

# Mount Williams

Archaeology at the World War II Norman Naval Air Station Machine Gun and Rifle Range in Norman, Oklahoma



John. D. Hartley, with contributions by Robert Bartlett

Oklahoma Department of Transportation  
ODOT Cultural Resources Research Report Series, No. 5



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Machine Gun and Rifle Range in Norman, Oklahoma

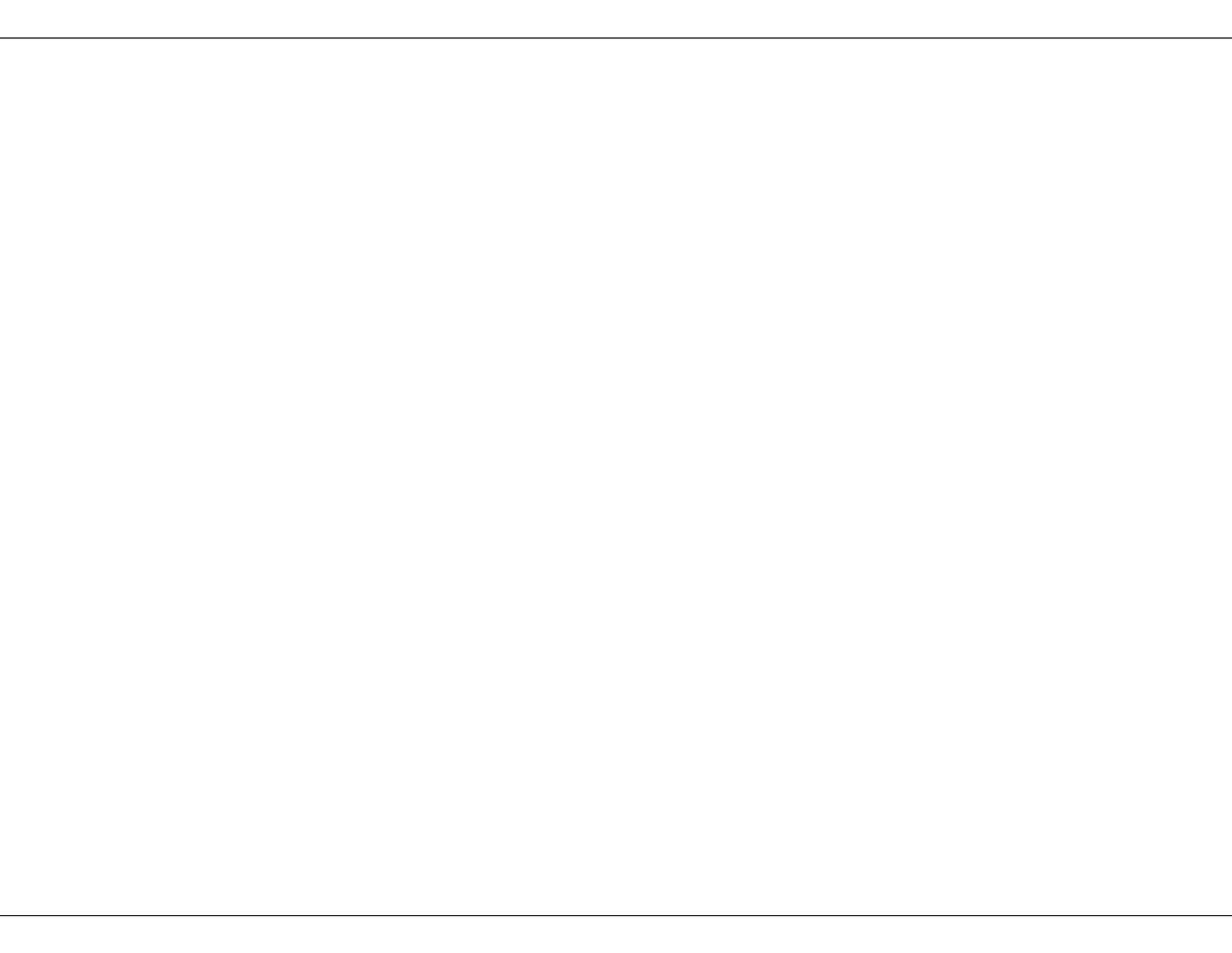
John D. Hartley  
With contributions by  
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Oklahoma Department of Transportation  
Environmental Programs Division  
Cultural Resources Program  
Norman, Oklahoma

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2018

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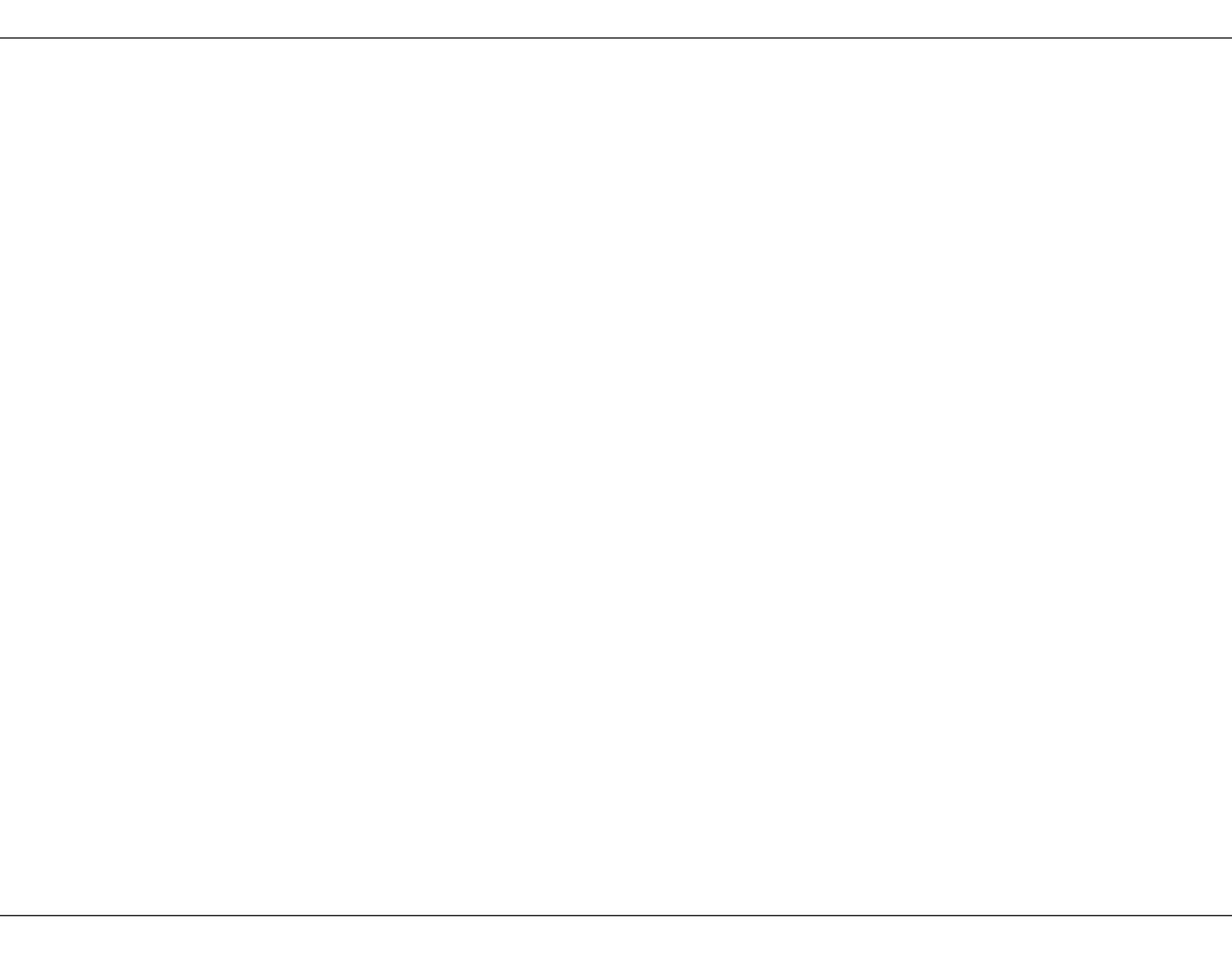
*In Memoriam*

*Robert Bartlett  
(1956-2018)*

*Valued Co-worker and Friend  
without whom this report would have  
not been possible.*

*Requiescat in Pace*

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## Preface

For many long-time residents of Norman, memories of that big hill that greeted motorists on I-35 as they drove into town die hard. It told us that we were now home. More than the signs erected by the Highway Department reminding us that Norman was a “city of festivals”. More than the exit signs for the University of Oklahoma or Main Street. It was a landmark. Our landmark.

Some people only knew it as the “Norman hill” and had only the vaguest idea what it was. Others knew it had to do with an “old navy base” – a fact that had to strike some recent immigrants to our town as a bit outlandish: “A Navy Base?...in Oklahoma?” Others knew it was an earthen embankment that had something to do with a firing range on the base. Some of these folks called it “Bullet Hill”, and thought it was full of everything from lead rifle bullets to cannon shells. Maybe it was so full of lead or unexploded shells it was a health hazard, they thought. That’s why it was still there. It was too dangerous to touch, they supposed. A few local historians or Navy veterans knew it had a real name, “Mount Williams”, and also knew that Norman once hosted one of the largest and most important U.S. Navy aviation training centers in the Second World War.

