roof are clad with heavy gauge corrugated steel paneling. Aircraft access to the building's two docks is through large retracting bay doors on the southwest side. Each opening consists of two sets of four hanging panels that slide horizontally into pockets at the center and sides of the hangar. Above the pocket doors and beneath the gable peak is a smaller metal roll-up door opening for the tail of the aircraft.

Building 222: Red Flag Maintenance Hangar

Building 228 (SHPO #B13551) is an aircraft maintenance shop built in 1989. It has a simple rectangular plan and walls constructed of split-face concrete blocks. The building is capped with a front gable standing seam metal roof and doors are a combination of metal roll-up doors and personnel doors.

Evaluation

The Red Flag program at Nellis AFB was established to season new combat pilots to increase their combat capability and effectiveness, which was found to significantly increase after completing ten missions. Red Flag also addressed problems encountered during the Vietnam War by F-4 Phantom and F-105 Thunderchief aircrews.

Buildings 222, 224, 226, and 228 form cluster of buildings along the flight-line that are all associated with the Red Flag training program. This study concludes that this complex of four buildings contributes to a potential Red Flag Historic District because its direct associations with the historically significant training program (NRHP Criterion A), and because this significance rises to the level of exceptional as required under NRHP Criteria Consideration G for properties less than 50 years old. The Red Flag program reflects an important aspect of the Cold War mission at Nellis AFB; learning from mistakes in Vietnam and preparing pilots for aerial combat in the event of a military confrontation with the Soviet Union or other enemy combatants.

Tactical Air Command established Red Flag at Nellis AFB in 1975, and the program gradually moved into more buildings in the late 1970s and 1980s. Under NRHP Criterion A, these buildings have a strong and direct association with this Cold War-era program that embodied the military doctrine of trying to maintain a strategic edge over the Soviet Union and its allies. None of the four buildings are recommended as individually eligible for the NRHP because none, on its own, possesses the strength of association necessary to convey the significance or scope of the Red Flag program, which is best represented by the functionality of the group. Additionally, research did not reveal any specific participants in the Red Flag program whose contributions to the program merit significance under Criterion B, or whose actions have direct and important associations with the maintenance activities carried out in Buildings 222, 224, 226, and 228.

Architecturally, the Red Flag buildings, whether considered individually or as a group, do not warrant significance under NRHP Criterion C. The maintenance docks/hangars were built according to standard definitive plan prepared by the U.S. Army Corps of Engineers and adapted to and executed on installations throughout the country and Building 228 is a strictly utilitarian building that does not represent significant achievements in architecture or engineering. There were no challenges presented by the site that had to be overcome that represents a significant engineering feat, and research did not reveal that the engineers of Ken O'Brien and Associates, who adapted the standard definitive plans to Nellis AFB, should be considered master engineers. Finally, these buildings were constructed according to well documented plans and do not have any potential to yield important information about historic building methods, materials, or styles that would make them eligible for listing under NRHP Criterion D.

The period of significance for the Red Flag program is 1975 through 1989; the year the Red Flag program began at Nellis AFB to the end of the Cold War. The character-defining features of Buildings 222, 224, and 226 are their footprints, scale and massing, steel siding and roof material, steel sliding doors, roll-up doors beneath the gable peaks, original door openings, large central open bay, and truss system. The character-defining features of Building 228 are its footprint, scale and massing, steel siding and roof material, concrete block walls, metal utility doors, single panel personnel doors, fixed windows, and the placement of original doors and windows.

The boundaries of these historic properties cannot be defined without further study that evaluates all buildings associated with the Red Flag program and determines which of these may be considered eligible contributors.

Note: These buildings were evaluated under a broader Cold War context. As stated in the evaluation section above, "the Red Flag program at Nellis AFB was established to season new combat pilots to increase their combat capability and effectiveness," and "addressed problems encountered during the Vietnam War by F-4 Phantom and F-105 Thunderchief aircrews." Therefore, these buildings would also be eligible as a district under this historic context for its direct associations with the historically significant training program as a direct result of the Vietnam War.

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Appendix B

Naval Fighters Weapons School (Top Gun) NAS Miramar

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Naval Fighters Weapons School (Top Gun) NAS Miramar

Navy and USAF fighter pilots are suffering staggering losses in Vietnam during Operation Rolling Thunder. Their "kill ratio" was appalling in comparison to American dominance in World War II and the Korean War. With the advent of beyond-visual-range missile technology, fighter pilot doctrine quickly and radically changed and top military brass declared the end to close-range aerial combat (dog fighting). As a result, an entire generation of pilots received almost no training in aerial-combat maneuvering. Fighter pilots were now expected to intercept bombers and launch missiles from miles away. American fighter and attack pilots found themselves on bombing runs in Vietnam and facing smaller and more maneuverable subsonic, Russian-built MiG-17, -19 and -21 jet fighters, they were underprepared. The Navy's kill ratio was 2:1 (compared to 10:1 in World War II and Korea), at times dipping below that. The USAF fared no better, at times, than breaking even (Elder 2009).

