CLARKSVILLE BASE HISTORIC DISTRICT
Fort Campbell
Montgomery County
Tennessee

HISTORIC CONTEXT

CLARKSVILLE BASE HISTORIC DISTRICT

Location:	Clarksville Base Storage Facility, encompassing an area of approximately 26,201 acres, located entirely within the boundary of Ft. Campbell. USGS Quad: *New Providence* Approximate Center: UTM Zone 16 457400E 4051032N
Date of Construction:	1949-1969
Engineers:	Black and Veatch, Inc. Bernard Johnson and Associates
Present Owner:	US Army
Original Use:	Storage of Atomic Weapons
Present Use:	Munitions storage, training facilities, and other military uses
Significance:	Based on previous cultural resources surveys, the Tennessee Historical Commission (THC) and the US Army concurred that Clarksville Base, an early atomic weapons storage facility, was eligible for listing on the National Register of Historic Places (NRHP) under Criterion A, as a historic district significant for its association with the Cold War.
Report Prepared by:	Patricia Stallings, Senior Historian, Brockington and Associates Edward G. Salo, Ph.D
Date:	December 2010

PART I. HISTORICAL INFORMATION

A. CHRONOLOGY

1947	Black and Veatch had laid out the plans for Clarksville Base.
1948	Constructed began on Clarksville Base
1949	First nuclear weapons arrived at Clarksville (July)
1949	The AFSWP had constructed only a few structures at Clarksville Base
1950	The number of storage igloos constructed at Clarksville Base grew to 26
1951	The number of storage igloos constructed at Clarksville Base was 27
1954	Black & Veatch constructed two A Structures formally called "Structure A-1" and "Structure A-2"
1958	Clarksville Base was designated modification centers for atomic weapons
1961	Clarksville Modification Centers went into operation
1964	AEC announced that the modification centers at Clarksville would be closed
1965	The Clarksville Weapons Modification Facility was deactivated (September 24)
1965	AEC designed Clarksville a branch office for the AEC Amarillo office
1969	DASA discovered radon gas in the buildings and tunnels of Clarksville Base, and shut the base down

B. INTRODUCTION

Clarksville Base is a Cold War-era nuclear weapons storage facility (Q Area) that is located entirely within the boundary of Fort Campbell. It was the second of the thirteen early atomic weapons storage facilities established by the Atomic Energy Commission and the Armed Forces Special Weapons Project in the late 1940s, and operated until the late 1960s. The engineering firm of Black and Veatch designed all the buildings and structures for Clarksville Base, as well as the other storage facilities. During the late 1950s, the Clarksville Base, called "The Birdcage" by the locals, was transformed from a storage site into a Modification Center for nuclear weapons. The nuclear weapons operations at Clarksville shut down in 1965, and the facility was annexed in 1969 by Fort Campbell. It is currently used as a munitions and equipment storage area for the fort.[1]

C. HISTORICAL CONTEXT

The US Military during the Cold War

The Cold War between the US and the Soviet Union represented a dramatic change in American foreign and military policy. The destructive power of nuclear weapons altered diplomatic and military thoughts on the threat and use of military might.[2] In addition to changing ideas of diplomacy, the US entered into a new paradigm of military readiness. Rather than maintaining a small professional military that would be augmented with citizen soldiers, the US developed a permanent military-industrial complex and equipped a large peacetime military.[3] Although the US military continued to be very large, it focused on high tech weapons, including nuclear weapons and airpower, to counter the numerically superior Soviet Forces. A brief history of the Cold War is provided below.[4]

Origins and Buildup, 1946-1964. Although many scholars debate the exact cause of the Cold War, geopolitical developments and tensions that arose during World War II were indications that the United States and the Soviet Union were headed for conflict after the war. The power vacuum left in Europe by a weakened Great Britain, Germany, and

---

[1] Globalsecurity.org, "Weapons of Mass Destruction; Clarksville Base 36°40'30"N, 87º29'30"W," *globalsecuirty.org*, http://www.globalsecurity.org/wmd/ facility/clarksville.htm; Globalsecurity.org, "Weapons Storage Sites/Q Area," *Globalsecurity.org*, http://www. Globalsecurity.org/wmd/facility/q_area-intro.htm.

[2] Walter L Hixon, "Proliferation: The United States and the Nuclear Arms Race," in *The American Military Tradition From Colonial Times to the Present*, edited by Colin F. Baxter and John M. Carroll (Rowman and Littlefield Publishers, Inc: Lantham, 2007), 267-268.

[3] Allan R., Millett and Peter Maslowski, *For the Common Defense: A Military History of the United States of America.* (New York: The Free Press, 1994), 494-496.

[4] For a more detailed discussion of the US military strategy during the Cold War, see Millett and Maslowski, *For the Common Defense*, 494-697; Hixon, "Proliferation," 267-288; Gar Alperovitz, *atomic Diplomacy: Hiroshima and Potsdam* (London, 1994), and Lawrence Freedman, *The Evolution of Nuclear Strategy* (New York: 1989). A more detailed view of the Cold War is in John Lewis Gaddis, *We Now Know: Rethinking Cold War History* (New York: Oxford University Press, 2007).

France; the introduction of atomic warfare; and the conflicting economic systems and ideologies of communism and capitalism, resulted in a geopolitical landscape ripe for conflict, open or covert. The Cold War resulted in the development of a massive military-industrial landscape in both the United States and the Soviet Union. This early period of Cold War history extends from the end of World War II in 1945 to the start of the Korean War in 1950.[5]

With a superior postwar economy and atomic bomb capabilities, American leaders in 1945 and 1946 cherished the belief they could solve any global problem with simple threats. Through either economic coercion or implied threats of atomic devastation, the United States exercised almost complete global domination directly after World War II. This strategy of implied threats was most apparent in the Iran Crisis of 1946, when American pressure resulted in the removal of Soviet troops from a disputed portion of Iran.[6]

Some American leaders viewed Soviet moves in Eastern Europe as a prelude to world domination, but it was Winston Churchill's 5 March 1946 speech that marked the beginning of the Cold War with his declaration that "an iron curtain [had] descended across the Continent." While warning signs were apparent, the military and foreign policies of the United States were moving in opposite directions. The United States military demobilized most of its World War II forces, a decision fueled mainly by the public desire to have the "boys home." Thus, the only viable military option for combating the Soviet threat was the use of the atomic bomb.[7]

By 1947, relations with the Soviet Union were strained and growing steadily worse. State Department official George F. Kennan had advised Washington that Soviet military policy was directed to destroy "our traditional way of life".[8] Kennan later laid out a strategy to mitigate the Soviet threat in an article in *Foreign Affairs*. He argued that a policy of containment, which would isolate the Soviet Union, might promote a more moderate Soviet government and perhaps instigate the demise of Communism. The Truman administration quickly signed off on the policy as the basis for its US foreign relations with the USSR.[9]

President Harry Truman first practiced containment by issuing the Truman Doctrine as a response to Communist threats in Greece and Turkey. The Doctrine states "it must be the policy of the United States to support free peoples who are resisting attempted

---

[5] F.J. Shaw, Jr., and T. Warnock *The Cold War and Beyond: Chronology of the United States Air Force, 1947-1997* (Maxwell AFB, Alabama: Air Force History and Museums Program, 1997), 8.
[6] Stephen Ambrose, *Rise to Globalism: American Foreign Policy Since 1938* (New York: Penguin Books, 1991), 69-73.
[7] G.B. Tindall, and D.E. Shi. *America: A Narrative History, Volume Two.* Fourth edition. (New York: W.W. Norton & Company, 1996), 1289.
[8] Tindall and Shi, *America: A Narrative History*, 1301.
[9] Ambrose, *Rise to Globalism*, 84-85.

subjugation by armed minorities or by outside pressures."[10] As part of the Doctrine, Congress passed a Greek-Turkish aid bill to fund opposition to the Communist threat in these strategic Mediterranean countries.[11]

The US provided both economic and military aid to Greece and Turkey, but it was economic aid alone that Western Europe so desperately needed after the devastation of World War II. The war had destroyed the economic base of the continent. Winston Churchill described Europe in 1947 as "a rubble heap, a charnel house, a breeding ground of pestilence and hate".[12] Even though aid from the United Nations (UN) kept most people from starvation, a full economic recovery was not yet possible. In his 1947 Harvard commencement speech, the new Secretary of State, George Marshall, who had served as Army Chief of Staff during World War II, outlined a new policy of the United States to offer aid to any nation in Europe that requested it, including the Soviet Union. While most of Western Europe welcomed the aid, Moscow called the Marshall Plan an imperialist tool. Many leaders in Congress were wary of the cost of such a massive aid package for Europe, but a Communist coup d'état in Czechoslovakia in early 1948 convinced both Congress and the American public of the need to contain Communism in Europe.[13]

During the late 1940s, President Truman's policy for containing the spread of Communism began to take shape through the Marshall Plan, Truman Doctrine, and the establishment of the North Atlantic Treaty Organization (NATO). In addition, the US Congress authorized the $1.5 billion Mutual Defense Assistance Program (MDAP) to provide military support for European allies. The military assistance provided by the US encouraged European cooperation and promoted a military alliance between the United States and the western European countries (Ambrose 1991:106-107).

By early 1950, China fell to the Communists, and the Soviets acquired atomic weapons. In response to these world events, Truman ordered the Departments of State and Defense to review the nation's defensive strategy. The policy paper resulting from that review, NSC Memorandum 68, was one of the most important Cold War documents. It laid out plans for "an immediate and large-scale build-up in our military and general strength and that allies with the intention of righting the power balance and in the hope that through means other than all-out war we could induce a change in the nature of the Soviet system".[14] Although NSC 68 described a strategy of combating the Soviet Union without open conflict, President Truman realized the build-up would require a huge change in national policy, one requiring the enlargement of the peacetime military in an unprecedented manner.[15]

---

[10] Tindall and Shi, *America: A Narrative History*, 1302.
[11] Ambrose, *Rise to Globalism*, 81-86.
[12] Tindall and Shi, *America: A Narrative History*, 1302-1303.
[13] Ambrose, *Rise to Globalism*, 86-95.
[14] Ambrose, *Rise to Globalism*, 113.
[15] Ambrose, *Rise to Globalism*, 114.

As part of the settlement agreements reached at the end of World War II, in 1948, the Allies divided the Korean peninsula into two separate countries, with a Soviet-supported Communist government in North Korea, and a United States-supported democratic government in South Korea. Future unification of the peninsula countries seemed unlikely. Nevertheless, the Soviets allowed North Korea to invade South Korea on 25 June 1950 in an effort to forcibly unify the peninsula. After receiving a UN mandate to stop the aggression, American military forces, supplemented by other allied forces, began to arrive in South Korea to turn back the Communists. American forces, however, were ill trained and ill equipped and quickly were in retreat until General Douglas MacArthur, commander of the UN forces, changed the tide of the war with a daring amphibious invasion behind enemy lines at the North Korean port of Inchon.[16]

After the victory at Inchon, UN forces began to push the North Korean forces back to the vicinity of the Chinese border. In November 1950, the Chinese Army attacked the UN forces, again sending them in retreat to the south. Because of his open insubordination in calling for attacks on China, MacArthur was removed as commander of UN forces by President Truman and replaced by General Matthew Ridgeway. By mid-1951, the Korean War was essentially in a stalemate with neither side making any true gains. Although peace talks began that year, a truce was not signed until 1953.[17]

The Korean War represented the first test of the containment policy and America's first foray into a strategy based on limited warfare. Unlike World War II, where President Roosevelt declared that the only acceptable resolution of the conflict was the unconditional surrender of the Axis nations, the Korean War was conducted to protect South Korean from North Korea aggression, not to conquer the Communist forces.

While the Korean War represented an important change in the US military strategy, the Eisenhower Presidency represented a shift from the strategy laid out in NSC 68, which relied on both nuclear weapons and a large Army, to a strategy very reliant on nuclear weapons that were to be delivered more often by missile than by bomber.

New Look. When General Dwight Eisenhower ran for president in 1952, he expressed dissatisfaction with Truman's containment policy, arguing instead of the liberation of "enslaved nations of the world." [18] Eisenhower and his future Secretary of State, John Foster Dulles, believed that containment was not designed to achieve victory over the Communist threat, and furthermore, was a costly policy. In spite of this rhetoric, however, the policies associated with the Eisenhower's administration showed no basic difference from that of Truman's Containment Policy. As a result, no military action was conducted during the Eisenhower years to liberate a single person. In essence, the

[16] Ambrose, *Rise to Globalism*, 117-121.
[17] Ambrose, *Rise to Globalism*, 116-131.
[18] Ambrose, *Rise to Globalism*, 132.

overall approach to the Communist threat remained the same, though the military policy had changed.[19]

The "New Look," as Eisenhower's military strategy was dubbed, had its birth in the Killian Report. This assessment of the United States' ability to maintain its deterrence policy was released in 1954. Among other things, the report emphasized the need to develop technology and adopt a strategy that would permit the United States to survive a Soviet attack and to be able to retaliate. This strategy led to what was know as Mutually Assured Destruction (MAD), a concept based on the notion that peace between the US and the Soviet Union could be achieved by obtaining a balance in the nuclear arms race, thereby creating a stalemate between the two nations. The MAD logic was based on the premise that as long as either side had enough nuclear weapons to survive an attack and launch a counter strike, neither nation would be willing to initiate the first strike. This led to a constant struggle between the two superpowers either to acquire more nuclear arms or to keep up with the other. Both superpowers worked to develop new weapons technologies, such as multiple independently targetable reentry vehicles (MIRVs), anti-ballistic missiles (ABMs), cruise missiles, etc., as a means to breaking the MAD deadlock. The mounting escalation in nuclear arms and oscillation between the two nations promoted an uneasy peace.[20]

Eisenhower's New Look rejected the high military spending advocated in NSC 68, but supported the other principles of containment. Rather than the large conventional military envisioned under NSC 68, the New Look emphasized the nation's ability to build and use nuclear weapons as a deterrent. As nuclear weapons were cheaper and more powerful than conventional forces, Eisenhower felt the threat of nuclear annihilation would balance the Soviet Union's numerically superior, but costlier-to-maintain, conventional forces. Dulles named this strategy Massive Retaliation, where any military engagement involving the US would result in the introduction of nuclear weapons onto the battlefield. Even as the strategy was being clarified, serious problems in implementation surfaced. For example, because of the nation's reliance on nuclear weapons, the United States was limited in its ability to support French Foreign Legion paratroopers during the siege of Dien Bien Phu in South Vietnam.[21] Many foreign policy and defense experts were critical of the lack of flexibility that the massive retaliation, or the MAD, policy provided.

---

[19] Ambrose, *Rise to Globalism*, 133-135.

[20] Ambrose, *Rise to Globalism*, 138; K. Lewis and K.J. Roxlau, "Historic Context of the Cold War from the Perspective of Air Power," in *A Systemic Study of Air Combat Command Cold War Material Culture, Volume I: Historic Context and Methodology for Assessment*, edited by K. Lewis, K.J. Roxlau, L.E. Rhodes, P. Boyer, and J.S. Murphey (Albuquerque: Mariah Associates, Inc., 1995), 30-40; Russell F. Weigley, *The American Way of War: A History of United States Military Strategy and Policy* (Bloomington: Indiana University Press , 1973), 403-404.

[21] Ambrose, *Rise to Globalism*, 136-141; Tindall and Shi, *America: A Narrative History,* 1369-1370.

To make up for the small size of the American conventional forces, Dulles began to create coalitions with allied nations as a means of supplementing the American military. In addition to the earlier creation of the Western European defense alliance (NATO) in 1949, the US entered into similar mutual defense agreements with nations of the Pacific Rim, the Middle East, and Asia. These alliances formed an actual containment ring of American client states around the Soviet Union. As part of the alliance system, the US military was tasked with supplying military equipment and training to foreign forces.[22]

During the late 1950s, several international crises ensued. In 1956, the Middle East erupted in violence over a British and French plan to seize the Egyptian-controlled Suez Canal. The US, however, did not support the Europeans, and the plan was quickly abandoned. During the same time, the Soviet Union cracked down on the rebellious Hungarian government that was flirting with Western reforms. International opinion of the United States, which fell when the US did not challenge Soviet aggression in Hungary and failed to support its European allies in the Suez, continued to suffer in the late 1950s after the Soviet launch of Sputnik, the first satellite, and the downing of an American U-2 spy plane over the USSR.[23]

As with international events, domestic events also affected the nation's defense policy. The Eisenhower presidency was characterized by a very conservative fiscal policy that was not just limited to domestic programs, but also to the Defense Department. In 1957, in an attempt to head off an economic downturn, President Eisenhower and Congress became embattled in a budget dispute that led to a cut in the defense budget.

The Vietnam War, 1964-1973. The decades of the 1960s and the early years of the 1970s were overshadowed within both the public and military domains by US involvement in Vietnam, which had been undertaken as part of the country's commitment to containing Communism throughout the world. The public at large became consciously aware of the struggle between South Vietnam and communist North Vietnam in August 1964 when President Lyndon B. Johnson announced on national television that the North Vietnamese had attacked two American destroyers in the Gulf of Tonkin. United States involvement in Southeast Asia actually began, however, as early as the Truman administration. Eisenhower continued the US involvement by supporting South Vietnam through money and military advisors when the French backed out of Indochina in 1954.[24] Unbeknownst to anyone at the time, Eisenhower had set the stage for a protracted conflict that would consume the Kennedy, Johnson, and Nixon administration.

Kennedy continued the policy toward South Vietnam set forth by Eisenhower, but the situation became increasingly tense when Ngo Dinh Diem took over the leadership of

---

[22] Ambrose, *Rise to Globalism*, 144-145.
[23] Ambrose, *Rise to Globalism*, 155-180.
[24] J.R. Oakley, *God's Country: American in the Fifties* (New York: December Books, 1990), 216-217.

South Vietnam. Autocratic, aloof to the deteriorating condition of the peasant class, and repressive toward Buddhists, the South Vietnamese premier failed to garner the support of his people, leaving the United States to back an unpopular leader who was incapable of uniting his country. The United Stats had hoped for a strong leader who could facilitate South Vietnam's independence and allow the United States to withdraw its support. Instead, Kennedy was compelled to increase the number of advisers by nearly 14,000, and the administration quietly turned its heard when South Vietnamese generals staged a successful coup d'état, thereby eliminating Diem. Concerned that the United States was already sliding into an intractable position, Kennedy announced prior to his assassination in November 1963 that South Vietnam would have to win its own war and that the United States would withdraw by the end of 1965. Instead of withdrawing that year, the nation's military commitment to South Vietnam escalated.