For many years Mount Williams often sported cloth signs or spray painted graffiti to entertain passing motorists. “Beat Texas” was a common message, as were other less polite opinions regarding that university to the south, often authored by OU sorority and fraternity members. Norman High students also wanted people to know they existed so they left their calling cards. Occasionally, one might see messages proclaiming young love and affection, or support for certain causes or politicians. In today’s litigious world, the mound might be considered a dangerous “attractive nuisance”. But in the time before the internet, social media, and hyperactive lawyers, it was a giant, free, billboard that anyone willing to sneak into an active airport and brave the snakes and stickers could use. Those who did no doubt discovered there was more to it than a big pile of dirt. There were half-buried concrete walls, foundations, and even a secret underground room to explore. Gradually, over the years, the mound began to lose its shape as it was mined for dirt by the University of Oklahoma, its owner. It and the surrounding field became overgrown with scraggly trees and bushes. By the turn of the century, it had become a lumpy weed-covered pile of dirt - even to some an eyesore - a far cry from the long flat-topped engineered earthwork that it used to be. Then, in 2006, it was gone, a victim of progress.

I first saw Mount Williams in 1968 when I arrived in Norman to study archaeology at OU. As a prospective archaeologist, I wondered what this obviously artificial mound was. Although I already knew better, part of me wanted to believe it was a prehistoric Caddoan mound. Later in the early 1970’s I worked at, and then managed, the University’s Oklahoma River Basin Survey (ORBS) laboratory on “North Base” as the old air station was still informally known. ORBS was, despite a name that conjured up images of fisheries and river bottoms, an archaeology arm of the University of Oklahoma. We were housed in a drafty corner of “Building 1001”, which I soon learned was once the recreation hall for the Norman Naval Air Station. We could look out the back landing of our lab and see the old base swimming pool, and behind that, the huge hangar-like indoor drill hall. The place exuded the ambience of the Navy and World War 2 “temporary” buildings – asbestos siding, peeling brown linoleum floors, high ceilings, old windows with cracked sills that often no longer opened, stenciled room and corridor numbers, and echoes of our footsteps when we walked down the cavernous halls to the lavatories or drinking fountains. It was boiling hot in the summer and freezing in the winter. Several of my coworkers and I enjoyed playing naval war games. We would come in in the evening and re-fight historical battles with tiny lead ships and brown linoleum substituting for the Pacific Ocean or North Sea. It was then that I began to develop my interest in what the United States Navy was doing in Norman, Oklahoma, and why.

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In 1976, my family and I moved from Norman and I no longer thought much about the Norman Naval Air Station or Mount Williams. However, as fate would have it, we moved back in 1985 when I was hired as the Department Archaeologist for the Oklahoma Department of Transportation (ODOT). In 1993, as described in the following study, ODOT became involved with Mount Williams when we were approached by the City of Norman and OU to build the extension of NW 24<sup>th</sup> Avenue through the old naval air station, just east of Mount Williams. It was during the survey for this work that we determined that Mount Williams, as part of the air station, was a significant historic site worthy of preservation. Over the next thirteen years we attempted, with the Oklahoma State Historic Preservation Officer's help, to convince the University to preserve and restore Mount Williams as an interpretative exhibit describing and honoring the Norman Naval Air Station and its role in the Second World War. Several times we believed we had reached solutions that could preserve all, or some, of the mound only to see the owners of the property eventually tell us that the mound just had to go to make way for the retail shopping complex that now occupies the site. We were, however, able to convince the site owners to support and assist with archaeological investigations of Mount Williams and its associated features, the results of which you will read about in this study. Today, a Target store sits on the former site of the Mount Williams firing range, an unintentional and ironic reminder of what once existed there. People who shop at Target and the adjacent strip mall will turn on "Mt Williams Drive" to get there, although probably only a tiny fraction know what the street sign honors, since there is clearly no mountain in sight.

The people and organizations that assisted with this study and the years leading up to it are almost too many to name, but I will try. During the initial 1993 survey, I was assisted by Joe Watkins of the Oklahoma Highway Archaeological Survey. Joe has since gone on to greater things, but I will always treasure my association with him at ODOT. Robert Bartlett of the ODOT Cultural Resources Program directed the 2005-2006 winter fieldwork on which this report is based and, with Lauren O'Shea-Knittle, conducted most of the initial laboratory work and analysis of the recovered bullets and cartridges. This report also drew on several unpublished interim reports and papers prepared by Mr. Bartlett. This report would simply not have been possible without Robert and his dedication to the documentation of Mount Williams. Mr. Bartlett was assisted by an able field crew consisting of Rhonda Fair, Lauren O'Shea-Knittle, Andy Knittle, Adam Graves, and Natalie Graves. These stalwart souls endured harsh winter conditions and the occasionally equally harsh expectations of their boss (me) and the site developers who were attempting to meet agreed-upon schedules. The construction crews for White Construction provided excellent and timely assistance to the archaeological field crew throughout the project. Among current staff of the ODOT Cultural Resources Program, I am indebted to its Director, Scott Sundermeyer, for his wholehearted support of this report and providing me with office space, equipment, and whatever else was needed to complete it. In their own ways, Greg Maggard, Mike McKay, and Kristina Wyckoff of the ODOT Cultural Resources Program provided useful advice, assistance, and good humored companionship when I worked in their office. I must also thank Stephanie Hixon of the Cleveland County Historical Society and the staff of the University of Oklahoma's Western History Collection and for providing access to their collections related to the navy bases in Norman.

I must also acknowledge my former supervisors at ODOT, particularly Dawn Sullivan and David Streb, who were strong advocates for the 2005-2006 ODOT work at Mount Williams, despite the fact that it was not required by federal laws or regulations. As Ms. Sullivan told me, it was simply "the right thing to do". In a bureaucratic infrastructure organization such as ODOT, it is not often that one hears words such as these. In addition, Ms. Sullivan and Mr. Streb were valuable allies when explaining to various ODOT Directors and Transportation Commissioners over the years why ODOT was involved with Mount Williams and why its archaeologists were working on a project that was not directly related to a federally-assisted highway project. In this context, I must also acknowledge my later supervisors at the Federal Highway Administration Oklahoma Division (FHWA), especially Elizabeth Romero, who allowed me to continue my involvement with the Mount Williams project after I retired from ODOT and took on a position with FHWA.

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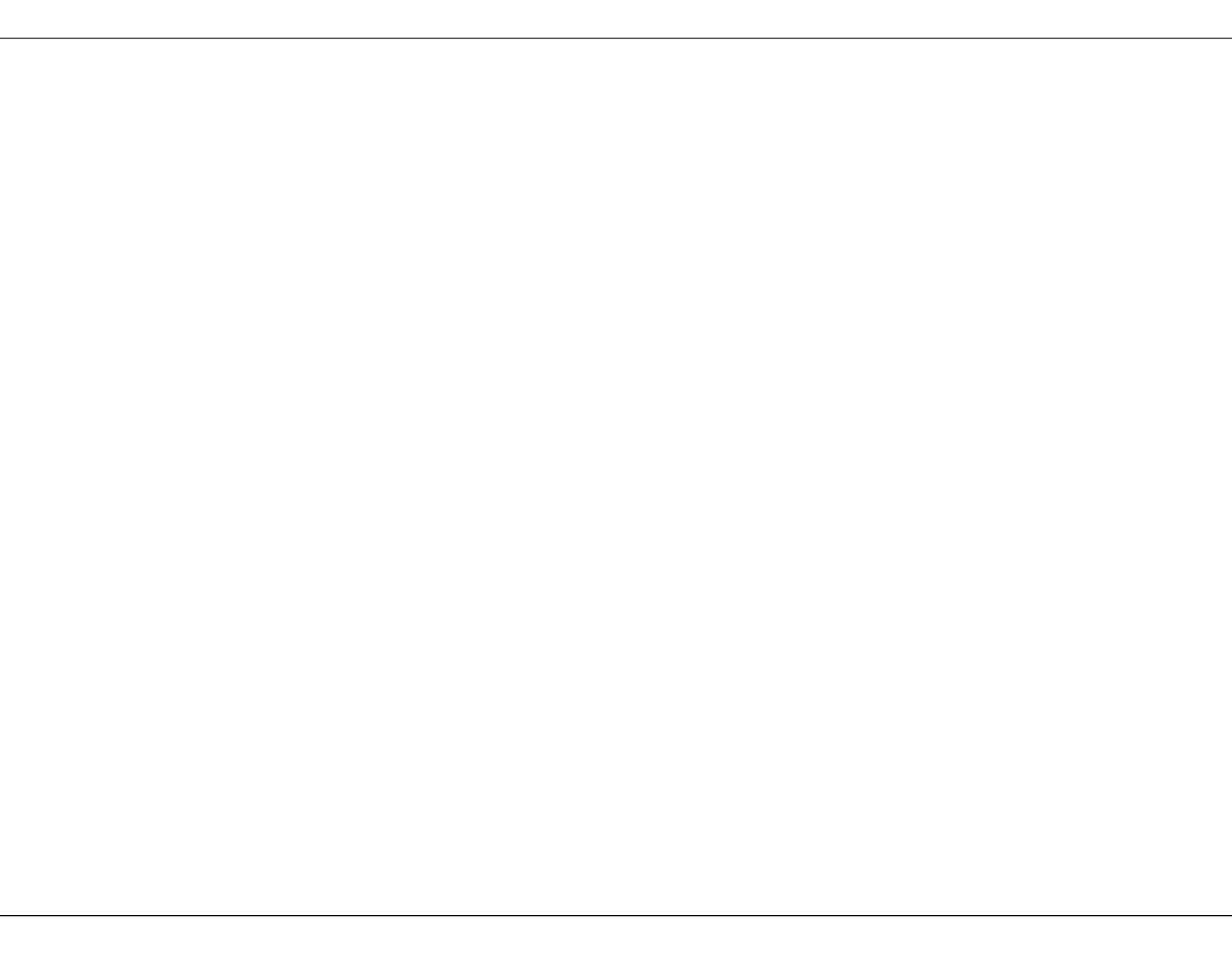
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This report and the work on which it is based would also not have been possible without Bob Blackburn, Melvena Heisch, and Charles Wallis of the Oklahoma State Historic Preservation Office, who provided advice and assistance to ODOT and the site developers regarding possible preservation and mitigation options for Mount Williams. In particular, Dr. Blackburn, as Director of the Oklahoma Historical Society and Oklahoma State Historic Preservation Officer, lent his authority to the preservation efforts and ably negotiated with all parties to develop a mitigation solution that, while not preserving Mount Williams, provided a means of documenting its history and features for posterity.