On 1 November 1968, President Lyndon Johnson ordered a halt to bombing north of the 20th parallel to bring the enemy to the bargaining table, which gave pilots time to regroup and assess what was wrong. Essentially, aviators were in battle armed with Sidewinder missiles with a range of 13 miles but rules of engagement called for visual identification (by the time they could identify the target, they were inside the missile's minimum range), and with no guns and little practice or tactics training (Elder 2009).

In May of 1968, then *U.S.S. Coral Sea* Commander Frank Ault, former World War II attack pilot, released what became known as the Ault Report, a demining indictment of the U.S. military strategy. Ault identified 242 problem areas that included maintenance and improvement of the faulty Sidewinder and Sparrow missiles. More importantly, he recommended the formation of a school specializing in aerial combat (Elder 2009).

The Naval Fighters Weapons School (Top Gun) was to be conducted by VF-121, a squadron based at Naval Air Station (NAS) Miramar. By 1955, the NAS housed nearly 400 jets, and was the principal fleet support Air Station for the Navy. In accordance with a new Navy concept, in 1961 NAS Miramar became "Fightertown;" a support base specifically for fighter squadrons. In October 1968, Miramar had become the busiest military airfield in the nation and was fourth among all U.S. airports behind New York's John F. Kennedy, O'Hare in Chicago, and Los Angeles International Airport (Stewart 2004).

VF-121 Lieutenant Commander Dan "Yank" Pedersen, 33 at the time, was ordered to make the school happen. His F-4 Phantom Replacement Air Group (RAG) was responsible for training and providing air and maintenance crews to the front line in the Navy's Pacific Fleet. Eight men (pilots plus backseat; Radar Intercept Officers) in the RAG, along with Pedersen, created the direction for the school, gathered intelligence and aircraft and devised a bulletproof operating procedure that endures to this day (Elder 2009).

VF-121, the largest squadron in the Navy, was already bursting at the seams. There were no rooms or buildings available. Top Gun started out in a single metal trailer in which offices, classes and research were all conducted. The instructors had a large room for classes, another for offices. That was all, along with a chalkboard, movie screen, tables and chairs. In those first several weeks, the

instructors digested the finer points of the Ault findings, from the minutiae of missile maintenance to crew and machine problems in flight (Elder 2009).

Deep in Central Intelligence Agency storage, the instructors found boxes of firsthand information on the Soviet MiGs. Instructors went to the desert to a top-secret location, where the U.S. government kept MiG-17 and -21 jets that had been obtained. The instructors experienced, firsthand, the aircraft's strengths, weaknesses and performance envelope. Coupled with more time in the F-4s, the instructors discovered that, while the older Russian jets were indeed more maneuverable, the F-4 could be pushed and flown in ways previously unimagined by pilots and its engineers. Since exploiting strengths and weaknesses is the strategic essence of air combat, instructors experimented with tactics not part of the current doctrine. Eventually, a formula was developed that would prove highly effective against MiGs and rigid North Vietnamese fighting strategy (Elder 2009).

The staff prepared its syllabus. Each member of the crew was to specialize in a particular topic, Sidewinder missiles or group combat, for example, with the goal for each instructor to become the foremost authority in the world on his area of knowledge. The plan for students was to cull the best pilots in each squadron, make them even better, and upon their return, they'd become the training officer in their squadron, disseminating the latest air-combat maneuvering tactics. Captains were initially reluctant to send any pilots away for six weeks to a school they had never heard of. On 31 March 1969, Top Gun accepts its first students. Once word got out after the third or fourth graduating class, and pilots saw the results, they were gunning for an invitation. In the ultracompetitive culture of fighter pilots, squadrons noticed that Top Gun graduates returned as the dominant fighters. Soon every pilot wanted to wear the Top Gun patch (Elder 2009).

When President Nixon resumed mining the harbors and bombing campaigns on 15 April 1972, air-to-air combat results against the North Vietnamese were night and day from four years earlier. Navy pilots were registering kill ratios of 13:1, while the USAF, which did no comprehensive overhaul of its approach to combat; kill ratios worsened for a time. (Elder 2009).

Top Gun's influence was not only immediate but lasting as well. The always-improving program drew return graduates for more training, and the very best were offered positions as instructors. The USAF instituted its own aerial combat maneuvering school at Nellis AFB, known as Red Flag (Elder 2009).

As a result of the Base Realignment and Closure Act of 1990 (Public Law 101-510), the specific base realignment recommendation was approved the President and the U.S. Congress in September 1993. The decision was made to close both Marine Corps Air Stations Tustin and El Toro and relocate all assets primarily to Miramar (Stewart 2004). In 1996, Top Gun was relocated to NAS Fallon, Nevada (Elder 2009).