Johnson, who took over the presidency with a pledge echoing that of Kennedy, had changed his course of action by the end of 1965 "the first year that the United States became directly involved" and 184,000 troops were stationed in Vietnam. This turning point in Johnson's policy followed the Vietcong killing of eight, and wounding of 126, Americans at Pleiku in February 1965. Soon after, Americans were attacked again, prompting Johnson to order Operation Rolling Thunder (the bombing of North Vietnam). By March 1965, Gen. William C. Westmoreland, the American Army Commander in Vietnam, received the first America combat troops in South Vietnam. No longer would South Vietnam rely on military advisors. The conflict had now taken a new turn with South Vietnam receiving the assistance of thousands of United States troops. Over the next few years, the number of military men and women sent to South Vietnam rose to alarming figures. By the end of 1966, 385,000 troops were in South Vietnam; that number expanded to 542,000.[25] The Vietnam War took its toll on Johnson, as is evident by his surprise announcement in March 1968 that he would not seek reelection. Johnson despaired over a war that eclipsed his social improvement programs. Thought he vowed to fight a "war on poverty," by 1968 the amount of federal money spent for poverty programs averaged $53 per person, while at the same time, the United States spent $322,000 on every communist North Vietnamese or Viet Cong killed.[26]

The Vietnam War ended under the Nixon administration. Campaigning under the rubric, "peace with honor," Richard Nixon claimed to have a plan for ending the war. However, he initiated a gradual withdrawal of troops and engaged in negotiation for ending the conflict, at the same time he increased the number of bombings in an effort to force the North Vietnamese and Viet Cong to accept the terms for peace offered by the United States. Unable to convince the North Vietnamese president, Nguyen Van Thief, negotiations stalled. Fighting continued while events at home and in Vietnam spiraled out of control. Alarmed by violence, unrest, and concerned with the upcoming

---

[25] Tindall and Shi, *America: A Narrative History,* 1409-1411, 1425-1426.
[26] Tindall and Shi, *America: A Narrative History*, 1429-1430.

presidential election, Nixon sent his special assistance, Dr. Henry Kissinger, to a series of private meetings with North Vietnamese in 1972.[27]

On 27 January 1973, the United States signed an agreement with the North Vietnamese to end the war. Through peace was a welcome relief, the terms of agreement favored the North Vietnamese stance, which meant that they would maintain troops in South Vietnam and continue efforts to unite the two nations under one communist government. South Vietnam had agreed to such terms on the condition that the United States would respond to treaty violations by North Vietnam. Within two months of the signing, though, South Vietnam was battling North Vietnam once again, but without the aid of the Untied States after Congress refused to provide assistance. A Communist victory was inevitable. Thus, after years of effort, after the sacrifice of more than 58,000 American lives, 25,000 American missing in action, nearly 100,000 veterans returning home with missing limbs, 150,000 addicted to drugs and alcohol, and violent demonstrations at home having taken their toll, it was clear that the involvement of the Untied States in Vietnam had been at a cost far beyond the imagination of anyone.[28]

Detente (1972-1976). While the Vietnam War monopolized most of the nation's foreign policy attention during the late 1960s and early 1970s, the Nixon administration also focused heavily on reaching a state of detente with both the Soviet Union and China. These attempts to reduce the hostility between the East and the West were a dramatic change in the United States' Cold War policy, which had previously focused on containing Communist expansion. Although tensions between the United States and Soviet Union remained high, there was definitely a warming trend as each country strove to establish a stable, strategic balance in nuclear arms.

Improvements in US/Soviet relations began as early as 1963 when the Limited Test Ban Treaty, outlawing aboveground nuclear testing, was signed. That treaty was followed by the Outer Space Treaty I 1967 that limited the military use of space, thereby helping to avoid the possibility of a space arms race. Finally, in 1968, the United States and the Soviet Union began engaging in the Strategic Arms Limitation Talks (SALT) to address the rapid expansion of both nations' strategic arsenal.[29]

Although this time is marked by diplomatic successes, the actual threat of nuclear warfare increased during the period of detente. For example while aboveground tests were outlawed in 1963, that same year, the second-generation of American ICBMs were deployed and President Kennedy was assassinated. In 1966, the Soviets adopted the first ABM system, thereby risking the uneasy peace dependent on MAD. In that same year, the US deployed the first MIRVs on ICBMs. This new weapon allowed a greater number of warheads, each targeted at a separated location, to be used in a single

[27] Tindall and Shi, *America: A Narrative History*, 1459-1465.
[28] Tindall and Shi, *America: A Narrative History*, 1459-1465.
[29] Lewis and Roxlau, "Historic Context of the Cold War from the Perspective of Air Power," 40-43.

weapon. Finally, in 1968, the US and the Soviet Union reached a strategic parity of weapons.[30]

Detente was a period in which new diplomatic relations were established, thereby, altering the policies between the superpowers. In 1971, Dr. Henry Kissinger, National Security advisor, conducted a series of secret conferences with Communist Chinese government to discuss the possibility of the US officially recognizing the Communist government. Since 1949, the United States had recognized only the Nationalist government of Taiwan as the legitimate Chinese government. In 1972, President Nixon visited Mainland China, initiating the process toward full diplomatic recognition that would finally take place during the Carter Administration. Of particular significance was that Nixon engaged in this diplomatic process without any serious outside pressure from other officials lobbying for better relations with China. Nixon, who rose to prominence as an anticommunist in the 1950s, felt that he could open diplomatic relations with China without any fear of being labeled weak on Communism. Besides being a successful venture in public relations, warming relations between the US and the Chinese Communists widened the growing divide between Beijing and Moscow. The Sino-Soviet alliance was already fragile because of historic difference between the two nations.[31]

In another diplomatic success, Nixon traveled to Moscow to meet with Leonid Brezhnev in 1973. The meeting resulted in a fundamental change in the Cold War. The leaders signed the SALT I treaty, which limited the number of ICBMs that either side could possess. The agreement allowed the Soviet Union to deploy more missiles, but the US was allowed more warheads. The meeting also led to other arms control talks and agreements.[32]

The End of the Cold War. The end of US fighting in Vietnam in 1973 and the advent of the all-volunteer Army brought changes to the Army's recruitment methods. Because of the loss in Vietnam and other internal and external problems, the US Army instigated various changes in the Army culture to make the service more palatable to volunteers. The Army consolidated forces into new commands in 1973, such as Training and Doctrine Command (TRADOC) and Forces Command (FORSCOM); instituted the revolutionary AirLand Battle doctrine; and began procurement of new weapons systems. They also closed several older and smaller bases and consolidated troop strength into fewer but larger bases.

As the 1980s approached, international events turned suddenly away from the peace of Détente. In 1979, the US-friendly Iranian government fell to an Islamic theocracy. Iranian students captured the American embassy and held the staff hostage for 444

---

[30] Lewis and Roxlau, "Historic Context of the Cold War from the Perspective of Air Power," 40-43.
[31] Ambrose, *Rise to Globalism*, 245-247.
[32] Ambrose, *Rise to Globalism*, 247-248.

days. The Soviet Union, taking advantage of political chaos in Iran, invaded neighboring Afghanistan, beginning a decade long war. Polish authorities instituted martial law to crack down on the *Solidarity* labor union. Cuban sponsored Sandinista insurgents seized control of Nicaragua in Central America. In response to the Soviet aggression, President Jimmy Carter ended support for SALT II with the USSR, boycotted the Summer Olympics in Moscow, and reinstituted selective service registration. He also provided US weapons and advisors to the military government of El Salvador in January 1981, which was facing a Nicaraguan-supported guerilla war; and supported the *Mujahideen* rebels in Afghanistan. A new era of the Cold War began.[33]

In early 1981, newly elected President Ronald Reagan began an aggressive policy of containment of Communism that translated into a buildup of US military strength and active support of anti-Communist regimes worldwide. Congress authorized funding to continue improving existing US military bases and to expand military support for friendly governments around the globe, especially in Central America. This latter initiative provided Mobile District the opportunity to expand its Military Construction work into several Central American countries, though not without a degree of political controversy.

The new Cold War did not last, and in the latter 1980s, breathtaking events surprised the US leaders. In the mid-1980s, a new Soviet leader, Mikhail Gorbachev took power. Unlike the hard-liners before him, Gorbachev saw the need to reform his nation's collapsing economic and social leadership and waning world influence. He initiated the new policies of *perestroika* (restructuring of the Soviet economy) and *glasnost* (openness). Winning leaders of the Western democracies with his friendly personality and ideas about change, Gorbachev began to allow open dissent and negotiated real nuclear arms limitations with Reagan (Ambrose 1991:344-349).

Gorbachev's reforms caused the break-up of the Soviet bloc. In 1989, Soviet troops withdrew from Eastern bloc countries; allowing the formation of democracies and the opening of their borders to the West. This opening of the Iron Curtain was symbolized in November 1989, when East and West Germans tore down the Berlin Wall that separated them for 28 years. By 1991, democracies replaced every Communist government in Europe, including the former Soviet Union. Additionally, the end of the Cold War halted many of the leftist revolutionary movements in Central America as the governments negotiated an end to hostilities and a commitment to democratize their nations. Unfortunately, the wave of democracy did not reach every corner of the world. In June 1989, a student-led democracy movement intent on peacefully bringing a change to the Peoples Republic of China was crushed by the Chinese Army. In addition, a group of Islamic radicals, the Taliban, took control of Afghanistan after the Soviet withdrawal. Furthermore, ethnic hostilities, kept in check by the Communists, boiled up

---

[33] Ambrose, *Rise to Globalism*, 293-314.

in the former states of Yugoslavia. While one challenge for the US ended, several others were on the rise.

In the late 1980s and throughout the 1990s, the US Congress, sensing the changes in the world, took advantage of the promise of peace and passed several Base Realignment and Closure Acts beginning in 1988. Essentially the acts scaled back US military presence at home and abroad, and made arrangements for permanently closing and disposing of many of the antiquated bases. Although Congress focused on reducing military spending, the law also included realigning commands and operations and thus provided opportunities for construction projects at several consolidated bases. One of the hallmarks of this reorganization was the Goldwater-Nichols Department of Defense Reorganization Act of 1986 (PL 99-433) which created unified regional commands and streamlined the military chain of command, so that it now runs from the President through the Secretary of Defense directly to unified combat commanders, bypassing the Joint Chiefs of Staff, who were assigned an advisory role.

THE DEVELOPMENT OF THE NATIONAL STOCKPILE SITE - Q AREAS

After the American's deployment of atomic weapons during World War II, and the change of American strategy from relying on conventional forces to atomic weapons and airpower, the US military began a program to develop weapons storage sites (Q Areas) across the nation to store atomic weapons near airbases and other important sites. Clarksville Base was one of these early atomic weapons storage sites. Dr. Karen Weitze has prepared numerous studies of Q Areas as part studies for the Army and the Air Force, and these reports serve as the basis for this brief history of the development of the Q Areas. For more in-depth information on Q Areas, Weitze's studies provide the most comprehensive work.

As one of the first national stockpile sites for nuclear weapons, ammunition storage facilities at Clarksville represent a rare assemblage of facilities associated with the development of the country's nuclear arsenal during the 1950s and 1960s.

The Establishment of the National Stockpile Sites. In 1946, the Atomic Energy Commission (AEC) was created and took over the operations of the Manhattan Engineer District at the Albuquerque Air Field, New Mexico. The airfield was renamed Sandia Base, after a neighboring mountain. In 1947, Sandia Base was taken over by the Armed Forces Special Weapons Project (AFSWP), and utilized to teach personnel how to construct nuclear bombs. In 1949, the Navy organized a Naval Air Detachment at Kirtland to establish a relationship and advance the Navy's nuclear capacity.[34]

Because nuclear weapons changed the US military strategy, the military had to develop a means to maintain the stockpile of nuclear weapons. Stockpiling of the atomic bomb

---

[34] Doerrfeld and Gatewood, *Air Force Ammunition And Explosives Storage & Unaccompanied Personnel Housing During The Cold War (1946-1989) Site Report*, 12.

began slowly, with only 13 bombs in the entire arsenal in 1947; 56 in 1948; and 298 by mid-1950. The leap came during the Korean conflict; the stockpiles reached 832 bombs. In 1955, the United States had an inventory of 2,280 nuclear (atomic and thermonuclear) bombs. During the late 1940s, the military decided that in order for America to maintain their presence as a force during the Cold War, they must establish a nuclear stockpile. The storage areas, designated as "Q area" storage sites, would be located at various locations around the country; the task of creating the areas was called *Project Water Supply*.[35]

The original concept for the storage of atomic weapons was to construct and operate only three national stockpile sites. In the event of a full-scale deployment of atomic weapons, aircraft at selected Strategic Air Command (SAC) bases would to travel to a national stockpile site to be armed with nuclear weapons, then proceed to its target. The time required to accomplish this led SAC to estimate that it could not penetrate Soviet radar with a mass strike force in less than 36 hours. The escalated Cold War tensions with Communist nations combined with the invasion of South Korea by the Chinese-backed government to the north, made it clear that an alternative solution was needed. The operational storage sites, located within the United States and at bases hosted by European allies, reduced the time needed to get planes in the air to six hours; eventually, with the development of the ready-alert concept, that time would be reduced to 15 minutes.[36]

The AFSWP oversaw these stockpile sites, commonly known as Q Areas. The civilian AFSWP—later developed into the Defense Atomic Support Agency (DASA) and today the Defense Nuclear Agency (DNA)—oversaw the selected Air Force, Army, and Navy nuclear facilities during the first years of the Cold War, paralleling jurisdiction of the AEC. The Q Areas was named for the Q clearance, which required a full Federal Bureau of Investigation check for all personnel—AEC, AFSWP, or contractor—with access to restricted data or excluded areas.[37]

The strategy behind the Q Areas was to disperse them geographically placing them near a military reservation. Two types of Q Areas existed historically: operational storage sites (OSS) and main stockpiles. Although both types contained similar infrastructural components, the OSS were alert facilities assigned the task of achieving a maximum war effort in a number of hours. The stockpiled atomic and nuclear weapons of the 1950s required facilities for the storage and testing of detonators (pits); the assembly and

---

[35] Doerrfeld and Gatewood, *Air Force Ammunition And Explosives Storage & Unaccompanied Personnel Housing During The Cold War (1946-1989) Site Report*, 13; Karen Weitze, *Cold War Infrastructure For Strategic Air Command: The Bomber Mission* (Langley Air Force Base, Virginia: Headquarters, Air Combat Command, 1999), 98-99.
[36] Rebecca Gatewood and Dean A. Doerrfeld, *Air Force Ammunition And Explosives Storage & Unaccompanied Personnel Housing During The Cold War (1946-1989) Site Report: Lackland Air Force Base, San Antonio, Texas. Draft* (Frederick, Maryland: R. Christopher Goodwin & Associates, Inc.,, 2008), 15-16.
[37] Weitze, *Cold War Infrastructure For Strategic Air Command*, 98-99.

disassembly of training bombs for SAC crews; training alerts inclusive of convoying a training weapon to a SAC bomber on the flight line; laboratory capabilities; a command post; ready crew quarters; radioactive dump sites; and, ancillary units such as power and fire stations. The Q Areas were heavily guarded sites with separate security forces and distinct from the adjacent base. The US military housed the military personnel working at the Q Area immediate near each Q Area.[38]

In the late 1940s, the US government established the National Stockpile Sites (NSSs) as the primary location for the growing atomic weapons stockpile. The first was at Killeen Base, near Fort Hood, in March 1948. The design for specific for the underground facilities, including the A chambers in the underground plants, occurred first for Killeen Base, and later was adapted for Clarksville Base as well as Killeen Base.[39]

Management of Q Areas. The Q Areas were initially managed by the Sandia Corporation of Albuquerque, New Mexico. Weitze details that Sandia Corporation was created out of the Z Division of Sandia Laboratory.[40] The Z Division was named for Jerrold R. Zacharias, a physicist who had been brought to the project from the Massachusetts Institute of Technology's Radiation Laboratory by J. Robert Oppenheimer in mid-1945. The Z Division was organized as numbered groups, including the Z-7 (assembly) and Z-9 (stockpiling). The Z Division became the Sandia Base, which assumed the responsibility for the engineering details, production sites, and military-assisted assembly, testing, and maintenance of ready-state atomic weapons in 1947. The first four sites were NSS, and were built before 1950. [41]

The AFSWP used alpha-coded names for all of the NSSs, with a break in the alpha sequencing for overseas locations. Sandia Base initiated construction of the OSS, the physically smaller alert facilities of key strategic importance, in 1950. The first five OSS were set up by Sandia immediately neighboring selected SAC bases. These OSS Q Areas were Caribou Air Force Station (AFS) [Site E] at Loring AFB (Maine); Rushmore AFS [Site F] at Ellsworth AFB (South Dakota); Deep Creek AFS [Site G] at Fairchild AFB (Washington); Fairfield AFS [Site H] at Travis AFB (California); and, Stonybrook AFS [Site I] at Westover AFB (Massachusetts). Total US continental Q Area sites, inclusive of main stockpile installations and operational storage (alert) sites, was 13. In 1962, the Air Force achieved full control of the Q Areas neighboring its installations through SAC.

The AFSWP did not confine construction of Q Areas to the United States. By August 1950, the AFSWP had planned and instituted seven operational storage sites on foreign soil.

---

[38] Weitze, *Cold War Infrastructure For Strategic Air Command*, 98-99
[39] Karen Weitze, *Cold War Properties at West Fort Hood, Texas: Research Overview And Preliminary Identification* (Austin, Texas: Prewitt and Associates, Inc., Cultural Resources Services, 2005), 1.
[40] Weitze, *Cold War Infrastructure For Strategic Air Command*, 99.
[41] Weitze, *Cold War Infrastructure For Strategic Air Command*, 99.

Designers of Q Areas. To design all of the Q Areas, the government turned to a single engineering firm, Black & Veatch of Kansas City. During World War II, Black & Veatch had worked for the US government designing specialized facilities including all of the architect-engineer services for the original planning of Los Alamos. Ernest Bateman Black and Nathan Thomas Veatch, Jr., had founded the firm in 1915, and originally specialized in city water, sewage disposal, and power systems projects across Kansas. During World War I, Black & Veatch was one of the firms selected to provide the engineering design for US military camps. Beginning in the late 1920s, Thomas Veatch became close friends with then county judge Harry S. Truman. Truman would remain friends with the members of the firm. It was during the Truman term in office, 1948 to 1952, that the firm established itself as the leader in design of special weapons storage facilities. Black & Veatch's Design Group 115 designed the entire Q Areas project. Black & Veatch later designed missile checkout and assembly structures and heightened military security systems.[42]

The Air Force Directorate of Installations (later, the Directorate of Civil Engineering) made explicit references to the development of design and engineering standards for the nuclear weapons depots between 1952 and 1956. Funding for fiscal year 1953 was roughly five million dollars for three planned Q Areas, with three other special weapons depots actively in the design and construction process. The Air Force anticipated that four of the first Q Areas would be fully completed by the close of 1953. That year Black & Veatch prepared the definitive drawings and facilities criteria that "would identify to the major commands, the construction requirements to support the Air Force Atomic Energy program throughout the world…These definitive drawings and other pertinent information will be incorporated into a brochure for distribution to major commands".[43]

In late summer of 1954, the Air Force planned for new SAC special weapons storage facilities. The Air Force met with Black & Veatch officials to design the new facilities. The next month, the Assistant Chief of Staff, Installations approved the schedule for a second-tier SAC program of special weapons storage design and construction. In early 1955, the Armed Services and Appropriations Committees gave their approval to the SAC special weapons storage program the necessary clearances. The Secretary of Defense, the Joint Chiefs of Staff, and the AFSWP staff produced and received memoranda discussing the "responsibilities for the provision of Zone of Interior atomic weapon storage facilities." By the end of 1956, 15 of the Q Areas were considered fully complete and approved, with the remaining five Q Areas anticipated to achieve the same status by June 1957.[44]

---

[42] Weitze, *Cold War Infrastructure For Strategic Air Command*, 106.
[43] Weitze, *Cold War Infrastructure For Strategic Air Command*, 106-107.
[44] Weitze, *Cold War Infrastructure For Strategic Air Command*, 106-107.

Maintenance of Nuclear Weapons at the Q Area. To understand Q Area facilities, and the Cold War missions of Clarksville Base, one must understand the basics of nuclear weapons and the buildings and activities of an operational Q Area.