Finally, I must thank my wife, Basha, who has put up with being an archaeologist's wife for 47 years and still counting. I cannot thank her enough for her love and emotional support during both good and frustrating times while her husband traipsed off to the jungles of Central America, the deserts of Utah and western Colorado, the swamps of Louisiana, the local pub, or wherever else his chosen profession took him.

As always, any errors or inaccuracies in this report are the author's alone.

John D. Hartley  
Norman, Oklahoma  
October 2017

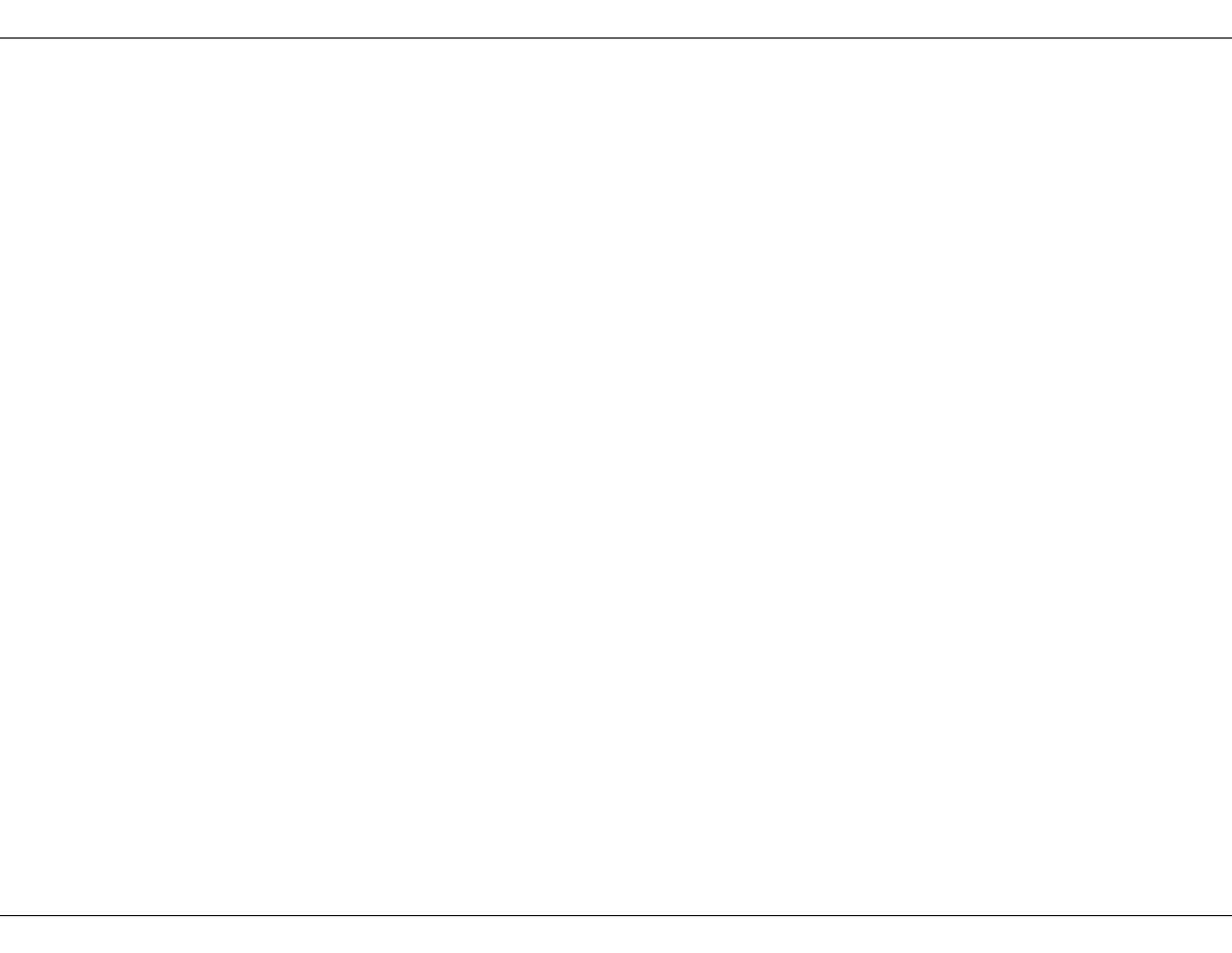


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# CHAPTER 1 - THE NAVY AND NORMAN

## Introduction



*Figure 1—NNAS wartime insignia. Such insignia were often informally designed by base personnel and reflect characteristics of base activities and location. The NNAS emblem was designed by Harold Frank, who chose a jackrabbit to represent Oklahoma. The rabbit is carrying textbooks which represent the training mission of the base and is being chased by lightning and running speedily on clouds. The images denoting speed indicates the urgency and efficiency of the NNAS training program. Intentionally or not, the emblem also reflects the common perception by many trainees that Oklahoma was a dry and stormy place for a future naval aviator to train.*

On December 6, 1941, Norman, Oklahoma, was a sleepy college town of approximately 11,000 souls, few of whom had any concern regarding the world conflagrations affecting Europe and China. The University football team had just completed a 6-3 season under first-year coach Dewey Luster, and fans were hopeful their Sooners would do even better in 1942. City residents were getting ready for Christmas, and most of the university students were either preparing for exams or their Christmas vacations.

On December 7, 1941, the “day that would live in infamy”, things changed drastically, for Norman, for the United States Navy, and for the nation. Prior to the Japanese attack on Pearl Harbor, the Navy operated only one major aviation training base, at Corpus Christi, Texas. Upon America’s entry into the Second World War, the Navy realized that this single facility would be totally inadequate to train the number of aviators needed to crew the 27,500 new airplanes ordered in 1942. The Navy requested funding to establish six new aviation training stations, all of them at inland sites near the center of the country.

Domestically, the United States was still suffering from the effects of the Great Depression. Communities from across the country eagerly competed for massive defense projects that would not only help defeat the Axis powers, but more immediately provide local jobs and infrastructure improvements.

Due to the combined lobbying efforts of the City of Norman, the Norman Chamber of Commerce, and the University of Oklahoma, Norman was successful in convincing the Navy to establish one of its six primary flight schools in Norman, despite several concerns expressed by the Navy. These concerns included air space, length of available runways at the proposed site (the University’s Max Westheimer flying field north of town), the availability of housing, and desirable weather.

Later in 1942, the Navy decided to locate three other important facilities in Cleveland County: (1) the Naval Air Technical Training Center (NATTC) south of the University, (2) a 400-bed naval hospital on the grounds of the technical center, and (3) a naval air gunnery school near Lexington, Oklahoma. A factor common to both main Norman sites was their location adjacent to the Santa Fe Railroad, which helped facilitate the transportation of construction materials, equipment, supplies, and war materiel to and between them. Eventually, between the two naval bases and related training and operational programs, the naval establishment in Norman and the nearby vicinity comprised the following organizations, divided among the Naval Air Station (“North Base” in local informal jargon), the Air Technical Training Center (“South Base”), the Naval Hospital at the Air Technical Training Center, the Purcell Naval Air Gunners School near Lexington, and the Navy V-12 Unit at the University of Oklahoma:

- Naval Air Station
- Naval Hospital, Norman, Okla.
- Naval Air Technical Training Center, Norman, Okla.
- Officer in Charge of Construction of Yards & Docks Contracts in the Norman Area.
- Navy V-12 Unit, University of Oklahoma, Norman, Okla.
- Naval Training School (Aviation Radar Operator's School), Naval Air Technical Training Center, Norman, Okla.
- Epidemiological Unit No. 43.
- Naval Training School (Aviation Metalsmiths), Naval Air Technical Training Center, Norman, Okla.
- Naval Training School (Rubberized Equipment Repair), Naval Air Technical Training Center, Norman, Okla.
- Naval Training School (Advanced Aviation Machinists Mates), NATTC, Norman, Okla.
- Naval Training School (Advanced Aviation Metalsmiths), NATTC, Norman, Okla.
- Combat Aircrewman Training School (AOM), NATTC, Norman, Okla.
- Combat Aircrewman Training School (AMM), NATTC, Norman, Okla.
- Purcell Naval Air Gunners School (Lexington)

Although the primary purpose of this report is to present the result of Oklahoma Department of Transportation archaeological salvage operations at the former “Mt Williams” firing range constructed at the Norman Naval Air Station (NNAS) in 1942, this chapter is intended to place these features within their overall context at the Air Station and its role in preparing young Americans for service in the Navy. It is to that end that this study begins with a general background of the NNAS, its principal training activities, and its relationship to the city of Norman and other naval installations in the vicinity.

When compared with fighting units and warships, stateside training facilities tend to be overlooked in the popular and scholarly literature of the Second World War. Secondary histories relating specifically to

## A Note on Sources

All sources used in this report are credited in an annotated “Notes on Sources” chapter in this report. This format is commonly used by the United States Naval Institute Press and other publishers of military history, and the author feels it is appropriate to a study such as this which is intended for popular readers as well as specialists.





Figure 3—View of NNAS, looking west. Oklahoma Electric Railroad (the "Interurban") is in the foreground. (CCHS)

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The NNAS was one of six primary aviation training stations constructed by the US Navy as part of the 1942 wartime buildup. The other stations were located at Memphis (Tennessee), Ottumwa (Iowa), Hutchinson (Kansas), Olathe (Kansas), and Bunker Hill (Indianapolis), Indiana. All were situated in the interior of the country, both for ease of access and security.