Per the 2011 Integrated Cultural Resources Management Plan for Marine Corps Air Station Miramar, existing station buildings and structures dating from the World War II era (1942–1945), the 1946–1963 period of the Cold War, the second 1964–1989 Cold War phase, and a single 1910 structure, were identified and evaluated by Popovich et al. (2006). This involved a total of 310 buildings and structures, and included a consideration of NRHP eligibility under Criteria A, B, C

and D, as well "exceptional" significance under Criterion G for the buildings that are less than 50 years old. None of the 310 buildings and structures was recommended as NRHP-eligible. It was also recommended that the post-1963 buildings eventually be re-evaluated under Criteria A, B, C, and D (as opposed to only G) when they reach 50 years of age. SHPO provided concurrence on these findings and NRHP eligibility recommendations (ASM Affiliates, 2011).

Note: Buildings were evaluated under a broader Cold War context and under Criterion G for exceptional significance. None of the building met the exceptional criteria. The TOP GUN training program was established specifically to address the low kill ratios and under preparedness of pilots during the Vietnam War. If the buildings are extant and retain integrity, the buildings directly associated with the TOP GUN school would likely be eligible as a district under this historic context for its direct associations with the historically significant training program as a direct result of the Vietnam War. The original TOP GUN trailer is no longer extant.

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Appendix C

Report 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 U.S. 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 NHPA, 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 Historic American Building Survey (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 Air National Guard (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 U.S., spanning from World War II 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 Aviation Administration 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 USAF Base in support of an environmental assessment. The project was on a short time schedule and both the Determination of Eligibility and Assessment of Effect were conducted simultaneously and presented in the same report. The entire process, including consultation with the State Historic Preservation Office 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 ANG Base (ANGB) installations. The installations are Camp Perry ANG Station and its sub-installation Plumbrook ANG; Alpena ANGB and its sub-installation 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 Leadership in Energy and Environmental Design (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 U.S. 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 U.S. 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 U.S. 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 U.S. 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 uard, U.S. Army Corps of Engineers, Department of Defense, the U.S. Fish and Wildlife Service, National Park Service, U.S. Forest Service, U.S. Geological Survey, General Services Administration, ANG, U.S. Coast Guard, USAF, 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 (NPS) 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 Revised Statute 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 U.S. 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, USAF, 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 ANG 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, photograph-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 (ICRMP), which was developed using a newly developed 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 photograph 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 photograph-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 ANG 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, photograph-documentation, historic context, management recommendations, and applicable historic structure evaluation forms.

Appendix D

List of Acronyms

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LIST OF ACRONYMS

AAF	Auxiliary Air Field
ACHP	Advisory Council on Historic Preservation
ADC	Air Defense Command
AFB	Air Force Base
AFR	Air Force Reserve
AFHRA	Air Force Historical Research Agency
ANG	Air National Guard
ATC	Air Training Command
CAS	Close Air Support
CCTS	Combat Crew Training School
CERL	Construction Engineering Research Laboratories
CFR	Code of Federal Regulations
CIA	Central Intelligence Agency
CNMI	Commonwealth of the Northern Mariana Islands
COIN	Counterinsurgency
DoD	Department of Defense
ERDC	Engineer Research and Development Center
FTC	Flight Training Center
FY	Fiscal Year
GPS	Global Positioning System
INARNG	Indiana Army National Guard
HAER	Historic American Engineering Record
HAWK	Homing All the Way Killer
NHPA	National Historic Preservation Act
JCS	Joint Chiefs of Staff
LEED	Leadership in Energy and Environmental Design
LZ	Landing Zones
MAC	Military Airlift Command
MAG	Marine Aircraft Group
MAP	Military Assistance Program
MCAS	Marine Corps Air Station
NAS	Naval Air Station
NAAS	Naval Auxiliary Air Station

NARA	National Archives and Records Administration
NAS	Naval Air Station
NATO	North Atlantic Treaty Organization
NCO	Noncommissioned officer
NHPA	National Historic Preservation Act
NPS	National Park Service
NRHP	National Register of Historical Places
OCS	Officer Candidate School
RAG	Replacement Air Group
RIO	Radar Intercept Officer
ROTC	Reserve Officers' Training Corps
RTU	Replacement Training Unit
SAC	Strategic Air Command
SAM	Surface-to-air missiles
SATS	Short Airfield for Tactical Support
SHPO	State Historic Preservation Office
TAC	Tactical Air Command
THPO	Tribal Historic Preservation Office
TWW	Tactical Training Wing
UPT	Undergraduate Pilot Training
U.S.	United States
USACERL	U.S. Army Construction Engineering Research Laboratories
USAF	U.S. Air Force
USAFE	U.S. Air Forces in Europe
USMC	U.S. Marine Corps
VAL	Light Attack Squadron
WTC	Weapons Tactic Center