> The earliest atomic weapons are considered fission bombs where a slightly sub-critical mass of radioactive material, primarily plutonium, becomes critical by imploding the material, creating an almost instantaneous chain reaction by bombarding the molecular nuclei with neutrons causing them to split releasing large amounts of energy; a process called fission…The spherical mass of plutonium is also called the "capsule" or "pit." The implosion is created by detonating carefully formed "lenses" of explosive material that surrounds the spherical mass. To successfully initiate fission, the pit was not only compressed, but additional neutrons were introduced to start the reaction. This was accomplished by inserting an initiator into the center of the capsule.
>
> Generally, the capsules were stored separately from the explosive component of the weapon, and were not inserted until the bomb was needed. While in storage, the capsules required regular maintenance. The spherical mass of plutonium would oxidize and required cleaning. Additionally, the early initiators used polonium and beryllium. To accomplish this, each storage site required specialized buildings to store the capsules and perform necessary maintenance. At the other two early national stockpile sites, the facilities were a combination of underground and aboveground buildings. Referred to as Plant 1, all facilities needed for maintenance of the weapons, inert storage, administrative areas, break and change rooms, emergency generators, and support facilities were located deep within the mountainside. The work areas and interconnecting tunnels were of reinforced concrete with vertical side walls and arched roofs; very similar in appearance to an earth-covered igloo magazine... Storage of capsules took place in facilities referred to as "A Structures." Special security measures were incorporated into the construction of Plant 1 and the areas used for storage of capsules …These included heavy bank-type vault doors. Additional security for the nuclear material was provided by each door having two combination locks; no single person knew both combinations. This level of security was required to prevent tampering with the capsules, but also because it was reported that the manufacture of plutonium made up a significant part of the nation's Gross National Product in the early 1950s. Each cell measures approximately 10 feet wide, 13 feet long, and 9 feet high. The cells are fitted with steel shelves where the nuclear material was stored. The capsules were contained within steel cylinders supported by a steel framework referred to as a bird cage. The bird cages were specially designed to maintain a safe distance between each plutonium sphere; if

the materials were placed too close together, they may approach a critical state. Each cell could hold about 30 capsules contained in individual bird cages.

Periodically, each capsule was removed from the A-Structure and taken to a maintenance facility called a "C-Structure." Each lab originally had wooden benches where the maintenance work was performed. Maintenance of the capsule included carefully removing it from its container, placing a Plexiglas glove box over the capsule, and then unscrewing a plug of machined plutonium from the sphere. The initiator was then removed from the core of the capsule and a new one inserted. The plug was put back into place and the sphere cleaned of any oxidation. The initiators were manufactured at Sandia Labs in New Mexico, and the used items were packaged and returned to the lab for refurbishment. To insure the viability of the nuclear core, it was necessary to periodically measure the intensity of the nuclear material with a radioactive source. Known as sources, these contained neutron-emitting radioactive materials, that when moved closer to the plutonium sphere, would excite the plutonium sphere; and a Geiger counter could monitor the activity. While many C Structures contained floor safes to secure the sources, Plant 1 shows no indication of a source safe, and it is possible that a moveable device was used. After maintenance, the capsule was placed back in its cylinder within the bird cage, the lid secured with a lead seal, and the container pressurized with inert gas. It was then transported back to the A-Structure. Sealed initiators, developed between 1954 and 1957, replaced the polonium-beryllium type and lessened maintenance on capsules to annual inspections. By 1962, capsules themselves were phased out of the nuclear stockpile, and C-Structures were no longer used. Q Areas also contained buildings for the maintenance of the non-nuclear components of the weapons. These were located in other rooms of Plant 1.[45]

Development of Clarksville Base

Clarksville Base is located entirely within the boundary of Fort Campbell. It was the second of the thirteen early atomic weapons storage facilities established by the AEC and the AFSWP. Clarksville was partially an underground base, and partly an aboveground base. The facilities at Clarksville for storing and maintaining the weapons and their components included original construction and conversions: ten "A" Structures (three original, seven converted from underground igloos), two "C" Structures (one in a tunnel complex, one aboveground), two assembly/maintenance

---

[45] Doerrfeld and Gatewood, *Air Force Ammunition And Explosives Storage & Unaccompanied Personnel Housing During The Cold War (1946-1989) Site Report*, 19-21.

plants (both aboveground), 16 storage igloos (mixed above- and belowground), and one aboveground "S" Structure. The engineering firm of Black and Veatch was responsible for all the designs and architectural drawings for Clarksville Base. Black and Veatch had laid out the plans as early as 1947, as indicated by early architectural and construction drawings (Figures 2 and 3). The actual construction began in 1948, and the first nuclear weapons arrived at Clarksville in July 1949.[46]

Decision to Build Clarksville Base. Black & Veatch began the design of two NSSs in late 1946, and followed with the design of Clarksville Base in the spring of 1948. Construction time for all three was long, and the achievement of partial operational capability at the sites differed. The three NSSs each feature important underground compounds. The basic idea was to have two redundant systems so that if the enemy destroyed one, the other could still function. At Clarksville Base, only a portion of the plant remained belowground: the storage and maintenance-surveillance buildings for the nuclear materiel of pits and initiators (the A, B, and C Structures). Black & Veatch designed the other chambers of the plant at Clarksville Base as a group of aboveground buildings, although most were very heavily protected by surrounding earthen berms. Clarksville Base also had a group of bedrock igloos. The Clarksville NSS was a transitional design to the NSSs and OSSs that followed in 1950–1951.

[46] Daniel R Bilderback and Michael S. Binder, *Early DoD-Sited Nuclear Warhead Infrastructure* (Columbia, South Carolina, and Dallas, Texas: Department of History, University of South Carolina and MILSITE RECON, 1999); Chanchani and Leary, *Clarksville Base Historic District Inventory and Management Plan. BHE-DACA27-01-D-0004, Delivery Order # 0023.*, 4.

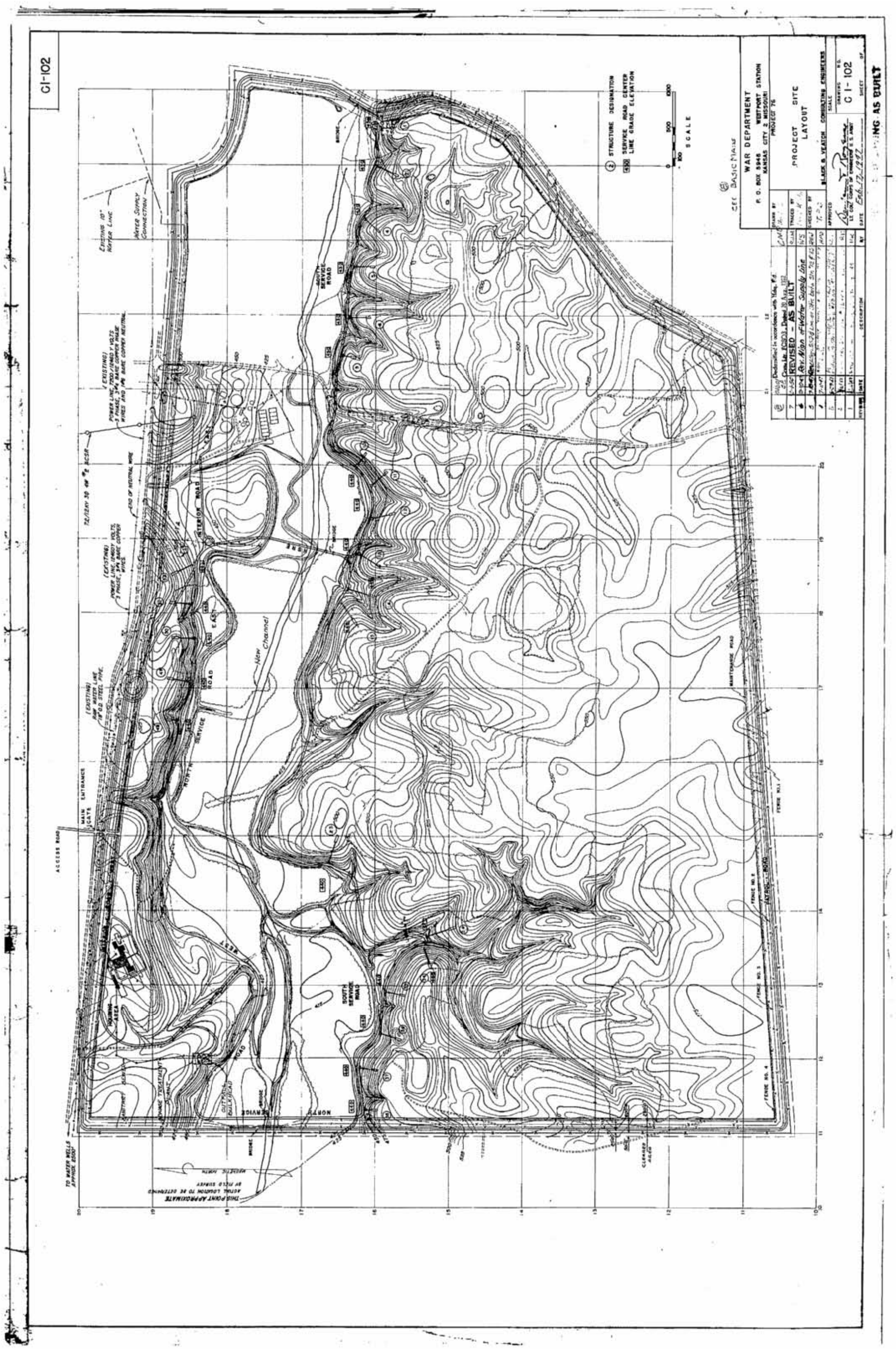

Figure 2. Clarksville Base Drawing No. C1-102: Project 76 Project Site Layout, executed by Black and Veatch, 1947 (revised 1950) (Chanchani and Leary 2006).

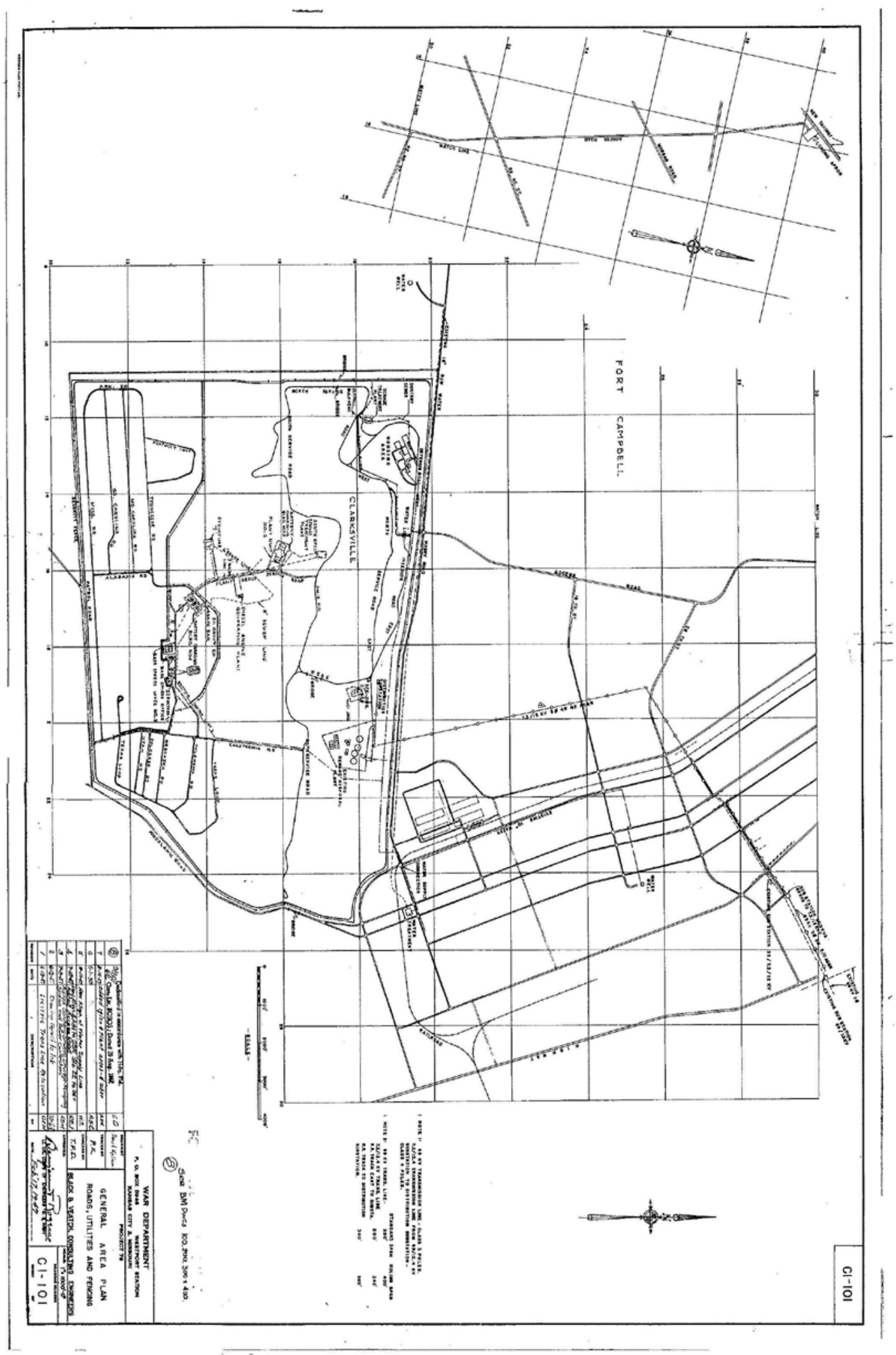

Figure 3. Clarksville Base Drawing No. C1-101: Project 76 General Area Plan, executed by Black and Veatch, 1947 (revised 1957) (Chanchani and Leary 2006).

Initial Construction at Clarksville Base to 1950. After World War II, the US Army kept Camp Campbell in service and in 1950, redesignated it as Fort Campbell, a permanent Army post. During World War II, the camp was used as a training ground for Army units.[47] Figure 4 provides an aerial photograph of the Clarksville Base area from 1941. Notice there was no real development at the site. After the war, the camp was retained by the US Army and housed the 11th Airborne Division.

The current authors could not locate in unclassified reports why Fort Campbell was chosen to host an early storage site. However, an examination of the area might provide clues. The base was located in a rural area, and far from any urban areas that might be a target of bombing. In addition, the camp had a railroad line and airfield. With the railway line that extended to the airfield, and the proximity to the highway system, the post appeared to have been well placed for the transportation of materials.[48] As mentioned above, Weitze is preparing a history of Sites Able, Baker, Charlie, and Dog and might provide an answer to why Clarksville was selected.

After its establishment, the Air Force took over operational responsibility for Clarksville Base at Fort Campbell from its opening in 1949 until 1952. The base was under the command of the 580th Aviation Squadron. In September 1952, the 580th Aviation Squadron left Clarksville Base. With the Air Force gone, Clarksville Base was turned over to the Navy who operated it for much of its time.[49]

After laying out of the plans for the base, the Sandia Corporation began construction work on the project. By 1949, the AFSWP had constructed only a few structures at Clarksville Base. Fort Campbell Real Property data indicate that only three structures (Buildings 7834, 7882, and 7873) were constructed prior to 1949. While small in number, they represented the core of the atomic weapons storage mission. These buildings and structures constituted the primary weapons maintenance facilities, and are among the earliest buildings and structures constructed at Clarksville Base. The M-Structure was located at the building 7873, with the H and K chambers in the nearby structure 7882. The chambers E, F, and G were located in building 7834, which is identified as the Plant I Structure.[50] Table 1 lists the current buildings at Clarksville Base from the period to 1950.

In addition to new buildings, the AFSWP also changed the landscape of the base to fit the needs of the mission. For example, before the construction of Clarksville Base, West Fork Creek meandered through the area, turning sharply north, flowing close to the location of the present day Georgia Road, and then turning sharply south to first flow

---

[47] see Clyde L. Jonas, "Camp Campbell, Kentucky: A History of Construction and Occupation During World War II," MA Thesis, Austin Peay University, 1973.

[48] Chanchani, Konicki, and Sweeten, *The Historic Context For The Cold War at Ft. Campbell, Kentucky*, 26.

[49] Weitze, *Cold War Properties at West Fort Hood*, *Texas,* 30.

[50] Chanchani, Konicki, and Sweeten, *The Historic Context For The Cold War at Ft. Campbell, Kentucky*, 10, 40, 84.

parallel to East End Road before resuming its east-west direction. Drawing No. C1-101 indicated that they planned to create a "New Channel" (see Figure 3). In addition to changing the creek, new roads and infrastructure were created in the base. Prior to the construction of Camp Campbell, there were few roads in the Clarksville Base area. Bridgewater Road went along an east-west direction near the northern portion of the base, intersecting Mabry Road near the Clarksville Base Administration area.[51] New road system, electric, water, and sewer systems were all placed at Clarksville Base. Figures 5 and 6 provide engineering drawings that show the layout of the new infrastructure.

Table 1. Buildings and structures constructed between 1948 and 1950 at Clarksville Base.

Building #	Address	Date	Survey Area	Design Use
7834	South Group/Plant Unit No. 1	1948	Plant Group	Plant I (E, F, G)
7845	South Group	1948	Plant Group	D Structure
7853	South Group	1948	Plant Group	Water Reservoir
7852	South Group	1948	Plant Group	Pump Station
7847	South Group	1948	Plant Group	Above Ground Igloo Storage
7715	Security Post (Guard Shack) on Bridge (ID 224) over West Fork Creek	1949	Boundary	Security Post on Bridge
OCB-16	Perimeter Patrol Road, Western Boundary over West Fork Creek	1949	Boundary	Bridge
OCB-14	Eastern boundary of Clarksville Base over the West Fork Creek	1949	Boundary	Bridge and Security
OCB-13	Perimeter Patrol Road	1949	Boundary	Security, Access Road
7882	South Group	1949	Plant Group	H-K Structure
7873	Plant I Group	1949	Plant Group	M Structure

[51] Chanchani, Konicki, and Sweeten, *The Historic Context For The Cold War at Ft. Campbell, Kentucky*, 22.

Figure 4. A 1941 Aerial Photo of the Clarksville Base area (Chanchani and Leary 2006).

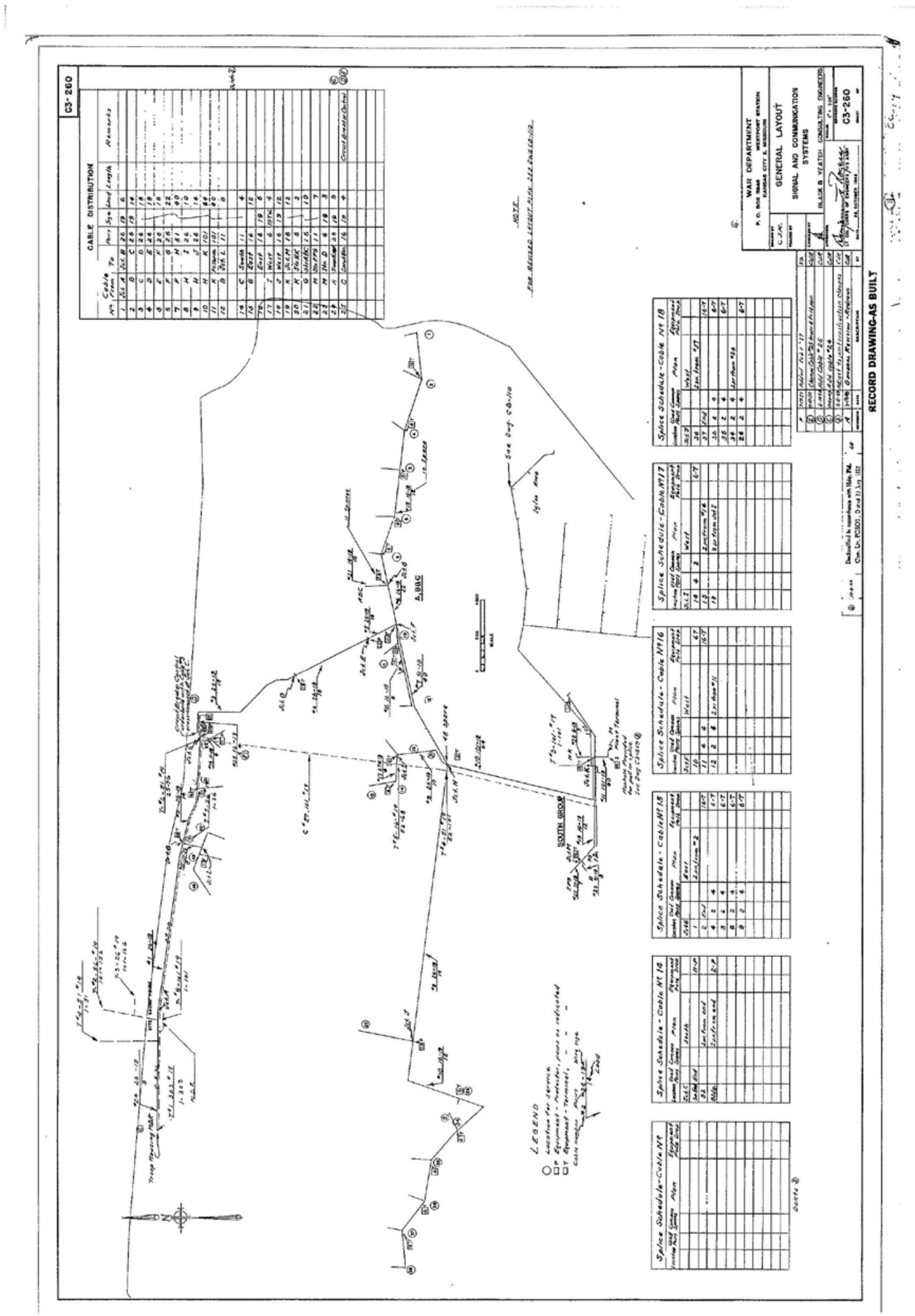

Figure 5. Clarksville Base Drawing No. C3-260: General Layout, Signal, and Communication System (Chanchani and Leary 2006).