According to the official history of the U.S. Navy Bureau of Yards and Docks and Civil Engineer Corps, the NNAS and its sisters were classified as “Primary and Intermediate Training Stations” and were similar in overall conception. As described, the NNAS was “built just northwest of the City of Norman, west of the Santa Fe Railway, in an area that had been farmland until shortly before the war, when a portion of it had been developed as a flying field operated by the University of Oklahoma.” The design for the NNAS was similar to the layout used for the Memphis NAS. This comprised four runways, each approximately 5,000 feet long, and two large “landing mats” where training aircraft could be easily landed and serviced. The Bureau of Yards and Docks history also summarizes the building of the Norman Air Technical Training Center, noting that buildings at both bases were “primarily temporary” and that level terrain and their location along the Santa Fe Railroad favored both Norman sites. The Bureau described a major obstacle as the unavailability of experienced labor in the area, requiring “farmers and laborers from the surrounding villages” to be trained during construction. This problem was made even worse by the concurrent construction of other major defense facilities (such as the US Army’s Tinker Field) in the general vicinity. “Nails and lumber were at a premium, and much of the lumber was so green that considerable trouble was encountered later by shrinkage, warping, and splitting. Because of severe dust and wind storms, cracks thus left around door and window frames proved more perplexing than in most other regions. High winds, in several instances, blew off numerous sections of roofing. Bermuda grass was eventually used advantageously to alleviate the dust problem within the station grounds”. Despite these problems, both Norman bases were completed in “satisfactory time” (US Navy, 1947).

Compared with the pace for development associated with modern infrastructure projects, the “satisfactory time” described by the Bureau of Yards and Docks and Civil Engineer Corps seems little short of miraculous today. Within days of the March 1942 decision to build the Norman air station, the Navy obtained a 99-year lease on the University’s Max Westheimer field, \$7,000,000 was allocated for construction, and contracts were awarded to Harmon Construction Company of Oklahoma City, Tankersley Construction Company of Oklahoma City, and the Cowan-Norton Company of Shawnee for construction. On April 14, 1942, Lt. Cmdr. R.H. Meade arrived in Norman to oversee all naval base construction activities in the Norman area, and the still incomplete NNAS was officially commissioned on July 31, 1942, under the command of Lt. Cmdr. J.W. Williams, Jr, whose primary responsibility was to oversee final construction. Flight instruction commenced shortly thereafter. The total construction cost of the NNAS was approximately \$9,774,000, and another \$12,000,000 was spent on the NATTC. By September 1942 over 10,000 civilian laborers were working on all the Norman area bases. Work on the NNAS and other major naval projects in the Norman vicinity was essentially completed in time for a massive October 27, 1942, Navy Day Parade involving upwards of 3,500 service people and participants from local churches, social organizations, and businesses.

At their peak operation, as many as 10,000 men and women were assigned to the Norman bases, essentially doubling the town’s population and significantly altering its demographics. Beginning in March 1942 and continuing until after the bases were complete, the Navy, the City of Norman, and the University of Oklahoma attempted to address several issues stemming from these changes.

A five mile health and safety zone was established around the NNAS (including the entire town of Norman) where substandard privies were replaced or remodeled to be “fly-tight”, although city sewer hook-ups were not mandatory. Up to 200 substandard outdoor privies requiring improvement were identified, a number of which were already being improved as part of an unrelated Works Progress Association (WPA) project.

The Navy initially estimated that at least 400 off-base dwellings would be required for base personnel, with approximately 80% of married officers requiring two- or three- bedroom homes. Although single civilian workers could be housed in University dormitories, this was only possible when school was not in session. Because demand for housing could not be met, rental costs spiraled out of local control, requiring the Oklahoma City Office of Price Administration to step in and recommend that Norman be designated a “defense rental area” and be given 60 days to stabilize rents.

Not only did the City lack sufficient housing, many of the existing vacant houses were in varying degrees of disrepair, requiring the city to issue a proclamation asking its citizens to “clean up, paint up, and beautify” their homes and modernize and repair rental properties. Improvements to the city’s firefighting, police, parks, and utilities infrastructure were also undertaken. The University of Oklahoma, which had initially lobbied hard for the naval air station, soon discovered that its own Civilian Pilot Training Program at Max Westheimer had to be moved to Oklahoma City’s Wiley Post airfield.

Other local concerns the Navy needed to address spoke more to the social mores and prejudices of southern pre-war America than economics. One of these was the perception that the influx of many single naval enlisted personnel would adversely impact the “moral character” of the Norman community or attract gamblers, prostitutes, and other unsavory criminal elements. The presence of thousands of single seamen in Norman was also a concern to the co-educational University of Oklahoma, which, in the age of *in loco parentis*, believed it had a responsibility to protect the “honor” of its female students. Despite opening many of its activities to naval personnel, and encouraging both its male and female students to socialize with sailors in organized dances, the University also had to quell rumors of fights and hostility between its students and naval personnel staying in former fraternity houses set aside for this purpose while on “shore leave”.

## Building the Bases

The scope of wartime base construction far eclipsed anything Norman had seen before or since. Construction on the NNAS began on April 22 with preliminary surveying and staking. By late June, over 2,000 laborers were working on site, and with the addition of the other three Norman-era facilities, this number had ballooned to over 10,000 by September. Approximately 50% of these men were unskilled laborers, many of whom required on-the-job-training. As much as practicable, preference was given to local laborers and contractors.

A total of 52 companies contracted or subcontracted for the naval construction projects. The construction companies hired through local labor union offices in Norman and Oklahoma City. The Oklahoma City wage scale of \$10/hour, which was higher than that in Norman, was established for all base jobs. Most laborers lived in rented apartments or houses in Norman or in federally established trailer camps outside of the city. By fall, when construction was tapering off, naval or civilian instructors and base staff had moved into many of the Norman houses or apartments that had been used by the temporary laborers.

During the peak of construction, approximately 50 to 60 trainloads of material and supplies arrived by rail daily at the NNAS. As much as possible, construction was of “non-strategic” materials. During construction of the NNAS hangers, 30,000 pound wood roof trusses were substituted for the originally planned steel, and this proved to be a very durable replacement. Trusses were built on site and hoisted into place with cranes. Depending on the situation, other replacements for metal included plywood, asbestos, concrete, or asphalt roofing materials.

Of more concern to many white Norman residents was the potential stationing of African-American personnel at the NNAS, which was announced by the Navy in April 1942. In a meeting with Norman leaders, Lt. Cmdr. Williams of the NNAS defended the move, noting, "We are all in the war, black and white." Although the U.S. Navy was in fact the most segregated US military service in the Second World War and restricted its small number of African-American personnel to service-related duties, the prospect of an African-American presence at the naval bases was clearly unpopular with many Normanites. Norman, like many small all-white southern towns had unwritten Jim Crow "sundown" rules that barred African-Americans from residing in the city limits or even merely being present after dark. In a July 10, 1942, article entitled "Negroes in Norman" the local *Norman Transcript* newspaper warned that the bases "may change a situation that has prevailed ever since the day Norman was first settled in the run of 1889, that of having no negroes here." The paper noted that "100 or more" African-Americans would be stationed at the NNAS, the NATTC, and the Naval Hospital and that "some of them may have families who will want to reside in Norman". The paper urged its readers to face the influx of black personnel "calmly, gracefully, and with no racial protests." Others noted the possibility that some (white) naval officers who live off base might expect to bring their black domestic servants with them. Some people even feared (or in some cases hoped) that the Navy bases might herald an end to Norman's sundown policies.

In fact, the presence of a small African-American contingent at the Norman naval bases did little to change Norman's long established prejudices, in part because of the Navy's own segregation policies. Rather than take "shore leave" in Norman, Black servicemen were encouraged to ride the Interurban train to Oklahoma City, and the Navy provided on-base dances for black personnel, coeds from Langston University being brought in as dance partners for the sailors. While the small number of African-American servicemen stationed at the Norman bases may have slightly cracked open Norman's "sundown" status during the war, the city returned to its old ways after the war. These cracks were reopened by the admission of a few black students to the University of Oklahoma in the late 1940's and 1950's, but it wasn't until the 1960's that most vestiges of Norman's sundown rules disappeared.

**Not all aviation cadets** immediately went into primary flight training. Because the Navy recruited more men as potential aviators than it had a need for, many men passed from flight school to flight school as "pre-flight" cadets. These men received all the classwork and ground education of their colleagues, but usually ended up working as "Tarmacs" - menial labor involving moving airplanes from hangars to the airfield, moving them around the tarmac and trying them down. In a 2008 online memoir entitled *Knights and Squires* (no longer posted, unfortunately) one former "Tarmac" describes being sequentially assigned to Hutchinson NAS, Norman NAS, and finally Natchitoches, without ever learning to fly. However, this memoir contains some interesting details regarding a young man's impression of life at the NNAS in 1944, a few of which follow below.