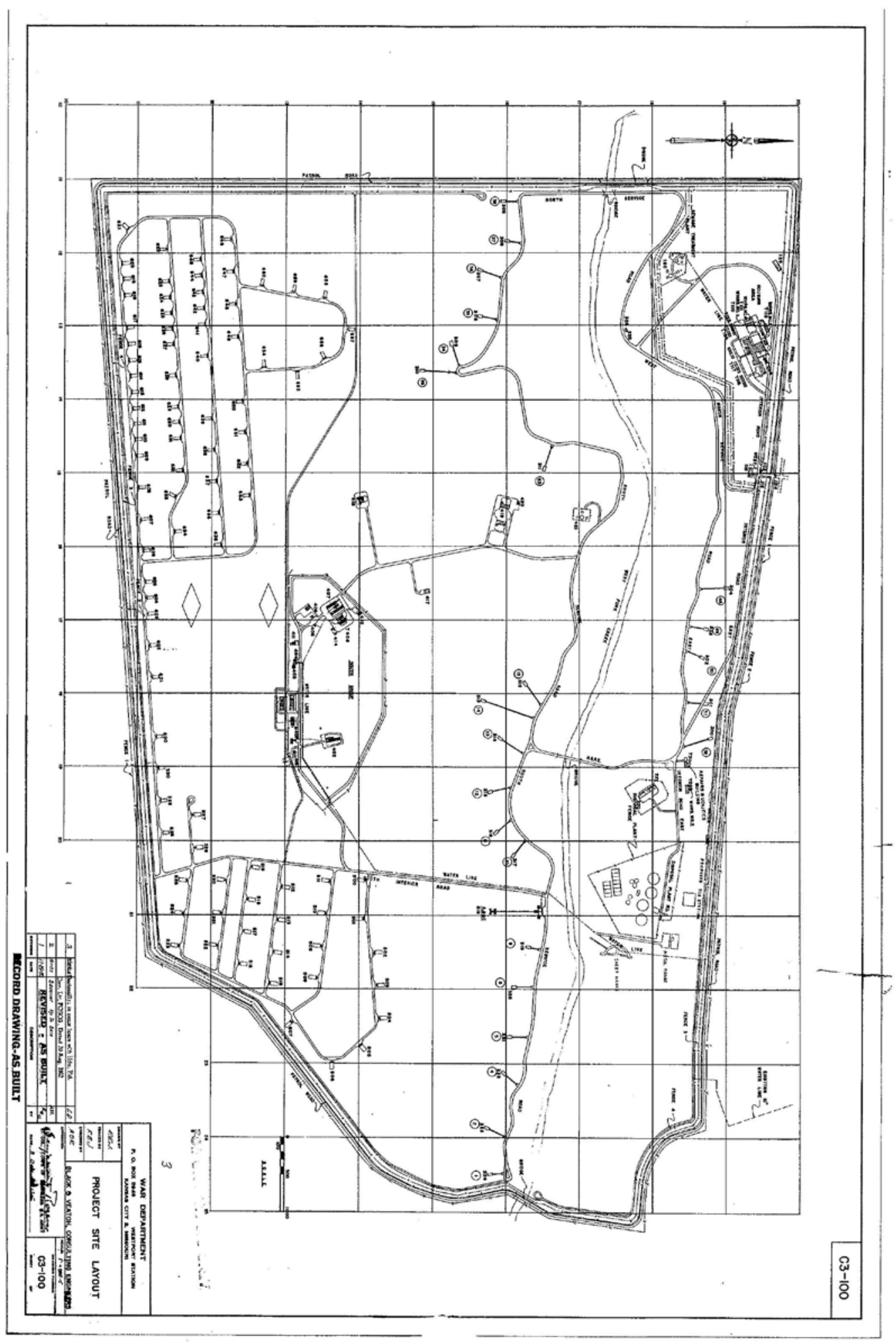

Figure 6. Clarksville Base Drawing No. C1-501: Project Site Layout, Electrical Installations (Chanchani and Leary 2006).

Expansion of Clarksville Base 1950 to 1957. The pattern of construction at Clarksville Base in the early 1950s reflects the development of the American nuclear arsenal itself. As the American stockpile increased to 450 warheads in 1950, the number of storage igloos constructed at Clarksville Base during that year grew to 26. In 1951, the United States had 650 weapons; and the number of storage igloos constructed at Clarksville Base was 27. Additionally, in 1952, the American stockpile had increased to 1,000 weapons; as many as 66 igloos were constructed at Clarksville Base that year. At this point, the storage capacity at Clarksville appeared to have met its operational requirements. The remainder of the construction until the late-1950s was pillbox, maintenance facilities, guardhouses, a church, fire station, barracks, and recreational facilities.[52]

Of course, the heart of the Clarksville Base was the bomb assembly buildings. Black & Veatch labeled these first atomic bomb assembly plants as Plant Facilities or Plant Structures. At Clarksville Base, the Plant Structures included individual aboveground buildings and the underground A-B-C Structures (the latter built as a single cluster).

In addition to the assembly buildings, Black & Veatch designed a second-generation, freestanding, reinforced concrete A Structure aboveground in early 1954 as a part of the new infrastructure for Project Truelove. These A Structures were typically numbered, unlike the A Structures of 1950–1953, a factor in the confusion over their formal names. At Clarksville Base, for example, two A Structures of 1954 are formally called “Structure A-1” and “Structure A-2.”.[53]

In addition to the structures and buildings which were directly associated with the assembly and maintenance of the nuclear weapon components, additional facilities were constructed at Clarksville Base to support the personnel who worked and were stationed there. While Clarksville Base was located at Fort Campbell, it operated separately and provided services to its military personnel. Like Fort Campbell itself, many of the support facilities at Clarksville Base were constructed in the early 1950s during the Korean War build-up. The headquarters building, a fire station, chapel, Post Exchange, barbershop, bowling alley, swimming pool and bathhouse, commissary and mess hall were all included in the administrative area of Clarksville Base. To house the Naval and Marine personnel who were stationed there, they constructed barracks near the administrative part of the base. Other support facilities located throughout sections of Clarksville Base that served both military and civilian personnel working within this facility included maintenance shops, sewage and electrical plants, ammunition storage igloos, and a radio transmission building. A snack bar and canteen were also available

---

[52] Chanchani, Konicki, and Sweeten, *The Historic Context For The Cold War at Ft. Campbell, Kentucky*, 30.
[53] Weitze, *Cold War Properties at West Fort Hood, Texas*, 16.

for the personnel who worked within the facility.[54] Table 2 provides a listing of the buildings at Clarksville Base from 1950 to 1957.

Changes in Mission at Clarksville Base 1958 to 1965. In 1958, the basic mission of Clarksville Base changed when it, along with the Medina Modification Center in San Antonio, Texas, were designated modification centers for atomic weapons. Changes in weapons technology made the initial stockpile plan moot. Because nuclear bombs were becoming more self-contained, they did not need the large infrastructure to prepare them for deployment. In fact, many smaller weapons storage areas were being prepared at SAC bases around the nation.

The engineering firm of Mason and Hanger won the contract to operate both the Clarksville and Medina Modification Centers. The mission of the modification centers was to perform nuclear weapons stockpile surveillance, modifications, retrofits, and weapon retirements. The Medina Modification Center became operational in 1959, while the one in Clarksville went into operation in 1961. While Sandia Laboratory was also involved with operations at the Clarksville Modifications Center, the extent of Sandia's involvement is not clear. However, it can be assumed that Sandia personnel conducted the Quality Assurance and Inspection of weapons at Q Areas, since this was a basic mission of the laboratory.[55]

Table 2. Buildings and structures constructed between 1951 and 1957 at Clarksville Base.

BUILDING #	ADDRESS	DATE	SURVEY AREA	DESIGN USE
7603	Interior Road East	1950		Utilities and Grounds Improvements
7523	Administration Area	1950	Administration	EM Barracks
7526	Administration Area	1950	Administration	Vehicle Maintenance Shop
7527	Administration Area	1950	Administration	Vehicle Maintenance Shop
7572	Administration Area	1950	Administration	Storage Building, General Purpose
7574	Administration Area	1950	Administration	Organizational Storage Building
7576	Administration	1950	Administration	Outdoor Games Court
7577	Administration	1950	Administration	Outdoor Games Court

[54] Gray, Humpt, and Mitchell, *Architectural Survey of the Proposed National Guard Complex on Clarksville Base, Montgomery County, Fort Campbell, Kentucky*, 26.
[55] Chanchani, Konicki, and Sweeten, *The Historic Context For The Cold War at Ft. Campbell, Kentucky*, 42.

7604	Interior Road East	1950	East End Road/East	Administrative
7700	North Service Road East	1950	North and South Service Roads	Igloo Storage
7702	North Service Road East (Georgia Road)	1950	North and South Service Roads	Igloo Storage
7704	North Service Road East (Georgia Road)	1950	North and South Service Roads	A Structure
7706	North Service Road East (Georgia Road)	1950	North and South Service Roads	Igloo Storage
7708	North Service Road East (Georgia Road)	1950	North and South Service Roads	A Structure
7709	North Service Road West	1950	North and South Service Roads	Small Arms Ammunition Storage
7711	North Service Road West	1950	North and South Service Roads	Small Arms Ammunition storage
7722	South Service Road	1950	North and South Service Roads	Igloo Storage
7740	South Service Road	1950	North and South Service Roads	A B C Structure
7741	South Service Road	1950	North and South Service Roads	Underground Wastewater tank
7833	South Group/Plant Unit No. 1	1950	Plant Group	General Storage
7876	Plant I Group	1950	Plant Group	Pillbox
7502	Administration	1951	Administration	Guard House
7503	Administration	1951	Administration	Badge Exchange
7504	Administration	1951	Administration	Fire Station/Radio Transmitter
7609	Interior Road East	1951	East End Road/East	Administrative
7830	South Group	1951	Plant Group	Administrative Building, General Purpose
7835	South Group/Plant Unit No. 1	1951	Plant Group	Battery Charging Plant
7851	South Group	1951	Plant Group	Administrative Building, General Purpose
7855	South Group	1951	Plant Group	Storage
7904	Road "A" (Texas Road/Loop)	1951	Texas Loop	Igloo Storage
8001	Road "I"	1952	8000 Group	Igloo Storage
8002	Road "I"	1952	8000 Group	Igloo Storage

8003	Road "I"	1952	8000 Group	Igloo Storage
8004	Road "I"	1952	8000 Group	Igloo Storage
8005	Road "I"	1952	8000 Group	Igloo Storage
8006	Road "I"	1952	8000 Group	Igloo Storage
8007	Road "I"	1952	8000 Group	Igloo Storage
8008	Road "I"	1952	8000 Group	Igloo Storage
8009	Road "I"	1952	8000 Group	Igloo Storage
8010	Road "I"	1952	8000 Group	Igloo Storage
8011	Road "I"	1952	8000 Group	Igloo Storage
8012	Road "I"	1952	8000 Group	Igloo Storage
8013	Road "I"	1952	8000 Group	Igloo Storage
8014	Road "I"	1952	8000 Group	Igloo Storage
8015	Road "I"	1952	8000 Group	Igloo Storage
8016	Road "I"	1952	8000 Group	Igloo Storage
8017	Road "I"	1952	8000 Group	Igloo Storage
8018	Road "I"	1952	8000 Group	Igloo Storage
8019	Road "I"	1952	8000 Group	Igloo Storage
8020	Road "I"	1952	8000 Group	Igloo Storage
8021	Road "I"	1952	8000 Group	Igloo Storage
8022	Road "H"	1952	8000 Group	Igloo Storage
8023	Road "H"	1952	8000 Group	Igloo Storage
OCB-35	Road "I"	1952	8000 Group	Igloo Storage
8024	Road "H"	1952	8000 Group	Igloo Storage
8025	Road "H"	1952	8000 Group	Igloo Storage
8026	Road "H"	1952	8000 Group	Igloo Storage
8027	Road "H"	1952	8000 Group	Igloo Storage
8028	Road "H"	1952	8000 Group	Igloo Storage
8029	Road "H"	1952	8000 Group	Igloo Storage
8030	Road "H"	1952	8000 Group	Igloo Storage
8031	Road "H"	1952	8000 Group	Igloo Storage
8032	Road "H"	1952	8000 Group	Igloo Storage
8033	Road "H"	1952	8000 Group	Igloo Storage
8034	Road "H"	1952	8000 Group	Igloo Storage
8035	Road "J"	1952	8000 Group	Igloo Storage
8036	Road "J"	1952	8000 Group	Igloo Storage
8037	Road "J"	1952	8000 Group	Igloo Storage
8038	Road "J"	1952	8000 Group	Igloo Storage
8039	Road "J"	1952	8000 Group	Igloo Storage
8040	Road "J"	1952	8000 Group	Igloo Storage
8041	Road "J"	1952	8000 Group	Igloo Storage
8042	Road "J"	1952	8000 Group	Igloo Storage
8043	Road "J"	1952	8000 Group	Igloo Storage
8044	Road "J"	1952	8000 Group	Igloo Storage
8045	Road "J"	1952	8000 Group	Igloo Storage
8046	Road "K"	1952	8000 Group	Igloo Storage

8047	Road "K"	1952	8000 Group	Igloo Storage
8048	Road "K"	1952	8000 Group	Igloo Storage
8049	Road "K"	1952	8000 Group	Igloo Storage
8050	Road "K"	1952	8000 Group	Igloo Storage
8051	Road "K"	1952	8000 Group	Igloo Storage
8052	Road "K"	1952	8000 Group	Igloo Storage
8053	Road "K"	1952	8000 Group	Igloo Storage
8054	Road "K"	1952	8000 Group	Igloo Storage
8055	Road "K"	1952	8000 Group	Igloo Storage
8056	Road "K"	1952	8000 Group	Igloo Storage
8057	Road "K"	1952	8000 Group	Igloo Storage
8058	Road "K"	1952	8000 Group	Igloo Storage
8059	Road "K"	1952	8000 Group	Igloo Storage
8063	Road "I"	1952	8000 Group	Igloo Storage
8064	Road "I"	1952	8000 Group	Igloo Storage
8062	Road "I"	1952	8000 Group	Igloo Storage
7621	south of Interior Road East	1952	East End Road/East	Storage
7733	South Service Road	1952	North and South Service Roads	Pillbox
7747	South Service Road	1952	North and South Service Roads	Pillbox
7703	North Service Road	1952	North and South Service Roads	Power Plant
7731	Ohio Road	1952	North and South Service Roads	Pillbox
7739	Ohio Road	1952	North and South Service Roads	Pillbox
7829	South Group	1952	Plant Group	Elevated Water Storage Tank
7843	South Group	1952	Plant Group	Storage, General Purpose
7856	South Group	1952	Plant Group	Storage
7874	South Group	1952	Plant Group	C Structure
7871	Plant I Group	1952	Plant Group	CO Headquarters Building
7927	Road "H" (Texas Loop Road)	1952	Texas Loop	Igloo Storage
7928	Road "I"	1952	Texas Loop	Igloo Storage
7929	Road "I"	1952	Texas Loop	Igloo Storage
7930	Road "I"	1952	Texas Loop	Igloo Storage
8000	Road "I"	1952	Texas Loop	Igloo Storage
7541	Administration Area	1953	Administration	Club
7563	Administration Area	1953	Administration	CO HQ Building

7611	Interior Road East	1953	East End Road/East	Storage
7832	South Group/Plant Unit No. 1	1953	Plant Group	General Storage
7562	Administration	1954	Administration	CO HQ Building
7721	Ohio Road	1954	North and South Service Roads	Pillbox
7860	South Group	1954	Plant Group	Storage
7861	South Group	1954	Plant Group	Storage
7862	South Group	1954	Plant Group	Storage
7863	South Group	1954	Plant Group	Storage
7877	South Group	1954	Plant Group	A Structure
7540	Administration	1955	Administration	Physical Fitness Center
7542	Administration	1955	Administration	Separate Toilet/Shower Building
7544	Administration	1955	Administration	Outdoor Swimming Pool
7580	Administration Area	1956	Administration	Enlisted Unaccompanied Personnel Housing
7581	Administration Area	1956	Administration	Enlisted Unaccompanied Personnel Housing
7582	Administration Area	1956	Administration	Enlisted Unaccompanied Personnel Housing
7585	Administration Area	1956	Administration	Enlisted Unaccompanied Personnel Housing
7586	Administration Area	1956	Administration	Enlisted Unaccompanied Personnel Housing
7510	Administration Area	1957	Administration	Brigade HQ Building
7514	Administration Area	1957	Administration	Chapel
7520	Administration Area	1957	Administration	EM Barracks
7812	Plant Unit No. 2	1957	Plant Group	Storage Building, General Purpose
7857	South Group	1957	Plant Group	Storage
7858	South Group	1957	Plant Group	Storage

7872	South Group	1957	Plant Group	Handling Crew Building
7608	Interior Road East	1951	East End Road/East	Storage Building, General Purpose
7607	Interior Road East	1951	East End Road/East	Storage Building, General Purpose
7620	South of Interior Road East	1951	East End Road/East	Supply Warehouse
7825	Plant Group Service Road	1951	Plant Group	S Structure
7718	South Service Road	1952	North and South Service Roads	Igloo Storage
7710	South Service Road (West End Road)	1952	North and South Service Roads	Igloo Storage
7720	South Service Road	1952	North and South Service Roads	Igloo Storage
7726	South Service Road	1952	North and South Service Roads	A Structure
7728	South Service Road	1952	North and South Service Roads	A Structure
7732	South Service Road	1952	North and South Service Roads	A Structure
7734	South Service Road	1952	North and South Service Roads	A Structure
7736	South Service Road	1952	North and South Service Roads	A Structure
7738	South Service Road	1952	North and South Service Roads	A Structure
7742	South Service Road	1952	North and South Service Roads	A Structure
7744	South Service Road	1952	North and South Service Roads	Igloo Storage
7746	South Service Road	1952	North and South Service Roads	A Structure
7748	South Service Road	1952	North and South Service Roads	A Structure
7750	South Service Road	1952	North and South Service Roads	A Structure
7752	South Service Road	1952	North and South Service Roads	Igloo Storage
7712	South Service Road	1952	North and South Service Roads	Igloo Storage
7716	South Service Road	1952	North and South Service Roads	Igloo Storage
7714	South Service Road	1952	North and South Service Roads	Igloo Storage