*"The Air Station at Norman was even windier than Hutchinson...this is a funny place, believe me. In two days, we've had two hurricanes [sic]. Each time the whole station shut down...A week later we started working on the flight line, warming up planes...anyhow there was a terrible storm, and I was in it. We were all rushing around trying to put covers on the cockpits and motors and I got soaked...We were also drilled in knot tying, not for use on ships, but so that we could tie down planes against the fierce Oklahoma winds, and since we were still regarded as potential pilots, who carried side-arms, we had target practice with .38 pistols. From 2200 to 0200 I carried a "38" revolver, and scared the pants off some drunks. They thought I was going to blow their heads off."*

## Riding the Interurban

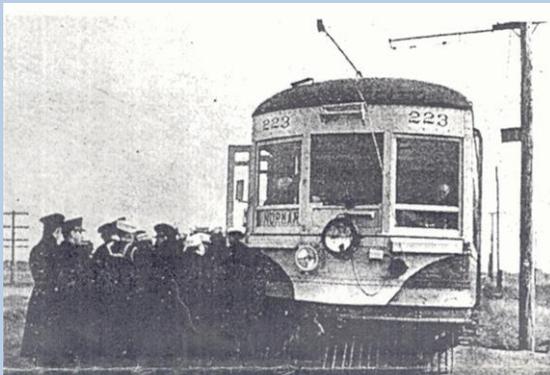
Although the Oklahoma Electric "Interurban" Railway is remembered with fond nostalgia by some today, the writers of the NNAS *Norman Log* had some less than sterling comments regarding this essential part of the sailor's life in Norman:

"Breathes there a man at NAS who has never taken his life in his hands and bought a ticket on the Interurban to Oklahoma City."

"The butt of many jokes, the always crowded cars, running on a half hour schedule most of the day and hourly the rest, provided the only means of transportation for much of the personnel when they went to the 'city' for the night or week-end."

"Due to the heavy traffic, especially on week-ends, double-deckers were put on to alleviate the crowded conditions caused when thousands of men from both the north and south bases wanted to get somewhere within a few minutes after secure."

"The 40-minute ride to Oklahoma City, 18 miles north, was a Toonerville Trolley affair for a while, with frequent breakdowns, delays, and, even head-on collisions contributing to the piquancy of a ride to town."



"The number 223 does not mean there are 222 other cars on the line." A bit of humor from the *Log*.

## Norman Naval Air Station Activities and Operations in the Second World War

The Norman Naval Air Station was formally commissioned on July 28, 1942, barely three months after initial earth work began. The base was deactivated on March 1, 1946. Although its *raison d'être* was primary flight training, the Navy also operated an enlisted men's boot camp at the base. The US Marine Corps also organized a Marine Corps Reserve Unit and boot camp at the NNAS, with a complement of approximately 1,400 men. In 1943 a sizeable WAVE (Women Accepted for Voluntary Emergency Service) detachment was established for service and training at both the NNAS and NATTC. Most WAVES trained as machinist mates or aviation mechanics.

During the Second World War, three officers commanded the NNAS: Lt Cmdr. James W Williams, Capt. William N. Updegraff, and Capt. Rufus C. Young. Cmdr. Williams was a reserve officer with a civil engineering background. His principal orders were to oversee final construction activities at the base, a job that was completed by October 1942. Some sources state that it was Cmdr. Williams' spur-of-the-moment idea to use spoil dirt from runway leveling to create a massive earthen embankment behind the target shed and handling trenches at the base's firing range. In 1943, this embankment was labeled "Mount Williams" on official plans of the base, leading credence to this supposition. Seven Executive Officers served the base: Lt. Cmdrs Carol Luethi, W.W. Shea, J.W. Hughes, W.B. McGinty, Marinus Jenson, and Cmdrs. Alfred MacCubbin and Ira Smalling.

During its three years of operation, a total of 8,945 cadets were assigned to the NNAS, of which approximately 6,500 graduated and moved on to advanced training, primarily at Corpus Christi NAS. These students accrued approximately 830,000 hours of flying time of which 32,000 comprised night flying. The first group of flight cadets arrived at the NNAS in early September 1942 after the first of two large hangars planned for the base were completed. Although the base as a whole was only about 50% complete its complement already comprised 3,500 navy personnel, including trainee aviation machinist mates, metalsmiths, and ordinance men, as well cooks, boatswains mates, and other support staff. Additional staff arrived by October, including 60 officers. A total of about 250 instructors were assigned to the base, of which approximately 75 were civilians.

When the base was at full operation, Cadets arrived at a rate of 135 every two weeks. Cadets split each day equally between flight and ground training, with an additional emphasis on physical training. All naval aviators were expected to have the skills to be a pilot, a navigator, an aircraft gunner, or a radio operator. This required that all graduates of primary flight schools acquire the basic ability to fly a light plane and understand the theory of aerodynamics, a basic knowledge of aircraft design and maintenance, basic navigation and communication skills, basic gunnery skills, and be versed in aircraft and ship recognition. They would then graduate and be transferred to an advanced school to specialize based on their aptitude. Upon graduation, aviator cadets were awarded the rank of ensign and moved on to NAS Corpus Christi or Pensacola. The nearby NATTC offered advanced training for machinist's mates, radar operators, metalsmiths, rubberized equipment repair, and combat aircrewmembers. The gunnery school near Lexington provided pre-advanced training in air-to-air and anti-aircraft gunnery. Assignment to the NNAS was not without its hazards: a total of 22 officers, 15 aviation cadets, and 9 enlisted men lost their lives in training or operations accidents.

The NNAS was one of the larger Navy primary aviation schools in the nation. Like all large bases it not only provided shops, hangars, mess halls, offices, indoor and outdoor training drill and training facilities, but also a large recreation building containing a dance hall and movie theatre as well as other benefits such as a large outdoor swimming pool.

Roads within the NNAS were named after ships or shore facilities associated with naval aviation. Many of these commemorated ships lost in action during the first several months of the Pacific War. The "main street" of the NNAS was Lexington Street, named after the aircraft carrier *USS Lexington*, which was lost in the May 1942 Battle of the Coral Sea. Other streets named after war casualties included Langley Street, serving the barracks area north of Lexington (*USS Langley*, the Navy's first carrier, lost in February 1942), Yorktown Avenue, running south from Lexington west of the main drill field (*USS Yorktown*, carrier lost in the June 1942 Battle of Midway), Hornet (*USS Hornet*, Yorktown-class carrier lost in the 1942 Solomon Islands fighting), and Wasp (*USS Wasp*, sunk by a Japanese submarine in September 1942). Other streets were named after the aircraft carriers *USS Enterprise*, *USS Ranger*, and *USS Saratoga*, while a few (Long Beach and Pensacola) were named after naval air stations. Kearsarge Avenue, which ran south from the main building complex to the perimeter road, was presumably named after *USS Kearsarge*, Union flagship during the Battle of Mobile Bay in the American Civil War.

Lexington Street ran due west from the east gate at the Oklahoma Electric Railway stop to the flight operations complex comprising flight control towers, two large hangars, and associated storage and workshop buildings. Barracks for enlisted men and WAVES, the WAVES mess, honey house, and brig were north of Lexington Avenue. South of Lexington was the main administrative and training complex. This included the large recreation center at the base entrance, a large outdoor swimming pool, the drill field and indoor drill house, tennis and handball courts, administration building, instruction building, mess halls, dispensary, cadet barracks, and large fields used for general recreation and physical training. The base was encircled by a gravel perimeter patrol road which could be reached by Saratoga and Kearsarge Avenues. The main (south) gate was on Saratoga Avenue. The Base Commander and Executive Officer lived in residences off the south perimeter road, which also provided access to the machine gun and rifle range including "Mount Williams" at the extreme southwest corner of the base (Figure 2).

Virtually all operational navy aircraft were flown into the airfield during the war. Many of these were former combat or transport aircraft that had reached the end of their useful flying life, but remained suitable to train machinists, mechanics, and ordnance men in various aspects of aircraft maintenance and repair. These aircraft were often flown into the NNAS for use by maintenance trainees at the NATTC south of Norman, since the NAATC lacked its own landing field. Among the aircraft that can be seen being serviced at the airfield or in various states of

disassembly in 1942-1946 photographs of the NNAS or NATTC are Grumman F4F Wildcat and F6F Hellcat fighters, Vought F4U Corsair fighters, Douglas SBD Dauntless scout bombers, Curtiss SB2C Helldiver dive bombers, Vultee SNV trainers, numerous North American SNJ Texan advanced trainers, Piper Cub liaison planes, Lockheed R5O Lodestar light transports, and Beechcraft SNB Kansan transports.



Figure 4—Boeing-Stearman N2S Kaydet, the principal trainer flown by aviation cadets at the NNAS. Because US Navy trainers were painted bright yellow for visibility, the N2S was colloquially known as the "Yellow Peril" by instructors and trainees.

Another primary trainer operated at the NNAS was the Timm NT2-1 Tutor. The Tutor was of more advanced conception than the Kaydet, being a two-place cantilever monoplane designed in 1940. Although it was reliable and generally popular, the plywood composite used to build the airplane was subject to decomposition. Because of this the Tutor was not intended for long term use. Only the Navy used the Tutor, 262 of which were ordered. A small number of Tutors were operated at the NNAS. The Spartan NP-1 was two-place biplane similar in concept to the Kaydet. Slightly over 200 were ordered by the Navy for reservist training, of which only a few found their way to the NNAS.



Figure 5—Timm NT2-1 Tutor, colloquially known as "Tiny Tim". The treated plywood construction gave the airplane a very smooth finish when compared with the Kaydet.

Flight cadets trained in three primary trainers, of which the Boeing-Stearman N2S Kaydet was by far the most common. The Kaydet was a rugged and forgiving two-place biplane of mixed construction certified for all aerobatics. The instructor and cadet sat in tandem open cockpits. The Kaydet was the standard primary trainer of the Navy and Army Air Corps from the 1930's through World War 2. Over 10,000 were built and they were operated by 20 nations in addition to the US. Many continue to be flown by private pilots today.

*"Norman was a big base, and there were many types of activities, including a very large choral group made up of Tarmacs, Waves, Cadets, officers and seamen and led by a former member of Fred Waring's Glee Club. Several of us tried out for it and were accepted, and the group got to perform for the entire station – our best number was 'the Battle Hymn of the Republic', done in Fred Waring's arrangement. The base was big enough to provide chaplains for the daily Masses that I and several friends attended.*

*"Every night there was a first-run movie. 'We go to the movies at night a lot,' I wrote to my family, 'but if it wasn't for the movies, I'd go nuts. They make me forget I'm not at home.' I did a lot of reading, too, much of it religion and philosophy. As at every military installation, rumors abounded. The ones that caught our attention had to do with shipping out."*

*--Knights and Squires (2008 online memoir)*



Figure 6—Spartan NP-1. Although manufactured in Tulsa by Spartan aviation, only a few NP-1s were used at the NNAS.

The Navy leased 17 outlying landing fields throughout Oklahoma to help train cadets in long distance navigation and various aspects of aircraft carrier or hazardous landing situations. Some of these sites had existing private landing fields but others were simply unimproved patches of farmland leveled and planted in grass. Most of these fields were returned to their owners after the war and have disappeared, but a few, such as a field near Goldsby south of Norman, became the site of small municipal or private airfields still in operation today. In a 2006 memoir entitled *Senior Birdman: the guy who just had to fly* (Price 2006), Eldon Price describes some of his experiences with the outlying fields. Price was unusual for a

cadet in that he already had some civilian flight training at the California Polytechnic Institute, so he and his group of cadets and their instructors



Figure 8—SBDs from NNAS flying over Oklahoma landscape (Smooth Log, 1944.)

immediately began flying their Stearmans to outlying fields that were designed to simulate various aspects of carrier operation. To master the basic techniques of landing on a carrier deck, a circle drawn on the ground was used. “We flew abeam of the circle downwind and cut the engine. Then we flew a 180 degree turn while descending dead stick and landed in the circle. The challenge here was to

maneuver the airplane in the wind without any power, then turn into the wind, planning the flight path so our landing was inside the circle. We had to land in the circle three out of five attempts.” Price also described touch and go landings on short fields, avoiding obstacles while landing, and taking off over obstacles.



Figure 7—Timm NT2-1 Tudor trainers from NNAS in flight. (CCHS)

Although available for recreational use on weekends, a major purpose of the large outdoor pool west of the base's recreational hall was to train cadets in various aspects of water survival. In the early 1940's men from rural inland states often had only the most rudimentary swimming skills if any at all, so it was essential that anyone who might serve at sea became at least adequate swimmers. The expectation for aviators was higher. Price described that fight cadets were required to pass water survival training that "included a simulated crash in which the pilot lost his hands and feet." This was simulated by "having straps tied around our ankles and wrists, and then – assuming we could get out of the airplane – we jumped into the pool and swam 25 yards, which is a safe distance from a sinking airplane and its water suction."

The NNAS was well equipped with a variety of recreational and athletic amenities, including the main recreational hall (Building 1001) with its dance hall and theater, the indoor drill hall which could be used for basketball games, a large outdoor athletic field for baseball and football, tennis courts, and handball courts. Musically-inclined men could join the station's band or chorus. Black personnel had their own band, the "Jive Bombers", which played at many base dances and social events. However, to the extent possible, enlisted men and cadets preferred "shore leave", which allowed them to visit the USO in downtown Norman for companionship and dances with WAVES and local ladies, attend University of Oklahoma functions such as chaperoned dances and football games, attend high school games, or frequent one of the several clubs that sprung up catering to sailors, marines, and soldiers on leave.

## The Norman Naval Air Station Zoomers

During the war, men were strongly encouraged to join organized football teams at their respective stateside bases, both as a recreational activity and, as the 1943 Naval Aviation Physical Manual put it, "to be superior to the enemy mentally and physically" so as to "run through and demolish a broken field of Axis planes." As many as 180 such teams were fielded, including about a dozen for black servicemen. They typically took names reflective of their service or base function ("Flyers", "Marines", "Blimps", "Bombers", "Winged Commandos", etc.).

In 1943 and 1944, the NNAS fielded the "Zoomers". As a large base, the NNAS could draw on a number of former college and professional players among its complement and, like other large base teams, was equivalent in quality to a major college or professional team. The NNAS competed against regional college opponents including the University of Oklahoma, Oklahoma State [then Oklahoma A&M], Texas A&M, and Arkansas as well as a few other military squads. The Zoomers compiled a 1-1 record against the hometown OU Sooners, losing 22-6 in 1943, but being victorious in 1944, 28-14. When playing OU, cadets at NNAS and NATTC usually filled most sections of the stadium, outnumbering OU students.

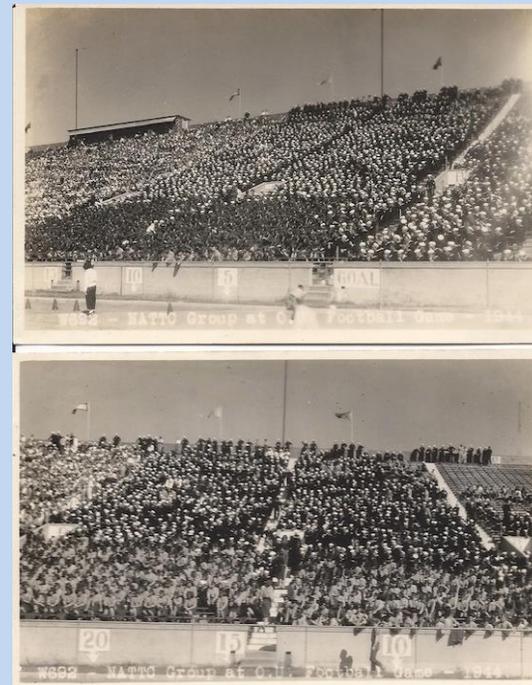




Figure 9—Postwar "Sooner Magazine" photograph showing proposed OU reuse of the NNAS.

## Base Closure

By August 1945, with the War in the Pacific ending, the Navy had made a significant investment in its Norman bases and initially intended to retain both as training facilities. However, both the City of Norman and University of Oklahoma lobbied for the NNAS to be closed, albeit for different reasons. The City was interested in obtaining the NNAS's eight water wells and the airfield as a municipal airport. The City also wanted to turn the NNAS's recreational hall, indoor drill hall, and swimming pool into a community center. Cleveland County coveted the NNAS as a possible new fairground. The University was primarily in need of housing and foresaw an even greater need once veterans returned from the

Or, as Price relates in his memoir, one could "ride the trolley [the Oklahoma Electric Railroad Interurban] to Oklahoma City for a nice dinner at a hotel or see a movie, often staying overnight at someone's home for \$1.50." Price also relates that his weekend shore leaves were often spent living in University of Oklahoma fraternity houses set aside for this purpose and attending OU and Norman high school games.

For Sooner games, the university typically reserved one side of Memorial Stadium for NNAS and NATTC personnel. At one such game against Texas A&M, Price and other Navy cadets were seated behind a group of Texas A&M students. Eventually "a fight broke out between [Texas A&M] students in army officer uniforms and those of us in the Navy." The Navy was apparently victorious because as Price relates, "Finally the A&M students moved to the other side of the stadium".

war and enrolled as students or sought staff and faculty positions. Although some in the Norman business community wanted the naval presence to remain, the university saw no benefit to itself in a navy base that would be training grade school or high school graduates unconnected to the university in any way. Eventually, the Navy decided to move its flight school at the NNAS to Memphis NAS. This decision was possibly hastened by a powerful “freak” September 1945 windstorm in Norman that damaged or destroyed many aircraft exposed on the flight line. The NNAS officially closed on March 1, 1946, although it was temporarily reactivated by the Navy on a small scale in the early 1950’s during the Korean War. The NATTC was also closed in 1946, but after reactivation during the Korean War, it remained in operation through 1959. The University eventually assumed ownership of both facilities, the old NNAS being restyled as a “university research park” initially housing a variety of academic and research labs in former naval buildings.

For many years after its final closure, despite its several official name changes by the university, the old NNAS was usually just referred to as “North Campus”. Old habits die hard, however, and even into the 1970’s one could occasionally hear older people from Norman and the university use the words

“north base” when talking about the Research Park. The name “Max Westheimer” was

restored to the airfield and its associated hangars and administrative buildings. Until the 1970’s, the university made extensive use of the many existing “temporary” naval buildings and offices, providing only minor renovations such as the addition of window air conditioning units or roof repairs. Many buildings even retained their original NNAS numbers stenciled in large black exterior numbers.



Figure 10—View of damage from September 1945 windstorm. (CCHS)



*Figure 11—Monument at the Max Westheimer airfield dedicated to the NNAS and those who served. (ODOT)*

With a few exceptions, the original system of circulation roads was maintained, but the new owners wasted little time replacing most of the original names commemorating naval ships with those they presumably considered more appropriate to a scientific research park or its Max Westheimer airport: Saratoga Ave became “Newton”, Ranger and Hornet Streets were linked and renamed “Westheimer”. “Halley” replaced Yorktown, “Priestley” replaced Enterprise. Wasp became “Goddard”, and Langley was renamed “Pasteur”. Kearsarge Street was obliterated, but a road occupying its general alignment was restored in the 2000’s when an extension of Norman’s Berry Avenue was built. Today, only Lexington Avenue retains its original name.

By the late 1990’s many of the base’s “temporary” buildings had reached the end of their useful life and were being demolished at an ever quickening pace. In addition, new construction, especially a large YMCA building on the site of the old drill field, the university’s computer center, the large National Severe Storms Laboratory complex, and many new private aviation hangars were built. Today, only a handful of original NNAS buildings remain. Arguably, only one of these still conveys a sense of its historic importance as part of a major naval base. This is Building 1005, the large NNAS indoor drill hall. Due to its hangar-like appearance, Norman residents often called it an “old hangar”, but that was not its principal purpose. Because of its large open interior space, Building 1005 has been used for a variety of recreational purposes, as a filming sound stage, and for other purposes until very recently. Eventually it and all other NNAS buildings will disappear, and the only visible evidence “a navy base on the plains” ever existed at Norman’s Max Westheimer airfield will be a few photographs in the airport terminal building and a small commemorative plaque by the terminal’s entrance.