7900	Road "A" (Texas Road/Loop)	1952	Texas Loop	Igloo Storage
7901	Road "A" Texas Road/Loop)	1952	Texas Loop	Igloo Storage
7902	Road "A" (Texas Road/Loop)	1952	Texas Loop	Igloo Storage
7903	Road "A" (Texas Road/Loop)	1952	Texas Loop	Igloo Storage
7905	Road "A" (Texas Road/Loop)	1952	Texas Loop	Igloo Storage
7906	Road "A" (Texas Road/Loop)	1952	Texas Loop	Igloo Storage
7908	Road "B" (Oklahoma Road)	1952	Texas Loop	Igloo Storage
7814	Plant Unit No. 2	1952	Plant Group	Battery Shop
7907	Road "A" (Texas Road/Loop)	1952	Texas Loop	Igloo Storage
7909	Road "B" (Oklahoma Road)	1952	Texas Loop	Igloo Storage
7910	Road "B" (Oklahoma Road)	1952	Texas Loop	Igloo Storage
7911	Road "B" (Oklahoma Road)	1952	Texas Loop	Igloo Storage
7912	Road "E" (Nebraska Road)	1952	Texas Loop	Igloo Storage
7913	Road "E" (Nebraska Road)	1952	Texas Loop	Igloo Storage
7914	Road "E" (Nebraska Road)	1952	Texas Loop	Igloo Storage
7915	Road "E" (Nebraska Road)	1952	Texas Loop	Igloo Storage
7916	Road "F" (Colorado Road)	1952	Texas Loop	Igloo Storage
7917	Road "F" (Colorado Road)	1952	Texas Loop	Igloo Storage
7918	Road "F" (Colorado Road)	1952	Texas Loop	Igloo Storage
7919	Road "F" (Colorado Road)	1952	Texas Loop	Igloo Storage
7920	Road "G" (Utah Road)	1952	Texas Loop	Igloo Storage
7921	Road "G" (Utah Road)	1952	Texas Loop	Igloo Storage
7922	Road "G" (Utah Road)	1952	Texas Loop	Igloo Storage

7923	Road "A" (Texas Loop Road)	1952	Texas Loop	Igloo Storage
7924	Road "A" (Texas Loop Road)	1952	Texas Loop	Igloo Storage
7925	Road "A" (Texas Loop Road)	1952	Texas Loop	Igloo Storage
7926	Road "H" (Texas Loop Road)	1952	Texas Loop	Igloo Storage
7811 (also called 7811 A-E	Plant Unit No. 2	1953	Plant Group	Gravel Gertie; Administrative Building
7723	South Service Road	1954	North and South Service Roads	Pillbox
7725	South Service Road	1954	North and South Service Roads	Pillbox
8060	Road "K"	1954	8000 Group	Igloo Storage
7724	South Service Road	1955	North and South Service Roads	A Structure
7573	Administration Area	1956	Administration	Storage Building, General Purpose

The operations for a new modification center required construction of new buildings and structures. At least seventeen new buildings and structures were constructed between the years 1956 and 1961. Table 3 provides information related to the buildings and structures constructed between 1957 and 1961. The most important was the Assembly/Maintenance Plant or simply, the Plant (Building 7811-A-E), which was constructed during the period 1957-1961. Plants, designated Plant II or B, were designed for the maintenance and assembly facilities for first generation thermonuclear weapons.[56] In addition to the Plant, AEC also constructed the Modification and Disassembly Plant, called the Gravel Gertie in 1957. The building was designed to withstand a 1-kiloton explosion in case a nonnuclear device accidentally went off. Also, a new S Structure (Building 7825 A-B), also known as the surveillance structure, was constructed in 1961. The S Structure housed Quality Assurance and Inspection functions.

[56] Chanchani, Konicki, and Sweeten, *The Historic Context For The Cold War at Ft. Campbell, Kentucky*.

Table 3. Buildings and structures constructed between 1958 and 1961 at Clarksville Base.

Building #	Address	Date	Survey Area	Design Use
7511	Administration (in front of building 7523, as shown in photo)	1959	Administration	Flagpole
7532	Administration	1959	Administration	Vehicle Maintenance Shop
7545	Administration	1959	Administration	Baseball Field
7543	Administration	1960	Administration	Power Plant
7565	Administration	1960	Administration	Company Headquarters Building

Other buildings constructed during the time were a "Q" Spares Warehouse, three shops, Assembly Plant Storage Building No. 2, a handling crew building, five barracks and dormitory buildings, a base supply warehouse, a bachelor officers quarters building, a headquarters building, and a chapel.[57] Most of these buildings were designed to provide support to the military personnel stationed at the base.

During the 1960s, Clarksville Base and the modification center also underwent significant changes. The Clarksville Modification Center became operational in 1961 and was run successfully until 1964 by Mason and Hanger. Oral interviews of the Clarksville Base civilian workforce indicate that the base had gone on high alert following the Kennedy assassination. Also during the Cuban Missile Crisis, personnel stated that they prepared weapons for deployment and had them ready to be transported across the base to the airfield.

In 1964, one year after the AEC assumed control of the Pantex Ordnance Plant, that agency announced that the modification centers at San Antonio and Clarksville would be closed, and the activities would be transferred to Pantex and Iowa AEC plants. The deactivation of the Clarksville Weapons Modification Facility was completed on September 24, 1965, and the base was returned to military control. The total number of civilians employed at the Clarksville Modification Center in 1964 was 235 with Mason and Hanger, 24 with Sandia Corporation, and 15 with the AEC.[58] Another change to Clarksville Base resulting from the changes in weapons was that the Air Material Command no longer managed the airfields adjacent to the NSSs of Killeen and Clarksville Bases. In both cases, the NSSs and their airfields were absorbed by the local Army bases.[59]

[57] Chanchani, Konicki, and Sweeten, *The Historic Context For The Cold War at Ft. Campbell, Kentucky*, 42.
[58] Chanchani, Konicki, and Sweeten, *The Historic Context For The Cold War at Ft. Campbell, Kentucky*, 55.
[59] Weitze, *Cold War Properties at West Fort Hood, Texas*, 31.

Decommissioning of Clarksville Base 1965 to 1969. The closing of the Modification Center did not mean the end of activities at Clarksville Base. In 1965, AEC designated Clarksville a branch office for the AEC Amarillo office in 1965. From 1965 to 1969, the base was used by the Defense Atomic Support Agency (DASA) for the storage of classified materials. However, in 1969, DASA discovered radon gas in the buildings and tunnels of Clarksville Base, and shut the base down. It was declared surplus, and relinquished to Fort Campbell.[60] Since then the base has been used for various training and support functions by Fort Campbell.

During the 1960s, few buildings were constructed at Clarksville Base. They did construct a new shop (7865) in 1966 and a "Q" Spares Warehouse constructed in 1967. The designation Q indicates that admission to this facility required the special clearance. The real property list shows two more properties that were constructed between 1965 and 1969, an OD Pool Service Building (7546) constructed in 1965, and a storage building (7884) constructed in 1966. All but the storage building, which is in the southern portion of Clarksville Base, is near the entrance in the northwestern corner of the facility[61] (Table 4).

Table 4. Buildings and structures constructed between 1962 and 1969 at Clarksville Base.

Building #	Address	Date	Survey Area	Design Use
7546	Administration	1965	Administration	Outdoor Pool Service Building
7865	South Group	1966	Plant Group	Storage
7884		1966	Plant Group	Storage

Development of Nuclear Weapons Technology

To understand the infrastructure needed at a Q Area, one first must understand the weapon components used during the early years of the Cold War. Because the early weapons were created from components, they required regular surveillance and maintenance to ensure that the weapon would function when needed. Bilderback and Binder state "Much of the storage infrastructure that was constructed was directly related to surveillance and maintenance activities conducted on these components."[62] At Clarksville Base, the earliest infrastructure was designed to accommodate these early weapons. As technology changed, and nuclear weapon design became more advanced, the weapons did not need the massive support facilities that characterized the early Q Areas. Provided below is a discussion from Bilderback and Binder that details the development of nuclear weapons technology.

Nuclear Components: Capsules and Initiators

[60] Chanchani, Konicki, and Sweeten, *The Historic Context For The Cold War at Ft. Campbell, Kentucky*, 55.
[61] Chanchani, Konicki, and Sweeten, *The Historic Context For The Cold War at Ft. Campbell, Kentucky*, 55.
[62] Bilderback and Binder *Early DoD-Sited Nuclear Warhead Infrastructure*, 12.

The primary nuclear component of an atomic bomb and the primary stage of a thermonuclear bomb was the capsule or "pit" that made up the majority of the weapons Special Nuclear Material. In gun-type weapons the capsule was two masses of uranium located at a critically safe distance at either end of the barrel, and in early implosion weapons the capsule was the single mass of plutonium that was mechanically compressed to create a supercritical mass. Because the overwhelming majority of atomic weapons created during the Cold War were implosion-type, and specialized facilities were constructed at the storage sites to maintain these capsules, the remainder of this discussion will focus on plutonium pits. The surface of the sphere had a tendency to oxidize in storage, so a routine maintenance activity was periodically wiping down the exterior with organic solvents. The interior of the capsule had a hollow cavity that was accessed by unscrewing a threaded plutonium plug that was machined into the sphere. This cavity held the second nuclear component, the initiator.

As the name implies, initiators supplied neutrons to initiate a nuclear chain reaction. For a chain reaction to occur, neutrons must be present at the exact time they are needed to achieve a nuclear explosion. In early implosion-type weapons, this timing was achieved by placing the initiator in the heart of the core. Early nuclear weapons used polonium-beryllium initiators to produce the neutrons required for a fission chain reaction. Locating the initiators in the center of the nuclear core ensured that the neutrons were where they were needed when they were needed. While the polonium-beryllium initiators were very effective, they produced major maintenance problems because polonium isotope, polonium -210 (Pu-210), had a half-life of 138 days. As a result, every nuclear capsule in the stockpile had to have its initiator replaced on a regular schedule. Later generation weapons had electronic initiators that greatly reduced the maintenance and surveillance requirements.

Non-Nuclear Components: Casings, Fuses, Batteries, Detonators, and Explosives

The above description of atomic and thermonuclear weapon design has so far only been concerned with the development and manufacture of the nuclear systems of the weapons. In atomic arid thermonuclear bombs, it was also necessary to have subsystems that housed the weapon, controlled its flight, sent signals the warheads when to detonate and then acted upon that signal to deliver electrical energy to the detonators that triggered the nuclear system. Nuclear weapons generally have requirements in some areas that are vastly different from those of conventional munitions. In the early generations of gun-type and implosion-type atomic weapons, they were housed in metal casings several inches thick that guarded against the accidental detonation of the high explosives contained within both weapon types and the resulting destruction such an event would entail. Assembled atomic bombs were vulnerable to accidents during loading into the aircraft's bomb bay, in flight due to the vibration of the aircraft, and over the target when the aircraft was subject to anti-aircraft fire. As the Cold War progressed, weapon components were designed that were less sensitive and therefore less vulnerable to accidental detonation. These safer components reduced the casing requirements and allowed for aluminum and other lightweight metal alloys to be used as casings. In thermonuclear weapons, especially lighter casings allowed for weapons to be manufactured that had a great percentage of their weight taken up by nuclear materials rather than casing. Attached to the bomb casings of weapons that were designed to free fall after leaving the aircraft were fins that stabilized the weapon's flight. A stable well-characterized flight trajectory was critical to the successful detonation of these bombs. The bombs had to have a stable trajectory so that the fuses could sense the bomb's location in flight and send a signal to the detonators to fire at the appropriate time. In bombs that were designed to come to rest on the ground or in water, parachute-deploying packages replaced fins.

Once the weapon was released from the delivery vehicle, arming and fusing systems were needed to signal the detonators or firing set that triggered the nuclear system. The arming system allowed the fusing system to control the firing set. The arming system in nuclear weapons was a safety system that ensured that the weapon did not detonate at the wrong time by blocking the connection between the fuse and firing set. Early weapons were armed by aircraft personnel just prior to the weapon's release. In later weapons, such as ICBM warheads, arming was accomplished through human action and automatic systems. Once armed, the detonation of the weapon was determined by the fusing system. Several types of fuses were used in nuclear weapons during the Cold War and were of four basic types: radar, barometric, time, and impact. Fuses were important because they allowed manned delivery vehicles time to escape the effects of the bomb's detonation and triggered the weapons explosion at a time and place were it would have the greatest effect. Most conventional explosive bombs employed during World War II had impact fuses that detonated the weapon when the bomb struck earth. Both atomic bombs dropped on Japan during the war detonated high in the air above the target cities that required a different fuse. In the case of the Fat Man and Little Boy bombs, the primary fuses were most likely barometric fuses, which sensed the bombs altitude in free fall and detonated the weapon at a predetermined altitude. The airburst of these weapons was desirable because an impact with the ground could have damaged the bomb to the point where it would not detonate. Additionally, detonation at a high altitude increased the area effected by the blast and limited the amount of radioactive fall-out. The topography of the area around the target could have shielded areas from the blast if the weapon was detonated on the ground and thereby diminished the weapon's effectiveness. Also, weapons that are detonated on the ground suck up huge amounts of earth and other debris into the mushroom cloud and make the material radioactive.

This radioactive material is then scattered by the wind and comes back to earth as fall-out that has long-term health consequences. Therefore, the airburst of the bombs used against Japan was desirable to insure the greatest possible initial destructive effects and to limit the longer-term negative health effect from fall-out.

In later bombs designed during the Cold War, radar fuses were incorporated that bounced a radar signal off the earth to tell the bomb its altitude and when to detonate. Later in the Cold War bombs known as "lay down" weapons were developed which would gently fall to earth after deploying a parachute. Lay down bombs would have a time fuse that would detonate the weapon after a fixed amount of time had elapsed after the bomb came to rest. Regardless of what the primary fuse was in a nuclear weapon, most all weapons would have had one or more backup fuse systems should the primary fuse fail to function. The backup fuse could have been of the same type as the primary fuse or of a different type. For example, a weapon with primary barometric fuse could have employed a time fuse to guarantee that the weapon detonated at altitude after so many seconds of flight or an impact fuse that would have detonated the weapon once it hit earth after failing to detonate at altitude. No matter what type of fuse was used, its function was the same, to signal the firing set to release an electrical charge to trigger the detonators. The firing set in nuclear weapons were small power distribution systems. In the earliest atomic bombs, lead-acid batteries similar to those used in automobiles supplied power. Lead-acid batteries, however, required a great deal of maintenance and the amount of time they could hold a charge was limited. As the Cold War progressed, battery technology greatly improved and the lead-acid batteries were supplanted by a succession of improvements, including: nickel cadmium, lithium, and thermo batteries. The power from the batteries was used to charge capacitors that were connected by wires to the detonators.

Detonators were the final subsystem required to initiate the explosion that activated the nuclear system. Detonators existed long before the advent of nuclear weapons in the form of blasting caps and spark-gap detonators that were used to initiate conventional chemical explosive charges. Both blasting caps and spark-gap detonators use primary explosives, such as lead styphanate, lead azide, and mercury fulminate, which are easily initiated by heat, impact, or electrical discharge and as a result are dangerous to handle. In blasting caps and spark gap detonators the timing was imprecise because they relied on a deflagration reaction (burning) to initiate a high explosive and static sparks, temperature, and impacts had a tendency to cause unintentional detonation.

For nuclear weapons a detonator was needed that had very precise timing and used secondary explosives (explosives that are much less sensitive to heat and impact, and generally do not explode when burned). Two types of detonators were developed for nuclear weapon use: the exploding bridgewire (EBW) detonator and the slapper detonator or exploding foil initiator (EFI).

The EBW detonator used the large pulse of electrical current from the firing set's capacitors to produce a shock wave in the detonator's resistive bridge. The shock created in the resistive bridge was strong enough to initiate an adjacent pellet of low-density high explosive, which in turn detonated another normal-density high explosive pellet that initiated the main high explosive charge. The slapper detonator was slightly different in its configuration. The electrical charge created a shock wave in the foil that punched out a piece of plastic film and projected it down a short barrel. At the muzzle of the barrel, the film hit a pellet of normal density high explosive and initiated it, which in turn initiated the main high explosive charge. Because the EFI did not use the more sensitive low-density high explosive pellet, it had an additional margin of safety.

In gun-type weapons, the firing set was simple because it only had to send power to the one detonator connected to the one explosive charge behind the sub-critical mass that traveled down the barrel. The firing sets of implosion type weapons were far more complex because of the large number of explosive charges that had to be detonated simultaneously.

The yield of an implosion-type bomb is the result of the percentage of the SNM that actually takes part in the fission reaction. In an implosion-type bomb, the percentage of material to fission is dependent upon the amount of compression and the length of time that the pit is held under compression before exploding apart.

Improvements in composition and design of explosive lenses during the Cold War allowed for greater compression and more of the plutonium to fission. Improved explosives also allowed for less plutonium to be used in bombs and for the creation of much smaller bombs. During the Cold War the United States had low yield implosion type bombs that were the size of basketballs and weighed as little as fifty pounds.

The high explosives used in the World War II era bombs were cast explosives. Cast explosives were created by melting trinitrotoluene (TNT) with highly energetic explosives such as RDX (Royal Demolition Explosive) and/or HMX (High Meltingpoint Explosive) in a hot water jacket kettle, similar to those used in large kitchens. Once melted and mixed, the explosives mixture was poured into molds and allowed to solidify slowly to achieve uniform density within the casting. The cast blocks were then machined to final dimensions in remotely operated machines with water applied to the explosive block as a coolant and lubricant. Once machined, the blocks were X-rayed to insure that there were no hidden defects. The drawback to cast explosives was that the amount of highly energetic HMX and RDX that could be suspended in the molten TNT was limited and as a result, cast explosives only had a moderate energy output.

To provide a higher energy output from explosives the plastic bonded explosive (PBX) technique was developed and first used in a nuclear weapon test in 1956. PBX contained mostly RDX or HMX with a small amount of plastic binder. The PBX was made by coating the explosive powder grains with plastic in a solvent evaporation process. The explosive powder was then molded in hydrostatic or isostatic presses that compacted the powder with a pressure of 20,000 pounds per square inch. Once removed from the press, the PBX blocks were machined and X-rayed like cast explosives. Because of the large quantity of highly energetic explosives and the density of the block created by the presses, PBX had a much higher energy output in comparison to cast explosives. In 1974, to improve the safety and reduce the chances of accidental detonation of the high explosive within nuclear weapons, the recipe of PBX was modified to incorporate insensitive high explosives (IHE) that are virtually impossible to set off accidentally. In PBX made with ME, triaminotrinitrobenzene (TATB) replaced the RDX and HMX. The TATl3 had an equivalent energy output as RDX and HMX but effectively eliminated the possibility of accidental high explosive detonation and the resultant dispersal of radioactive material.

Boosting Components: Tritium Boosters

In 1951, scientists at the Los Alamos laboratory successfully demonstrated the principal of "boosting." Boosting is the enhancement of a fission weapon's performance by more fully exploiting the neutrons released in thermonuclear reactions produced within the weapon's core. Boosting of fission reactions was a key step in the development of thermonuclear weapons and gave weapon designers the ability to produce smaller and lighter-weight weapons. Boosting is produced by injecting tritium gas in to the fission reaction. This gas increases the fission yield and thereby supplies the energy required to initiate the fusion reaction in thermonuclear weapons. Boosting was such an important aspect of nuclear weapon designs from the early 1950s onward, the Atomic Energy Commission established the Savannah River Site in South Carolina to produce the tritium gas. All or almost all thermonuclear weapons in the nation's stockpile used a boosted primary design and some atomic bombs in the stockpile were designed or modified to take advantage of boosting to increase their yield.