# CHAPTER 2 – PROJECT BACKGROUND

## *Initial Investigations*

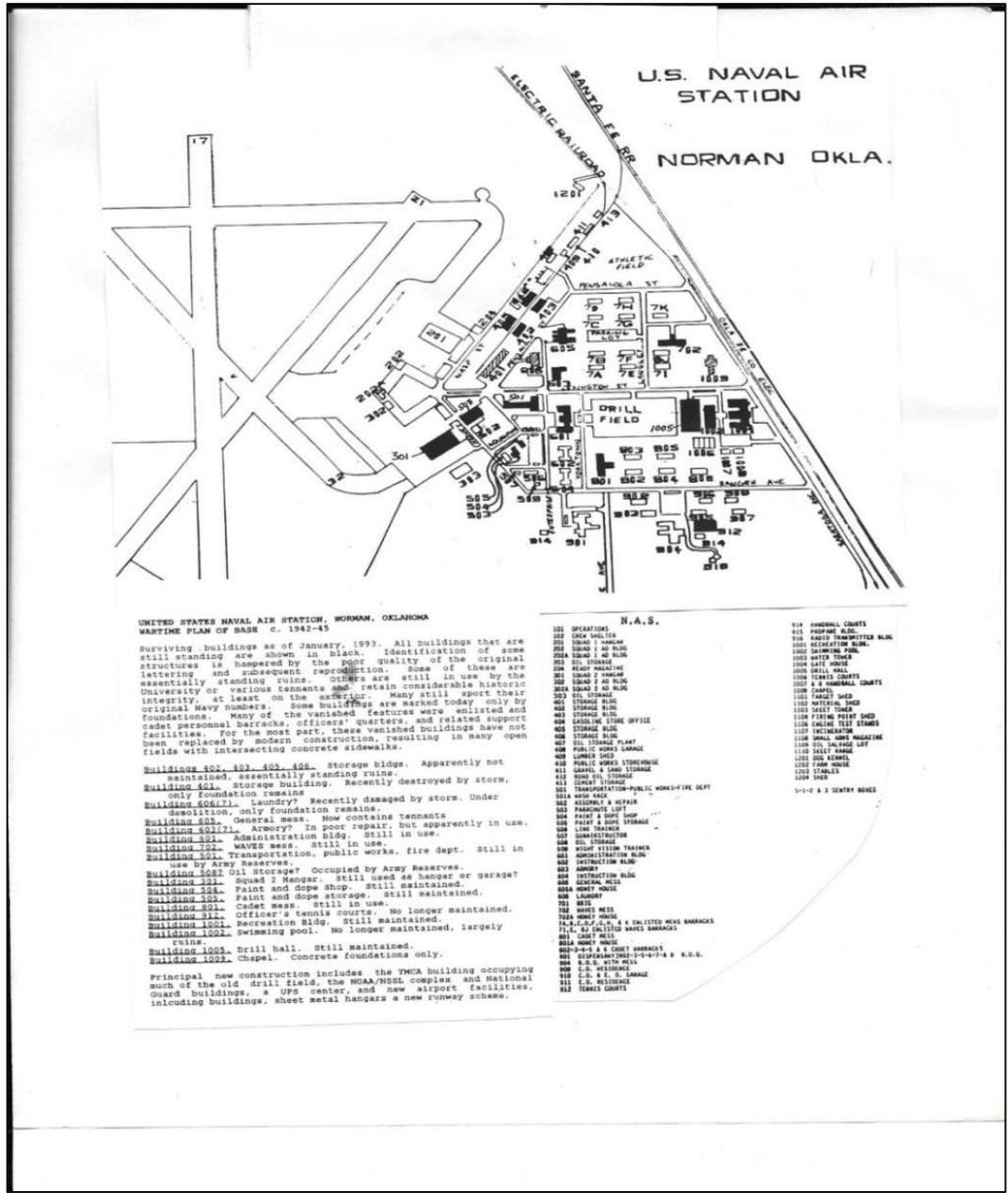
The Oklahoma Department of Transportation Cultural Resources Program (then known as the “Oklahoma Highway Archaeological Survey”) and this author initially became involved with the Norman Naval Air Station in early 1993 when the University of Oklahoma and the City of Norman proposed building an extension of NW 24<sup>th</sup> Avenue from its then- existing end at Robinson Street to Tecumseh Avenue, one mile to the north. The intention was to connect these two major east-west streets and open up university property immediately west of Max Westheimer airfield for potential airfield-related development in a proposed university-owned business park, called the “Employment Center”. The City approached



*Figure 12— 1993 view of Mount Williams looking north. Little of its original shape remains due to repeated borrowing of earth from the east side by the University for a variety of construction projects.(ODOT)*

the Oklahoma Department of Transportation (ODOT) in 1992, requesting state or federal funds to build the extension, and a project to do so was approved. To justify using state funds to build what was for all intents and purposes a city street, the proposed project was designated as “State Highway 77T” (“T” for temporary), because in theory it could serve as a relief route for I-35 or SH 77 in the event one of these highways was closed for construction or a major accident. Because ODOT

believed at the time that federal funds would also be used in the project, the project needed to be developed in compliance with a number of federal environmental laws and regulations, including the National Historic Preservation Act (NHPA).



We at the ODOT Cultural Resources Program (ODOT-CRP) were immediately aware the roadway and any development along it would affect OU property that had once been part of the Norman Naval Air Station. In 1993, the base still retained many of the largest and most noteworthy original World War 2 buildings. Many of these were still being used by the University (Figure 13). Although many smaller buildings had been removed over the years, there was very little modern infill construction, and many original sidewalks, foundations, and roads were all still evident. This, together with the airfield, allowed the overall site to convey much of its original association with its naval use in the Second World War. Even before we conducted our initial field survey on January 12, 1993, it was obvious that “Mount Williams”, the base firing range backstop visible for motorists on I-35 and already something of a local landmark to Norman residents, would be potentially endangered by development made likely by the new roadway.

Figure 13 –Map included in the 1993 ODOT report assembled from an original 1942 US Navy plan of the NNAS to describe the general status of the main base in 1993 and highlighting the structures and buildings that were still intact. Many of the most iconic buildings such as the Recreation Center, Outdoor Swimming Pool, Indoor Drill Hall, Administration Building, and one of the two main base hangars were still extant, and even where other buildings had been removed, their original location was evident by foundation slabs, sidewalks, and the base street system, which remained largely unchanged. Except for an improved airport terminal, a university computer center, and a new YMCA building, very little new infill construction in the main base area had occurred (ODOT).

Our detailed field survey focused primarily on the proposed serpentine route of SH-77T, but we also used wartime NNAS plans to locate and identify known features associated with the base in an “expanded impact zone” between the active Max Westheimer airfield and I-35. We also conducted a reconnaissance of the main base to determine how many of the original buildings remained, and in what condition.

During our survey we visited Mount Williams and examined other features associated with the naval firing range as shown on the available 1942 US navy plan of the base. This included the remains of its associated target trench and bunker (Target Shed 1101), three presumed firing pads extending south from the mound, and other concrete pads and features presumed to include an incinerator (Bldg. 1107), and engine test stands (Bldg. 1106). The entire area was partially flooded by heavy rains and heavily overgrown in scrubby vegetation and grass, making definitive identification of some features uncertain, and we determined that significant vegetation clearing followed by more detailed mapping would be necessary to fully identify all of the firing range features. Based on our study, we recommended that the entire NNAS retained enough historical integrity to warrant inclusion in the National Register of Historic Places (NRHP). Since “Mount Williams” and its associated features were the only features likely to be adversely affected by development related to SH-77T, our report especially noted their significance and made the following recommendation:

*“Although these resources [the firing range features and Mount Williams] will not be directly impacted by highway construction, subsequent uncontrolled business park development made possible by the highway may result in adverse effect to them. In the event that any of these resources are officially determined eligible for the NRHP by the Oklahoma SHPO [State Historic Preservation Office], it is recommended that project approval be made contingent upon the University’s commitment to protect them from future development or take appropriate actions to mitigate impacts if they cannot be so protected. Any protection or mitigation plans must be reached in consultation with the SHPO and the State Archaeologist’s Office.”*

On February 10, 1993 the SHPO responded with its formal determination that the entire NNAS was eligible to the NRHP as an historic district, recommending that a Memorandum of Agreement (MOA) among ODOT, the Federal Highway Administration (FHWA), the University of Oklahoma, the Oklahoma Archaeological Survey, the Oklahoma State Historic Preservation Office and the federal Advisory Council on Historic Preservation (ACHP) be negotiated to address appropriate preservation of the entire base. The Oklahoma Archaeological Survey also concurred with our significance determination, and assigned the archaeological site number 34CL179 to the NNAS.

Accordingly, an MOA was negotiated and eventually approved by all parties on November 10, 1993. This agreement allowed the construction of SH-77T to proceed with three main requirements:

- (1) The University would conduct a complete historic survey of surviving buildings of the former Norman Naval Air Station in consultation with the Oklahoma SHPO. This survey would be complete prior to the development or sale of lots in the Employment Center;
- (2) The University of Oklahoma would establish a protective easement surrounding Mount Williams and its associated features and prohibit any development in this area other than to maintain or restore the historic features; and
- (3) Other known ruins or historic features in the Employment Center would be documented prior to their demolition or destruction.

However, two events occurred shortly after approval of this agreement that changed the situation.