The tritium boosters used in atomic and thermonuclear weapons were specially designed gas cylinders and gas transfer mechanisms, not altogether unlike those used in welding and other industries. The extreme temperatures and pressures that the high-pressure storage and transfer systems were exposed to in the initial stages of the fission reaction require extremely robust engineering. Designing, developing, and engineering these booster systems was a major achievement in the history of nuclear weaponization.

SEALED-PIT WEAPONS ("WOODEN BOMBS")

Prior to the mid- 1950s, all atomic and thermonuclear weapons required extensive maintenance and surveillance to ensure that they would be ready when needed. In 1956, the first sealed-pit warhead, the W25, entered the stockpile. Sealed-pit weapons were a milestone in atomic weapon development, because they did not require the extensive surveillance and maintenance of early generation weapons. As a class, sealed-pit weapons were termed "wooden bombs" because they could sit on a shelf like a piece of wood, needing no attention until its use was required.

Sealed-pit weapons were particularly important to the wide variety of nuclear weapon delivery systems, particularly missiles, which the United States came to rely on as the Cold War progressed. In fact, the first sealed-pit warhead to enter the stockpile, the W-25, was designed for the *Genie* air-to-air missile system. While it was possible to have weapons that required extensive maintenance and surveillance when the nation's nuclear stockpile was comprised exclusively of gravity bombs stored in relatively few confined storage areas, it became a practical impossibility to have high maintenance warheads mounted on missiles aboard submarines or in silos dispersed over a wide geographic area. The effectiveness of these missile systems depended on warheads that could be put in place and left unattended for months or years on end.[63]

[63] Bilderback and Binder *Early DoD-Sited Nuclear Warhead Infrastructure*, 12-16.

PART II. DESCRIPTION

A. GENERAL STATEMENT

Q Areas, like Clarksville Base, are defined by the presence of several major property types. Several surveys of Clarksville Base have identified the major property types located there. Also Bilderback and Binder discuss the major property types located at the base. Listed below is a discussion taken from these earlier studies that details the significant features of the resources; the architectural or structural aspects of the property; the technical aspects of the property; details of design of construction, including structural systems, and special features of the building or property, both interior and exterior; and machinery, tools, specific processes, and other intricate parts of the building's technology.

B. PHYSICAL DESCRIPTION

B.1 Make up of a Q Area

A NSS typically contained approximately 40 to 50 buildings including the igloo nuclear weapons storage area. The entire complex was surrounded by high, chain-link fences topped with strands of barbed wire, as well as by patrol and maintenance roads. Key buildings within the Q Area were the A and A-2 structures; the B Structure; the C structure; the assembly plants I and II (A and B); the command and control building; the S structure; Modification/Disassembly Plant; and the storage igloos. The study conducted by Gray et al. identified these seven building types at Clarksville Base, plus the "infrastructural facilities." Under infrastructural facilities, Gray et al. included not only the core facilities such as sewage, water supply, electrical, and communication systems, but also administrative facilities, community buildings, and other support structures.

The compound usually developed in three stages. During the initial phase, the Q Areas had a minimal administrative group of buildings near the main entrance gate, with an underground command post; a weapons area with emergency power plant and buried radioactive dump sites; a semi hardened, multi-part assembly plant interconnected by an underground vestibule (two plants, I and II—also referenced as A and B); an isolated detonators (also known as pits or initiators) storage building, the A structure; a checkout building for the stored bomb components, the C structure; and, the igloo storage area.[64]

During 1954-1957, the government expanded Q Areas' administrative components, provided greater hardening of the command and control buildings and the articulation of their multiple communications links; and added special weapons crew building at the assembly plant.

[64] Weitze, *Cold War Infrastructure For Strategic Air Command: The Bomber Mission,* 99-100.

B.1.1 A Structures

The A and A-2 structures were used to store nuclear weapons components, also known as "bird cages." The A-2 structure did not become a regular part of the Q Area until the US began to field thermonuclear bombs in 1954. Generally, both structures are referenced as A structures, and their roles were similar. Both were hardened structures, with the A-2 receiving additional shielding by bermed earth or built completely belowground. They were identical in design, and had reinforced concrete walls approximately 10 feet thick. For the windowless, aboveground A structure, measuring 41.5 feet by 53 feet (21.5 feet by 33 feet, interior, of nine-foot height), a second story actually provided more protection through its 17 feet of solid reinforced concrete fake building.[65] Figure 6 provides a typical view of an A Structure.

For the A-2 structure, the storage space for the capsules is entirely bermed or belowground, with a false single story aboveground (again, actually solid reinforced concrete) in the cases where berming was selected. The interior space is divided into four, single-entry rooms with a narrow bisecting corridor between pairs. Each room contained four, six-cubicle; and two, three-cubicle; structural steel Holt racks welded to special weapons storage standards. One A structure stored 120 detonators, 30 per room. Both the A and bermed A-2 structures furthermore gave the appearance of office buildings, when viewed from any distance, through the addition of bands of paired false fenestration and a projecting entrance offset.[66] The bermed A-2 structure was less convincing in this regard from a near perspective, due to the mounded earth and the resultant tunnel-like extension of the offset on one facade.

The A structures usually had a single leaf metal door that opened into a small vestibule where a heavy, bank-type vault door blocked access to the storage areas (Figure 7). The door led to a small corridor where four similar doors provided access into individual cells where the "bird cages" were stored (Figure 8). Additional security for the nuclear material was provided by each door having two combination locks; no single person knew both combinations (Figure 9).[67]

[65] Weitze, *Cold War Infrastructure For Strategic Air Command: The Bomber Mission,* 100.
[66] Weitze, *Cold War Infrastructure For Strategic Air Command: The Bomber Mission,* 100
[67] Gatewood and Doerrfeld *Air Force Ammunition And Explosives Storage & Unaccompanied Personnel Housing During The Cold War (1946-1989) Site Report: Lackland Air Force Base, San Antonio, Texas*, 17.

Figure 6. Building 404, A-Structure, looking southeast at Lackland AFB (adapted from Gatewood and Doerrfeld 2008).

Figure 7. Entry door to capsule storage area (Gatewood and Doerrfeld 2008).

Figure 8. Corridor leading to storage cells (Gatewood and Doerrfeld 2008).

Figure 9. Door securing storage cell (Gatewood and Doerrfeld 2008).

B.1.2 B Structure

Structure B, which is not located at Clarksville Base, was made up of three compartments, one B1 Vestibule and two B2 Work Areas. Bilderback and Binder describe the B Structure as having:

> The B 1 Vestibule was fifteen feet long by nine feet wide by eleven feet high and had the same foundation, wall, and ceiling treatments as Structure A to prevent water infiltration. Access into the B1 compartment was made through a metal louvered passageway door with a key lock. The B 1 compartment contained a four man steel locker, a laundry container, washbasin, and drinking fountain. The B2 compartment consisted of three distinct areas: an air lock; a deluge shower; and a workroom. Upon leaving the B 1 compartment, the workers would pass through an air lock door into the air lock area. The B2 workroom was six feet wide, nine feet long, and nine feet tall. The workroom was constructed, like the rooms of Structure A, to allow for a hospital level of cleanliness to be maintained. The exact function of Structure B is unknown other than it was intended as a work area for the surveillance, maintenance and inspection of nuclear capsules. At aboveground storage facilities there are no structures, unlike Structures A and C that have a "B" designation, so it is possible that Structure B was intended for a maintenance activity that was necessary in very early weapon designs but quickly became obsolete. Other possibilities include that Structure B was for the maintenance of uranium capsules or for the assay of nuclear capsules. Whatever the case may be, the activities that took place in the B2 workrooms were intend to take two people approximately four hours to perform and involved nuclear material. The compartments, with their airlocks and deluge showers, were designed to contain any accidental release of radiation and allow workers to decontaminate themselves prior to leaving the structure should an accident have occurred.[68]

B.1.3 C Structure

Q Area personnel maintained the pits and capsules stored in the A and A-2 structures. Bilderback and Binder and Weitze describe how the early atomic bomb required polonium/beryllium detonator pits (or initiators) to generate the neutrons of the explosive sequence. Since Polonium-210 has a half-life of about 138 days, the staff had to periodically replace the pits. In order to access the pits, personnel opened threaded couplings machined from fissile uranium—a process that produced radioactive waste items buried within the Q Area. The new thermonuclear weapons of the late 1950s had a sealed neutron initiator that replaced the polonium/beryllium pit. As of 1962, capsules

---

[68] Bilderback and Binder *Early DoD-Sited Nuclear Warhead Infrastructure*, 68-69.

were completely phased out and AEC maintenance activities with nuclear materials ceased in the C structure.[69] C structures were similar in design to A structures.

B.1.4 Plants I and II (A and B)

Plant I (A) served as a maintenance and assembly building for the non-nuclear components of the atomic bomb, and Plant II (B) had the same function for the first generation TN weapon of 1955-1957 (Figures 10 and 11). Weitze contends, “the plants were always multi-unit reinforced concrete facilities, earthen embanked, and tunnel interconnected. Concrete arch construction varied in thickness from two feet at the base to 12 inches through the spring, with a crown of 1.5 feet thickness.” Plant I was usually a six-bay structure; and Plant II only had two-bays.

B.1.5 Command and Control Building

Between 1955 and 1956, Q Areas added a command and control building which usually coincided with augmentation for the special weapons facilities (Figure 12). The building had a belowground command post with heightened communications, and a single aboveground story. Bands of windows accented the upper story on all of its facades, while the flat roof cantilevered out from the structure.[70]

B.1.6 S Structure

The S structure was a large additional maintenance building constructed after 1954 to augment quality control by separating routine maintenance and assembly functions performed in Plants I and II from other distinct quality assurance activities. Also known as a surveillance structure, the S structure contained electrical and mechanical bays, a calibration room, and a photographic laboratory. Sandia staffed the Quality Assurance and Inspection Agency responsible for work in the S structure.[71]

B.1.7 Modification/Disassembly Plant

The Modification/Disassembly Plant was commonly referred to as “Gravel Gertie” and was part of the Plant structure. The Gravel Gertie was used to disassemble high explosive shells from the nuclear assembly components.[72]

---

[69] Weitze, *Cold War Infrastructure For Strategic Air Command: The Bomber Mission,* 104.
[70] Weitze, *Cold War Infrastructure For Strategic Air Command: The Bomber Mission,* 106.
[71] Weitze, *Cold War Infrastructure For Strategic Air Command: The Bomber Mission,* 106.
[72] Gray et al., *Architectural Survey of the Proposed National Guard Complex on Clarksville Base, Montgomery County, Fort Campbell, Kentucky.*

Figure 10. Black & Veatch. Plant I (A) in the Q Area at Ellsworth Air Force Base (Weitze 1999).

Figure 11. Black & Veatch. Plant II (B) in the Q Area at Ellsworth Air Force Base (Weitze 1999).

Figure 12. Command/Control Bldg. Q Area, Caribou AFS, former Loring Air Force Base, circa 1957 (Weitze 1999).

C. Layout Descriptions of Clarksville Base Make up of a Q Area

A NSS typically contained approximately 40 to 50 buildings including the igloo nuclear weapons storage area. The entire complex was surrounded by high, chain-link fences topped with strands of barbed wire, as well as by patrol and maintenance roads. Key buildings within the Q Area were the A and A-2 structures; the B Structure; the C structure; the assembly plants I and II (A and B); the command and control building; the S structure; Modification/Disassembly Plant; and the storage igloos. The study conducted by Gray et al. identified these seven building types at Clarksville Base, plus the “infrastructural facilities.” Under infrastructural facilities, Gray et al. included not only the core facilities such as sewage, water supply, electrical, and communication systems, but also administrative facilities, community buildings, and other support structures.

The compound usually developed in three stages. During the initial phase, the Q Areas had a minimal administrative group of buildings near the main entrance gate, with an underground command post; a weapons area with emergency power plant and buried radioactive dump sites; a semi hardened, multi-part assembly plant interconnected by an underground vestibule (two plants, I and II—also referenced as A and B); an isolated, detonators (also known as pits or initiators) storage building, the A structure; a checkout building for the stored bomb components, the C structure; and, the igloo storage area.[73]

During 1954-1957, the government expanded Q Areas' administrative components, provided greater hardening of the command and control buildings, and the articulation of their multiple communications links; and added a special weapons crew building at the assembly plant. Key additions to the Q Areas included the nuclear booster storage buildings, the A-2s, substantially bermed or underground; and the S structure used to conduct another level of quality assurance activities for weapon disassembly and maintenance. In 1959-1960, Q Areas expanded their assembly plants to accommodate new nuclear weapons technologies, also adding laboratory facilities for heavy metals studies at some locations.[74]

D. Layout of Clarksville Base

The Administration Area

The Administration Area is located along the northwestern portion of Clarksville Base, south of Mabry Road and East of 101st Airborne Division Road (Figure 13). These properties are bordered by the Headquarters Loop Road (running parallel to Mabry Road) to the north, and Interior Fence Road and Georgia Road to the south, and the western boundary of Clarksville Base. The area contains parking lots, internal roads, tennis courts, a swimming pool, and a basketball court. The property types represented in this section are administrative, residential and community, and security buildings and apparatus. This cluster includes a guardhouse and security buildings, administrative spaces, and the Hope Chapel. [75]

Most of the buildings were constructed of brick, brick veneer, or cinder blocks, while some were constructed of metal and metal sheets. A cluster of buildings is located centrally in the area**.** The cluster includes administrative, residential and community, security apparatus such as fences, and warehouses and general storage facilities. The building 7523 housed barracks, a mess hall, and administrative space, was constructed in 1950, making it part of the early development of the base. [76]

The North and South Service Road Area

This area comprises the present day Georgia Road (North Service Road), West End Road (also North Service Road), and Ohio Road (South Service Road). The area between Georgia Road and Ohio Road is hilly and heavily wooded, and bisects the West Fork Creek (Figure 14). Most property types in this area are concrete storage igloos and weapons maintenance facilities (A Structures and the only A-B-C Structure) which are

---

[73] Weitze, *Cold War Infrastructure For Strategic Air Command: The Bomber Mission,* 99-100
[74] Weitze, *Cold War Infrastructure For Strategic Air Command: The Bomber Mission,* 99-100
[75] Chanchani and Leary, *Clarksville Base Historic District Inventory and Management Plan*, 53.
[76] Chanchani and Leary, *Clarksville Base Historic District Inventory and Management Plan*, 53.

underground or aboveground igloos with heavy, metallic security gates. There are also several pillboxes located across from the A Structures. These structures are arranged in a linear pattern along the winding Georgia and Ohio Roads. BHE identified the winding roads as significant features, since they ensure that not all of the igloo structures are clearly visible as they would be along straight paths**.** Most of the igloos are still in use for storage purposes by various departments and commands at Fort Campbell. A few of the structures are sealed off and have been classified as contaminated, as discussed below.[77]

Plant Groups

The Plant Survey Area is located in the central part of Clarksville Base, with building clusters either along South Group patrol Road or Louisiana Road (previously South Group Service Road), which connects Ohio Road to South Group Patrol Road (Figure 15). This area contains both the Plant Group I and Plant Group II buildings. These areas contain the buildings where weapons component maintenance took place including the S-Structure where weapons surveillance was performed**.** There are five clusters of buildings, each isolated by surrounding trees and vegetation. Two of these building clusters are located adjacent to the South Group Patrol Road. Plant I buildings are located in the western part of this road. These buildings and structures constituted the weapons maintenance facilities, among the earliest buildings and structures constructed at Clarksville Base.[78]

The original Plant I building is centrally located within this cluster and is the largest building in the area. The plant is surrounded by ancillary warehouses and other facilities and two aboveground storage igloos. The rest of the Plant I area is wooded areas, and some paved areas that serve as spaces for vehicle parking. To the south-southwest of the Plant Group I is a large cluster of buildings primarily used for administrative, warehouse and general storage facilities associated with the plant group. There are also several pillboxes in the area. The site-plan C1-101 indicates that these buildings constituted the “Base Spares Warehouses.” The site plan C1-101 also indicates that the area was surrounded by a fence.[79]

Plant II is located along the South Group Patrol Road. The northern-most cluster is constructed around Plant II building (the Gravel Gertie). To the north of the Gravel Gertie are the remaining buildings of this cluster; three warehouses and support buildings in varying conditions of disuse.[80]

The S-Structure cluster, located also off Louisiana Road, consists of only three buildings – the old S-Structure (7825) building and two guardhouses. The S-Structure was one of

---

[77] Chanchani and Leary, *Clarksville Base Historic District Inventory and Management Plan*, 74-77.
[78] Chanchani and Leary, *Clarksville Base Historic District Inventory and Management Plan*, 84.
[79] Chanchani and Leary, *Clarksville Base Historic District Inventory and Management Plan*, 84-85.
[80] Chanchani and Leary, *Clarksville Base Historic District Inventory and Management Plan*, 85.

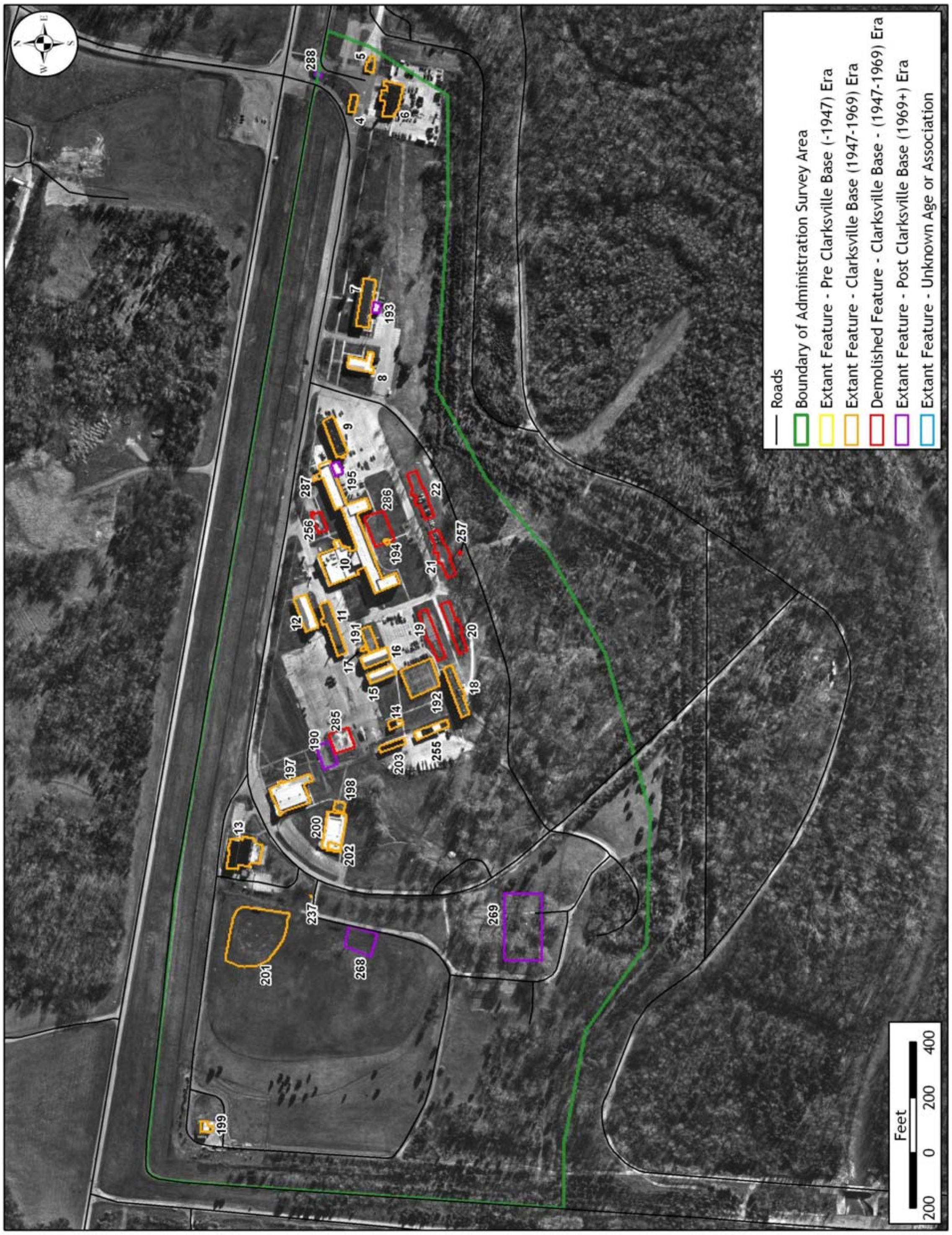

Figure 13. Features Identified in the Administration Area, Depicted on the 2004 Color Aerial (Chanchani and Leary 2006).

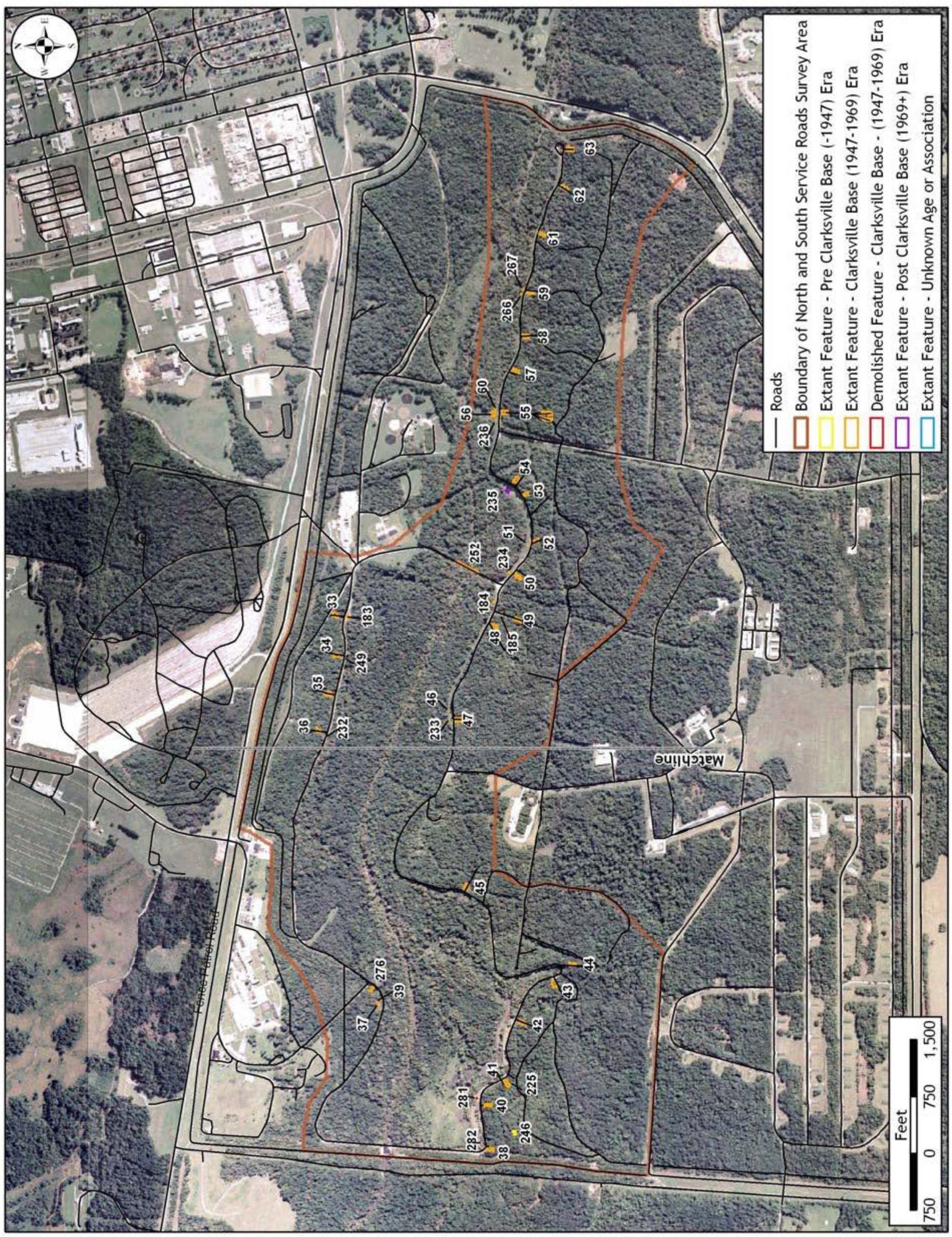

Figure 14. Features Identified in the North-South Service Road Area, Depicted on 2004 Color Aerial (Chanchani and Leary 2006).

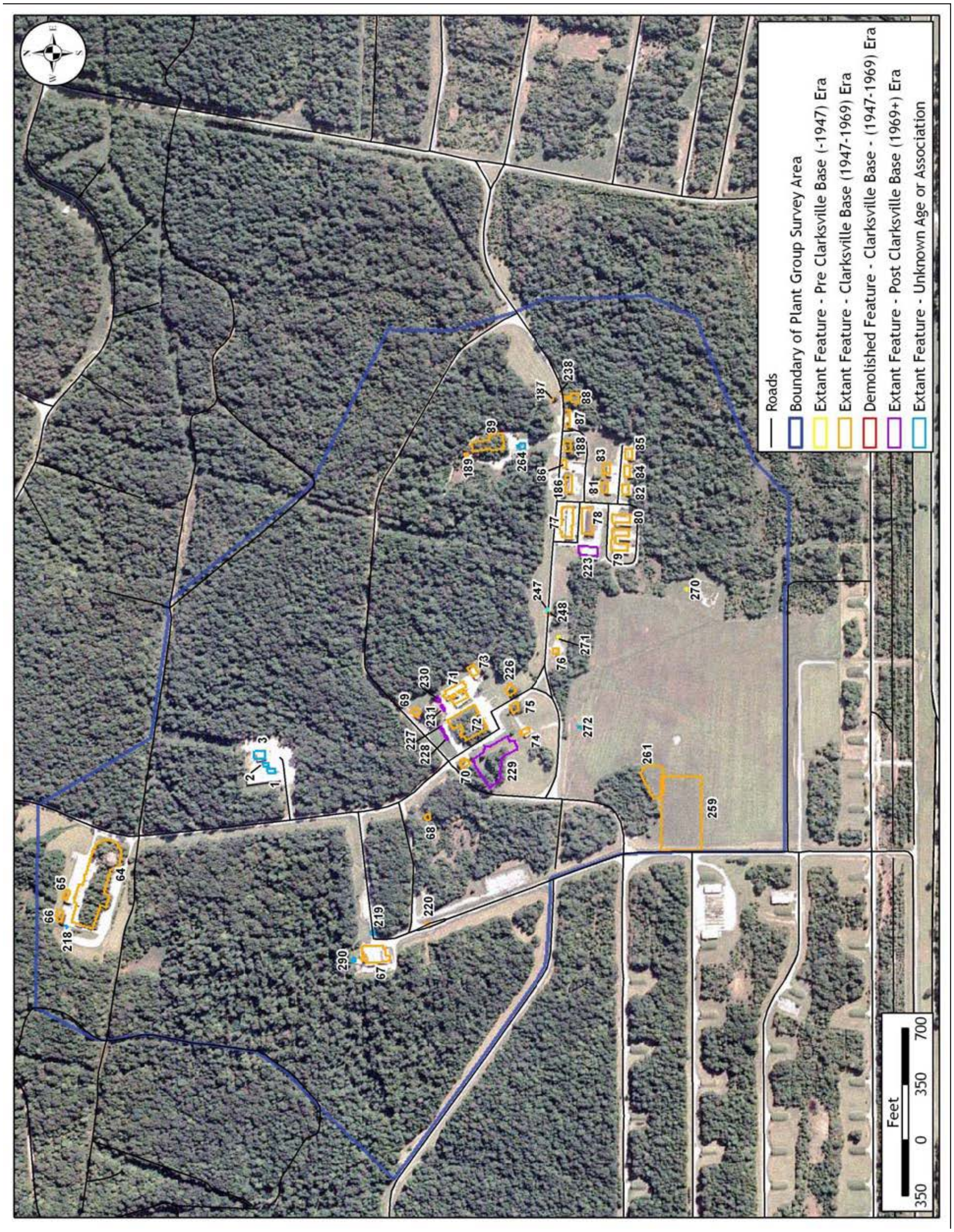

Figure 15. Features Identified in the Plant Group Area, Depicted on the 2004 Color Aerial (Chanchani and Leary 2006).

the most significant facilities constructed at the Clarksville Base, and was an additional maintenance building used to augment quality control by separating routine maintenance and assembly functions on weapons components performed in Plants I and II from other distinct quality assurance activities. It is also currently used for the maintenance of conventional ammunition and ammunition components.[81]

E. Buildings and Structures at the Q Areas

The Plants- assembly and maintenance buildings

At Clarksville Base, there are two buildings, 7834 and 7811, that were used as assembly and maintenance buildings. These buildings were known as "The Plant." They were constructed to maintain the non-nuclear components of the weapons. Each contains large bays and overhead rails capable of supporting weapon subassemblies for routine maintenance. The buildings are characterized by heavy blast doors and earthworks that would have deflected the effects of an explosion upward.[82]

Black & Veatch labeled the first atomic bomb assembly plants as Plant Facilities or Plant Structures. At Clarksville Base, the Plant Structures included individual aboveground buildings and the underground A-B-C Structures (the latter built as a single cluster).

The A-B-C Structures at Clarksville Base can be described as:

> Three individual buildings composed one aboveground group. The E, F, and G chambers were wings of a large building that also included two P chambers (latrines). A 20-ft earthen berm surrounded three sides of the building. The D chamber became a fully freestanding structure, sited away from the larger complex and coupled with a third freestanding P chamber (latrine). Design of the D chamber was very unusual at Clarksville Base. The chamber was isolated and heavily protected. A 10-ft earthen berm sat behind a concrete wall and walkway at its rear, with two additional 10-ft berms at its sides. A second concrete wall, similar to that of an igloo, comprised the façade of the building. At a fully separate location, the K and H chambers occupied another large building, with a freestanding M Structure sited across the road from its entrance. A set of parallel ditches and a perimeter road ran around three sides of the K-H Structure, and a 15-ft earthen berm surrounded all sides of the M Structure. It remains unclear whether or not earthen cover topped any of the bermed freestanding buildings of the Clarksville plant.[83]

---

[81] Chanchani and Leary, *Clarksville Base Historic District Inventory and Management Plan*,85.

[82] Gray et al., *Architectural Survey of the Proposed National Guard Complex on Clarksville Base, Montgomery County, Fort Campbell, Kentucky,* 23.

[83] Weitze, *Cold War Properties at West Fort Hood, Texas*, 12.

The E-F-G transitional aboveground plant of Clarksville Base served as a model for later Type I Plants, designed by Black & Veatch.

As part of Project TrueLove, Black & Veatch designed a counterpart to the Type I plant for work on the thermonuclear bomb. They used the term *Type II* to signify its use with the thermonuclear bomb. The Department of Defense constructed the prototype Type II plant only at Clarksville Base. Weitze described the Type II plant as "a bermed, two-unit, igloo-like reinforced concrete structure. The bays of each unit primarily accommodated electrical and mechanical work on the non-nuclear components of the thermonuclear bomb…The two-unit prototype featured one unit 118 ft wide (across its façade) and one 146 ft wide."[84] Black & Veatch also designed an addition for Clarksville's S Structure, which in turn was coupled with the prototype Type II plant of 1952 to handle the middle 1950s thermonuclear bomb-assembly mission.

C Structures in the Underground Plants, 1947–1949 The A-B-C area of the plants had a separate entrance tunnel, angling off from one of the main tunnels in most instances. The A-B-C area was designed slightly higher in elevation from the main body of the plants (ostensibly to encourage greater safety in case of a plutonium fire).[85]

Gravel Gerties

Gravel Gerties are the only major buildings found in an NSS that were not of Black & Veatch design. Only Clarksville and Medina Bases had Gravel Gerties among the 13 NSS and OSS locations. (The two nuclear weapons production plants in Amarillo, Texas, and Burlington, Iowa, also had Gravel Gerties, and were the first operational locations of the structure.) The engineering design firm for this unusual structure is interpreted to have been Mason & Hanger of Lexington, Kentucky. The Gravel Gertie's distinctive feature was an assembly cell capped by a steel catenary roof system that supported a thin monoform membrane weighted down with massive amounts of gravel. Contractors attached the Gravel Gertie to the existing Type II plants at Clarksville (one Gravel Gertie) and Medina Bases (three Gravel Gerties). (At Medina Base, Bernard Johnson & Associates were the engineers for the conversion.) Personnel worked in the assembly cells to upgrade existing older nuclear bombs into modern weapons. Work in the Gravel Gertie was exclusively on sealed-pit bombs, which came into the war reserve stockpile after the middle 1950s. Sealed-pit bombs did not require the surveillance and maintenance of the nuclear materials in the pits. The polonium-beryllium initiators that occupied a cavity inside the plutonium pits had evolved into electronic initiators. The development of sealed pits also made both the A and C Structures obsolete. In sealed-pit weapons, the high explosives were directly integrated with the nuclear material. Mason & Hanger engineered the catenary, gravel-loaded roof of the Gravel Gertie to implode in the event of a nuclear accident. The imploding gravel—coarse at the base of

[84] Weitze, *Cold War Properties at West Fort Hood, Texas*, 13.
[85] Weitze, *Cold War Properties at West Fort Hood, Texas*, 17.

the roof and fine at its apex—both filtered and contained the dispersal of radioactive materials.[86]

Modification/Disassembly Plant (Plants I and II): Although this has been described as a separate structure, it is in reality a part of the Plant (II) Buildings complex. The Modification/Disassembly Plant was commonly referred to as "Gravel Gertie"; its main room is a concrete, circular-shaped plan with a conical roof and an attached underground storage tank. The Gravel Gertie was connected with the Plant Buildings via a tunnel-like corridor. The Gravel Gertie was used to disassemble high explosive shells from the nuclear assembly components. A mesh-wire that contained several tons of gravel was placed over the roof of this structure. In case of an accidental explosion, the energy in the explosion would be dissipated in lifting the gravel, which would also act as a filter to absorb radioactive material before it was released into the atmosphere. [87]

Weitze provides more information on Plant buildings than is available at Ft Campbell. Weitze includes the underground A-B-C Structure at Clarksville Base as part of the Plant facilities since maintenance of weapons and components was done there. The remainder of the atomic bomb plant featured two clustered aboveground areas of structures (the Plant I cluster). In turn, these structures either housed groups of chambers, each of which served specific functions, or individual chambers. For example, Weitze writes that the E chambers (two rooms for work on electrical components of the bomb), F chamber (mechanical bays), and G chambers (shipping rooms for uncrating and re-crating bombs) were part of a single structure that also included the latrines or P chambers. The D chamber (possibly used for work on detonators) was a freestanding building, isolated, and heavily protected with a 10-ft earthen berm behind a concrete wall and a walkway to its rear, and two additional 10-ft berms at its sides. At a separate location, the K chamber (large utility stations with distinctive domed air intake and exhaust structures mounted on the exterior) and H chamber (machine shop) occupied another large building with a separate M Structure (office space) across from the entrance.[88]

There is no mention, in either the Gray et al. report or Ft. Campbell database of these additional types of chambers or their location. BHE closely reviewed the Black and Veatch construction documents for Clarksville Base and was able to determine the following information on the location of these chambers. The M-Structure was located at the building number 7873, with the H and K chambers in the nearby structure 7882. The chambers E, F, and G were located in building 7834, which is identified as the Plant I

---

[86] Weitze, *Cold War Properties at West Fort Hood, Texas*, 19.
[87] Gray et al., *Architectural Survey of the Proposed National Guard Complex on Clarksville Base, Montgomery County, Fort Campbell, Kentucky.*
[88] Weitze, *Cold War Infrastructure For Strategic Air Command: The Bomber Mission,* 45-46.

Structure. The building 7845 was structure D, while the building 7847, appearing identical in its construction to 7845, was Structure P.[89]

Storage Igloos
Clarksville Base has 115 storage igloos that were constructed for the storage of atomic and thermonuclear weapons and weapons parts. These were strictly storage facilities and no assembly/modification or surveillance activity took place there. Nineteen of the igloos were constructed into existing hillsides, while the rest are aboveground, earth-covered structures.[90] The underground igloos were part of this documentation process.

Bedrock Igloos, 1946–1951. In 1946, Black & Veatch designed the first igloos designed for the storage of the non-nuclear casings and components. These igloos were characterized by arched reinforced concrete structures tunneled into existing bedrock sites with long underground access tunnels of varied dimensions. They had vented rear storage chambers the size of standard munitions igloos of World War II (60 ft 8 inches by 26 ft 6 inches), although some of the igloos were longer. The bedrock above the igloos was usually one of two depths, 15 feet or 30 feet. The War Department planned for 24 bedrock igloos at Clarksville Base.[91]

A Structures
Gray et al. identify three types of A-Structures, based on their forms and construction, at Clarksville Base – those located within a tunnel complex, those within reinforced concrete aboveground storage igloos, and those within converted, belowground igloos.[92]

Bedrock A Structures, 1947–1954. The bedrock A Structures constructed at Clarksville Base contained a separate A-B-C underground cluster. In 1951, the military constructed another set of bedrock A Structures by converting seven existing bedrock igloos at Clarksville. Three years later, they again converted another bedrock igloo into an A Structure.[93]

Aboveground A Structures, 1954. As part of Project TrueLove, Black & Veatch designed a second-generation, freestanding, aboveground, reinforced concrete A Structure in early 1954. Weitze describes the aboveground A Structure of 1954 has having a

> foundation and walls 10 ft thick (as was the case for the aboveground A Structure of 1950). Its solid upper story was 12 ft thick, reduced from the 17-ft thickness of the first-generation aboveground A Structure. The

[89] Chanchani and Leary, *Clarksville Base Historic District Inventory and Management Plan*, 40.
[90] Chanchani and Leary, *Clarksville Base Historic District Inventory and Management Plan*, 38.
[91] Weitze, Cold War Properties at West Fort Hood, Texas,14
[92] Chanchani and Leary, *Clarksville Base Historic District Inventory and Management Plan*, 34.
[93] Weitze, Cold War Properties at West Fort Hood, Texas, 15.

> exterior appearance of the second-generation A Structure was that of a one-story building, again with false fenestration. The lower story—that which contained the four interior vault rooms for storage of the plutonium pits—was further encased by an earthen berm about 10 ft high on all sides of the building. A long entrance tunnel ran through the berm at the front of the aboveground A Structure of 1954, accessed by a small loading dock area. The dock appears as a freestanding structure in front of what looks like a one-story office on a small hill. From an aerial perspective, the second-generation aboveground A Structure was deliberately designed to appear as a parking lot accessed by an entrance road. The purpose of the significant design changes between the aboveground A Structure of 1950 and that of 1954 is undetermined.[94]

Clarksville Base received only one of the second-generation aboveground A Structures.

Gray et al. identified three types of A-Structures, based on their forms and construction, at Clarksville Base – those located within a tunnel complex, those within reinforced concrete aboveground storage igloos, and those within converted, belowground igloos. The study identifies building 7740 as an A-Structure located within a tunnel complex. Architectural drawings accompanying the text show that the A-Structure consisted of four rooms accessible from a corridor, with each room having metal shelves on which capsules could be stored.[95]

The second type of A-Structure at Clarksville Base was built aboveground. There were two aboveground A-Structures at Clarksville Base, namely Buildings 7877 and 7724, and both of them contained four independent vault rooms with 10 ft thick partition walls, and loading docks outside**.** The third type of A-Structure (represented by buildings 7704, 7708, 7726, 7728, 7732, 7734, and 7746) were underground storage bunkers excavated into existing hillsides. These structures were converted from ordinary concrete igloos to provide added storage capacity.[96]

Clarksville Base had both types of A-Structures, with the aboveground structures being the A-Structures for atomic weapons detonators and the belowground A2-Structures for the thermonuclear detonators. It is pertinent that the belowground structures were converted igloos.[97]

There were two aboveground A Structures at Clarksville Base, namely Buildings 7877 and 7724, and both of them contained four independent vault rooms with 10 ft thick partition walls, and loading docks outside. The third type of A-Structure (represented by

[94] Weitze Cold War Properties at West Fort Hood, Texas, 16.
[95] Chanchani and Leary, *Clarksville Base Historic District Inventory and Management Plan*, 34
[96] Chanchani and Leary, *Clarksville Base Historic District Inventory and Management Plan*, 34.
[97] Chanchani and Leary, *Clarksville Base Historic District Inventory and Management Plan*, 36.

buildings 7704, 7708, 7726, 7728, 7732, 7734, and 7746) were earth covered or underground storage bunkers excavated into existing hillsides. These structures were converted from ordinary concrete igloos to provide added storage capacity.[98]

S Structures (Sandia Surveillance)
The S Structure (Building 7825), also known as the surveillance structure, was constructed in 1961. The S-Structure housed Quality Assurance and Inspection functions for the Modification and Disassembly Plant. The S Structure (or Surveillance Structure) was an additional maintenance building to augment quality control by separating routine maintenance and assembly functions performed in Plants I and II from other distinct quality assurance activities. The S-Structure contained electrical and mechanical bays, a calibration room, and a photography laboratory.[99]

The S-Structure is currently used as an ammunition repair and repacking building. The general condition of the S-Structure is good, and it has retained its integrity. Some additional storage areas have been added to the north face of the building, but these do not affect the integrity of the building. The renovations and changes to the interior also do not adversely affect its integrity. Comparing the existing building with old plans of the buildings shows that rooms constructed of structurally independent metal walls in the center of the large space have been removed. Other changes include modern fixtures, and floor finishing by painting over the existing concrete floor.[100]

Support Infrastructure
Administration Facilities: The main complex of administrative buildings at Clarksville Base is located near its main entrance. The administrative buildings are typically functional and modernistic in character, constructed of either brick, drywall with brick veneer, or cinder blocks. This large block includes office space, barracks for unmarried soldiers, and a mess hall. Administrative facilities were also located elsewhere at the base serving specific groups of buildings. The Plant groups of buildings have their own administrative areas, either combined with the Plant building (in Plant II) or as a separate property, (the Plant I group).[101]

Residential and Community Facilities: Residential and community facilities were located near the main entrance to Clarksville Base alongside the administration facilities. There were seven buildings housing barracks. Other community facilities included a recreation club, dining facilities, basketball and tennis courts, as well as playfields. A church, (the Hope Chapel) was also located within this complex of buildings. Because of the high security nature of the facility, all of the community facilities located near the main entrance were fenced off and separated from the rest of the base. The residential and

---

[98] Chanchani and Leary, *Clarksville Base Historic District Inventory and Management Plan*, 135.
[99] Chanchani and Leary, *Clarksville Base Historic District Inventory and Management Plan*, 38.
[100] Chanchani and Leary, *Clarksville Base Historic District Inventory and Management Plan*, 140.
[101] Chanchani and Leary, *Clarksville Base Historic District Inventory and Management Plan*, 40.

community buildings were typically functional, modernistic buildings constructed of brick, drywall with a brick veneer, or cinder blocks.[102]

Warehouses and General Storage Facilities: Throughout Clarksville Base were various warehouses and general storage facilities. Most were associated with various clusters of buildings and structures where supplies were kept. Most of the buildings were Butler-style buildings made out of metal sheets, giving them the appearance of temporary facilities, although there are some warehouses and general storage facilities built of sturdier materials such as concrete. [103]

***Security Buildings – Guardhouses and Pillboxes*:** Security for Clarksville Base included a fence that has been repaired and replaced over time, as well as a guardhouse (Building 7502) at the main entrance. There were internal guardhouses within Clarksville Base near the south plant area and associated with the S-Structure. Theses internal guardhouses were typically simple, constructed either of brick or of cinder blocks. The pillboxes were both aboveground and partly belowground, and all were located near either A-Structures or storage igloos. Weitze (2006) indicates that the early weapons storage facilities contained guard-posts or pillboxes, in pairs, adjacent to all A-structures. At Clarksville Base, while BHE located pillboxes near original A Structures and A-B-C Structure, it was not able to locate those adjacent to converted igloos, indicating that they were either demolished, or not constructed, or covered under heavy vegetation to be hidden from view.[104]

Security at Clarksville Base

One of the most important elements of Clarksville Base was the massive security net that surrounded it. Because it was operated by the US Navy, US Marines guarded the facility. The Marines patrolled within a highly secure facility. Clarksville Base had with four fences (including one electric). In addition to the four fences surrounding the perimeter of the facility, there were vehicles that carried heavily armed marines who had orders to shoot to kill should anyone break through the security lines. These marines kept a twenty-four hour watch on the perimeter of Clarksville Base and would pass any given point at thirty-minute intervals on the patrol road.

All operations at the site were classified with a "Q" security clearance, the highest level of clearance. Due to the extreme security features as well as the top-secret clearance necessary to work at Clarksville Base, there were numerous rumors within the surrounding communities of what was taking place within this mysterious facility adjacent to the army's Fort Campbell. The civilian workers were frequently moved from place to place within this facility in order to prevent too much familiarity or knowledge with one area or building.

---

[102] Chanchani and Leary, *Clarksville Base Historic District Inventory and Management Plan*,40-41
[103] Chanchani and Leary, *Clarksville Base Historic District Inventory and Management Plan*, 41
[104] Chanchani and Leary, *Clarksville Base Historic District Inventory and Management Plan*,41

PART III. SOURCES OF INFORMATION

A. ENGINEERING DRAWINGS AND PLANS

Various engineering drawings from the Engineering Drawing Branch, Directorate of Public Works at Fort Campbell were consulted. Many of these drawings were available digitally. However, a number have yet to be scanned into electronic format and had to be reviewed in their original form.

B. HISTORICAL DATA

Clarksville Base has been the subject of several historical studies, and therefore, Brockington historians utilized the previous reports as the basis for this documentation. From January 2009 to July 2010, research was conducted at various locations at Fort Campbell. Resources included personnel in the Cultural Resources Program, the Master Planning Division, and the Engineering Drawing Branch, all under the Directorate of Public Works at Fort Campbell. In addition, individuals with the Ft. Campbell Historical Foundation and the Pratt Museum opened their collections. The Cultural Resources Program was a crucial source for prior studies and inventories conducted. The Engineering Drawing Branch provided electronic versions of engineering drawings of properties built and used during the Cold War and assisted with locating hard copies if buildings were not available electronically. As noted in other reports, information and documents at Master Planning and Engineering Drawing departments has not been catalogued and, therefore, difficult to locate. To develop individual building descriptions and data sheets, the project historians utilized real property records, original drawings (when available) as well as descriptions and building information from the various previous studies.

C. BIBLIOGRAPHY

Alperovitz, Gar. *Atomic Diplomacy: Hiroshima and Potsdam*. London, 1994.

Ambrose, Stephen. *Rise to Globalism: American Foreign Policy Since 1938*. New York: Penguin Books, 1991.

Bilderback, Daniel R, and Michael S. Binder. *Early DoD-Sited Nuclear Warhead Infrastructure*. Columbia, South Carolina, and Dallas, Texas: Department of History, University of South Carolina and MILSITE RECON, 1999.

Bratton, Debbie McGaha. “The “Bird Cage.” *Our City* 2 (: 12-13.

Chanchani, Samiran, Leah Konicki, and Lena Sweeten. *The Historic Context For The Cold War At Ft. Campbell, Kentucky* BHE-DACA27-01-D-0004 Delivery Order # 0009. Cincinnati, Ohio: BHE Environmental, Inc., 2006.

Chanchani, Samiran, and Christopher G. Leary. *Clarksville Base Historic District Inventory and Management Plan. BHE-DACA27-01-D-0004, Delivery Order # 0023..* Cincinnati, Ohio: BHE Environmental, Inc., 2006.

Doerrfeld, Dean A., and Rebecca Gatewood. *Air Force Ammunition And Explosives Storage & Unaccompanied Personnel Housing During The Cold War (1946-1989) Site Report: Kirtland Air Force Base, Albuquerque, New Mexico Draft.* Frederick, Maryland: R. Christopher Goodwin & Associates, Inc., 2008.

Energy, US Department of. "Closing the Circle on the Splitting of the Atom," http://legacystory.apps.em.doe.gov/index.asp.

———. "Connecting the Cold Wars Nuclear Weapon's Production Process to their Environmental Consequences," http://legacystory.apps.em.doe.gov/index.asp.

Freedman, Lawrence. *The Evolution of Nuclear Strategy*. New York: 1989

Gaddis, John Lewis. *We Now Know: Rethinking Cold War History*. New York: Oxford University Press, 2007.

Gatewood, Rebecca, and Dean A. Doerrfeld. *Air Force Ammunition And Explosives Storage & Unaccompanied Personnel Housing During The Cold War (1946-1989) Site Report: Lackland Air Force Base, San Antonio, Texas. Draft.* Frederick, Maryland: R. Christopher Goodwin & Associates, Inc., 2008.

Globalsecurity.org. "Weapons of Mass Destruction; Clarksville Base 36°40'30"N, 87º29'30"W,." *globalsecuirty.org*, http://www.globalsecurity.org/wmd/facility/clarksville.htm.

———. "Weapons Storage Sites/Q Area." *Globalsecurity.org*, http://www.Globalsecurity.org/wmd/facility/q_area-intro.htm.

Gray, Anna, Dorothy Humpt, and Kelly Mitchell. *Architectural Survey of the Proposed National Guard Complex on Clarksville Base, Montgomery County, Fort Campbell, Kentucky*. Fort Campbell: Public Works Business Center, Environmental Division, Conservation Branch, 1998.

Hixon, Walter L. "Proliferation: The United States and the Nuclear Arms Race." In *The American Military Tradition Form Colonial Times to the Present*, edited by Colin F. Baxter and John M. Carroll. Rowman and Littlefield Publishers, Inc: Lantham, 2007.

Hufstetler, Mark, Mary McCormick, and Jeff Buechler. *Ellsworth Air Force Base, South Dakota Cultural Resource Survey Report*. Butte, MT: Renewable Technologies, Incorporated, 1997.

Jonas, Clyde L. "1973 Camp Campbell, Kentucky: A History of Construction and Occupation During World War II." MA Thesis, Austin Peay University, 1973.

Lewis, K., and K.J. Roxlau. "Historic Context of the Cold War from the Perspective of Air Power." In *A Systemic Study of Air Combat Command Cold War Material Culture, Volume I: Historic Context and Methodology for Assessment*, edited by K. Lewis, K.J. Roxlau, L.E. Rhodes, P. Boyer, and J.S. Murphey, 23-107. Albuquerque: Mariah Associates, Inc., 1995.

Millett, Allan R.,, and Peter Maslowski. *For the Common Defense: A Military History of the United States of America.* New York: The Free Press, 1994.

Oakley, J.R. *God's Country: American in the Fifties*. New York: December Books, 1990.

Prior, Marsha, and Duane Peter. *Ellsworth Air Force Base: Landscape Survey and Evaluation of Five Historic Properties.* Plano, Texas: Geo-Marine, Inc., 2002.

Prior, Marsha, and Edward Salo. *Air Education and Training Command: Training the Peacemakers during the Cold War Era (1945-1991). United States Air Force Air Education and Training Command Cold War Context Series Report of Investigation, No. 1.* Plano, Texas: Geo-Marine, Inc., 2003.

Salo, Edward. *Inventory and Assessment of Cold War–Era Resources (1955–1965) and Military Landscapes, Fort Rucker, Alabama*. Mt. Pleasant, SC: Brockington and Associates, Inc, 2009.

Salo, Edward, Marsha Prior, and Michelle Wurtz. *Lackland Air Force Base: Cold War-Era Buildings and Structures Inventory and Assessment*. Plano, Texas: Geo-Marine, Inc., 2002.

Sandia National Laboratories. Site Summary for The Fort Campbell (Clarksville Base) Kentucky/ Tennessee Former Weapons Storage Area, 1996. Manuscript on file, Environmental Division, Fort Campbell, Kentucky.

_______. Trip Report-Fort Campbell (Clarksville Base), Kentucky/Tennessee, Former Weapons Storage Area, 2004. Manuscript on file, Environmental Division, Fort Campbell, Kentucky.

Shaw, F.J., Jr., and T. Warnock *The Cold War and Beyond: Chronology of the United States Air Force, 1947-1997*. Maxwell AFB, Alabama: Air Force History and Museums Program, 1997.

Tindall, G.B., and D.E. Shi. *America: A Narrative History, Volume Two.* Fourth edition. New York: W.W. Norton & Company, 1996

Weitze, Karen. *Cold War Infrastructure For Strategic Air Command: The Bomber Mission*. Langley Air Force Base, Virginia: Headquarters, Air Combat Command, 1999.

———. *Cold War Properties At West Fort Hood, Texas: Research Overview And Preliminary Identification*. Austin, Texas: Prewitt and Associates, Inc., Cultural Resources Services, 2005.

PART IV. PROJECT INFORMATION

In 2008, the US Army Corps of Engineers Louisville District, through GEO Consultants, LLC contracted with Brockington and Associates to prepare architectural and historical documentation of the Cold War-era National Stockpile Storage Site, at Clarksville Base, Fort Campbell, Kentucky, as part of mitigation for the construction of new buildings in the area. Based on previous cultural resources surveys, the Tennessee Historical Commission (THC) and the US Army concurred that Clarksville Base, an early atomic weapons storage facility, was eligible for listing on the National Register of Historic Places (NRHP) under Criterion A, as a historic district significant for its association with the Cold War. The Army has determined that the construction of new buildings at Clarksville Base will have an adverse effect on historic properties that are eligible for listing on the NRHP and has consulted with THC and the Advisory Council on Historic Preservation pursuant to 36 CFR 800, the regulations implementing Section 106 (16 USC 470ff) of the National Historic Preservation Act (NHPA) as amended through 1992, Section 110 (16 USC 470h-2) of the NHPA, and Section 111 (16USC470h-3) of the NHPA, and this documentation is one element of the mitigation strategy.

Brockington and Associates was contracted to produce the documentation as specified in the Clarksville Base Programmatic Agreement for each of the unique building designs constructed during the operational period of the Clarksville Base. The documentation includes a narrative text describing the documentary project and the historic context and background of the facility. This report has also been included to consolidate previous historical information and to provide a critical narrative that captures development and/or implementation of engineering principles, innovative and/or surviving technologies, and extractive/manufacturing processes.

The estimated 75 structures selected for the project included unique building designs constructed during the operational period of the Clarksville Base. As part of the task, Brockington was responsible for producing four sets of drawings on Mylar for each of these 75 buildings (not including standard storage igloos). Secondly, the project called for four sets of printed photographs on archival quality paper and high quality digital photographs meeting the National Park Service’s Digital Photography Standards. Finally, the photographs would be accompanied by four sets of narrative descriptions of the buildings, including their history and architectural features to the extent that information allowed.

Methods of Investigation

Clarksville Base has been the subject of several historical studies, and therefore, Brockington historians utilized the previous reports as the basis for this documentation in addition to gathering additional data to the extent that it was available. These previous studies were supplemented with an additional review of original drawings as well as the installation real property files.

The photography conducted for this project is consistent with the National Park Service standards for digital photography (as of January 2009). Photographs were taken with a Nikon D3000 digital SLR camera in Nikon's proprietary RAW image format (NEF). These images were then converted to TIFF files for printing on archival quality paper. The TIFF and RAW images were burned onto CDROM or DVD media as size allowed. The final format of the documentation consists of the photographs, electronic media, and data sheets contained within archival quality folders and boxes for permanent archiving. In addition, these materials are accompanied by four sets of mylar drawings.

Previous Investigations
The Clarksville Base has been the subject of several cultural resources reports. In the mid-1990s, Sandia National Laboratories evaluated contamination issues of several structures on Clarksville Base.[105] In 1998, the Fort Campbell Cultural Resources Management staff conducted survey and documentation of the Clarksville Base area of the installation in Montgomery County, Tennessee. The Army was proposing the construction of a National Guard training complex on 50 acres of Clarksville Base. The US Army determined that Clarksville Base was eligible for inclusion on the National Register of Historic Places as an historic district. Its significance is related to the early Cold War and nuclear weapons storage technology. However, the National Guard facility would have no adverse effect on Clarksville Base.[106]

In 1999, the Tennessee Historical Commission concurred, based upon the report provided by Fort Campbell Cultural Resources Program, that Clarksville Base was eligible for listing on the National Register under Criterion A for its association with the early history of the Cold War, and C for its distinctive design and physical characteristics.[107]

Fort Campbell CRM staff determined that this earlier study needed to be supplemented in order to achieve the more comprehensive management purposes required under Section 110 of the NHPA. In 2004, the Army hired BHE to document the current condition and historic association of Clarksville Base in detail, with particular emphasis on the definition of contributing and non-contributing properties and features of the district and of buildings and structures. BHE also identified management and preservation concerns for properties, elements, features at Clarksville Base, and made

---

[105] Sandia National Laboratories. Site Summary for The Fort Campbell (Clarksville Base) Kentucky/ Tennessee Former Weapons Storage Area, 1996. Manuscript on file, Environmental Division, Fort Campbell, Kentucky; Sandia National Laboratories. Trip Report-Fort Campbell (Clarksville Base), Kentucky/Tennessee, Former Weapons Storage Area, 2004. Manuscript on file, Environmental Division, Fort Campbell, Kentucky.
[106] Gray, Humpt, and Mitchell, *Architectural Survey of the Proposed National Guard Complex on Clarksville Base, Montgomery County, Fort Campbell, Kentucky*,
[107] Chanchani and Leary, Clarksville Base Historic District Inventory and Management Plan. BHE-DACA27-01-D-0004, Delivery Order # 0023., 12.

recommendations for the management of the historic district and properties and features.[108]

The Clarksville Base has also been the subject of other studies. Debbie McGaha Bratton, a local reporter, has written articles about the base.[109] The US Department of Energy produced *Closing the Circle on the Splitting of the Atom* and *Linking Legacies: Connecting the Cold War Nuclear Weapon's Production Processes to their Environmental Consequences* that focused on the environmental legacy of the American Nuclear Weapons Program.[110] Clarksville Base is briefly discussed in these works.

---

[108] Chanchani, Konicki, and Sweeten, *The Historic Context For The Cold War at Ft. Campbell, Kentucky*, ii.
[109] Debbie McGaha Bratton, "The 'Bird Cage'" *Our City* 2:12-13.
[110] US Department of Energy, "Closing the Circle on the Splitting of the atom," http://legacystory.apps.em.doe.gov/index.asp; US Department of Energy, "Connecting the Cold Wars Nuclear Weapon's Production Process to their Environmental Consequences," http://legacystory.apps.em.doe.gov/index.asp.