First, ODOT did not obtain federal funding for the construction of SH-77T. Because the roadway was no longer a federal project, the MOA developed to meet the requirements of the National Historic Preservation Act (NHPA) no longer applied. However, we believed the mitigation measures noted above were developed in good faith by the SHPO, ODOT, and other local parties. So, on February 28, 1994, ODOT and the University signed a letter agreement stating that mitigation measures in the original MOA would be completed at part of the state-aid roadway project. This letter established the basic requirement that the University of Oklahoma would have to consider the concerns of historic preservation with respect to Mount Williams during its eventual development of the property.

Second, although ODOT completed construction of SH-77T a few years later, the University decided against developing its planned “Employment Center” business park. Also, no other developments were anticipated in the near future.

As a result, neither the University nor ODOT saw any urgency in formalizing the “protective easement” around Mount Williams and its associated features. Consideration of Mount Williams lay dormant - and largely forgotten - for almost another 10 years.

However, the University did complete the required “Historical Survey - U.S. Naval Air Station Norman

## Laws, Regulations, and Agreements

In the US, regulations of the National Historic Preservation Act (NHPA) of 1966 (so-called “Section 106”) require federal agencies, or organizations using federal money or federal permits for their projects, to consider their effect on “historic properties”. As defined in the National Historic Preservation Act an “historic property” is any object, building, structure, site, or district that is listed in or considered eligible for listing in the National Register of Historic Places (NRHP). This process includes consulting with the State Historic Preservation Office (SHPO) and others as appropriate to identify, avoid, minimize, or mitigate adverse impacts to historic sites by destruction, demolition, or any other activity that eliminates their historic character.

What many laypeople often do not realize is that the NHPA only applies to what the federal government does. In the absence of local or state historic preservation regulations, a non-federal organization or individual can do whatever it wants to a historic site it controls. Also, laypersons often believe that the NHPA requires agencies to *preserve* historic sites. This is not true. In legal jargon, the NHPA is a *procedural* not a *substantive* law. It mandates no specific outcome. It only requires that agencies follow a defined *process of consultation* to identify and consider historic properties in their planning. In many instances, this may result in the eventual destruction of an historic property with this being “mitigated” by other actions, such as archaeological excavations or documentation, exhibits, or modification to a project to minimize its adverse effects.

In the case of the 2006 work at Mount Williams described in this study, however, the NHPA no longer applied. There was no legal requirement for the university to give any consideration to Mount Williams whatsoever. Arguably, the 1994 agreement between ODOT and the University could have been seen as void since it rested on no federal or state requirements. Although demolition of the mound was eventually determined unavoidable by all parties, ODOT, together with the State Historic Preservation Officer, insisted that this be mitigated by measures equivalent to what a federal agency might do if NHPA did apply. Rather than challenge this, the University chose to assist in a resolution that was probably the best outcome that could be expected.

Oklahoma” on February 1, 1996 (Glover-Smith-Bode, Inc. 1996). This is an excellent study, but unfortunately it was never released for general public or academic use. The report provides an outstanding record of all buildings of the NNAS, both surviving and no longer extant, as of the mid 1990’s. It also includes a very useful history of the base, much of which contributed to the discussion in Chapter 1 of this report. Since virtually all of the buildings documented in the 1996 study no longer exist, this 1996 document is an invaluable resource for anyone interested in the Norman Naval Air Station.

### ***The Project at Mount Williams Returns***

In 2002 the University again became interested in developing its frontage along I-35, now known as University North Park. The University planned to sell most or all of it to private developers to help fund the new Weather Center on south campus. Representatives from the University approached the Oklahoma SHPO to discuss the plan and how it might accommodate the original MOA’s requirement for preservation of Mount Williams. The SHPO informed the University that, since the new proposal did not involve federal funding or permits, the NHPA did not apply. The University was eventually made aware that it was in fact governed by its 1994 letter agreement with ODOT for the SH-77T project (now the existing NW 24<sup>th</sup> Ave). Accordingly, Representatives from the University met with ODOT to discuss the matter.

Based on the likely tenants and activities associated with the new retail park, the University felt that the “preservation easement” protecting Mount Williams and all the associated target range features identified in the 1994 agreement was too large and too restrictive to make the development economically viable. Most critically, the University believed the large preservation easement would prohibit construction and safe operation of an access road alongside the I-35 corridor needed for businesses in the development.

The University proposed to completely level Mount Williams and replace it with a small park-like circular memorial in the retail development near the original location of the mound. At this time, neither ODOT nor the Oklahoma SHPO were favorably disposed to this idea, but they did acknowledge that the original preservation easement could be revised. In exchange for a much smaller preservation easement, ODOT proposed that the University consider access road options that could allow the mound and its target shed/trench to be preserved as part of the memorial. To assist this process, ODOT engineers developed several alignments for access roads in the proposed retail development that could satisfy the needs for safe and efficient roadway operation while preserving all or part of the mound and target trench. Four conceptual options were developed further and eventually incorporated into a new agreement between the University and ODOT in June 2003. This agreement replaced the original 1994 agreement in its entirety. The University was free to proceed with any roadway option in the agreement, or develop others if they provided at least equivalent preservation benefit as ODOT’s options. This agreement would have allowed for at least some of the original mound and target handling bunker to be preserved and reconstructed in place as part of an interpretative display.

Unfortunately for the future of Mount Williams, plans and requirements changed again. Less than a year after the ink on the June 2003 agreement was dry, ODOT was approached by legal representatives of University North Park, L.L.C. (UNP), an Oklahoma limited liability company that had purchased University North Park from the University, and who would be the entity actually selling the property to private interests. UNP informed ODOT and the Oklahoma SHPO that the proposed retail center planned by the private developers would be untenable if Mount Williams was preserved in place. UNP wanted a new agreement that allowed the mound to be removed. Eventually, after some discussion, ODOT and the SHPO agreed to sign a new agreement allowing Mount Williams to be demolished, only if it included the following stipulations:

- UNP would provide the ODOT Cultural Resources Program with a minimum of 30 days notification prior to any earth disturbance affecting the Mount Williams firing range complex to document the site and make its field contractors available to the ODOT archaeologists to assist in any way necessary to expedite excavations, feature documentation, and artifact removal. ODOT archaeologists would be allowed unhindered access to accomplish this work. The ODOT Cultural Resources Coordinator would assist the Oklahoma Historical Society (OHS) as a “special consultant” and oversee archaeological investigations, report the findings, and provide insight to the OHS regarding any exhibits and historical markers.
- Prior to the removal of Mount Williams, UNP would provide \$100,000 to the OHS for exhibits at the Oklahoma History Center related to Oklahoma in the Second World War.



*Figure 14—The author looking down at the Mount Williams target trench and bunker in the 1993 survey. The sliding wooden door was no longer extant by the time of the 2005-2006 archaeological documentation. Note also the extent of soil deposition in the trench (CCHS). Compare this with the trench after excavation (Figure 24)*

This agreement was executed by ODOT, the OHS, and UNP in October 2004, and formed the basis of the archaeological work described in the following chapter.

# CHAPTER 3 – ARCHAEOLOGICAL DOCUMENTATION

## Field Methodology



*Figure 15—Undated photograph of Mount Williams taken from I-35, looking to the northeast, original source unknown. It appears to have been taken shortly after the completion of I-35, which would place it in the early to mid 1960's. Portions of the wall fronting the target handling trench are clearly visible. Later, the University bulldozed earth against the wall to eliminate graffiti. The surrounding area is relatively clear of the scrubby vegetation that eventually covered much of the site. Although a small portion of the west side of the mound may have been removed for highway construction, it still retains its overall shape.*

documentation regarding the NNAS as a whole was fairly complete, these sources understandably focused their interest on the main base and the flight school. Aside from captions on official base plans describing the site area as a “machine gun and rifle range” and a few offhand mentions of “target practice” with rifles and pistols or “skeet shooting” in memoirs or the base’s log and yearbooks, there is little or no information regarding the specific purpose of gunnery activities at

Archaeological investigations were initiated in late September 2005 and extended intermittently based on weather and construction contractor schedule until January 2006. The field work was led by Robert Bartlett, director of the Oklahoma Department of Transportation Cultural Resources Program (ODOT-CRP). The small but able field crew consisted of Rhonda Fair, Lauren O’Shea-Knittle, Andy Knittle, Adam Graves, and Natalie Graves.

Although we entered the field with no defined research design other than to document the site’s features, a number of related questions regarding the use of Mount Williams and its firing pads informed our field methodology. While historical

## Feet or Meters?

As an international science, archaeology usually uses the metric system when conducting excavations or measuring structures, artifacts, and other remains. However, all buildings and features at the NNAS, as well as their layout and arrangement, were designed and built by the Navy in what used to be called “English units”: i.e., feet and inches.

Early on, we decided that the use of metric measurements to describe the base and most examined features and artifacts would not only be inconsistent with how these items were built and measured by the Navy, it might possibly make it difficult to identify possibly important patterns in their layout and dimensions.

However, to be consistent with current archaeological practice, some general site plans and the controlled excavations were performed and recorded metrically, most typically 1x1 meter excavation units. Since these excavations and maps did not focus on the built features themselves, we felt that this would not create any confusion or inconsistency. Thus, the reader of this report may see the use of both metric units and English.

the site, or the types of weapons with which the men trained. Only one picture of Mount Williams in use is known to survive (Figure 21), and it depicts a line of seamen standing on a firing line with rifles. Local informants have described frequent use of the firing range by civilians in the 1960's and 1970's, while others have even mentioned the rather improbable idea that Mount Williams was used as an occasional target for air-to-ground strafing, bombing practice, or even artillery. Although some of these ideas can be easily discounted by what we know from documentary sources, we hoped that our excavations would help clarify the exact functions of the firing range.

The scope and nature of the excavations were also dictated by the fact that it was a large area and any artifacts recovered from the shallow soils throughout the general site area would likely be in a mixed context and reflect modern, as well as historic use, cleanup, and discard practices. It was our opinion that an attempt to recover artifacts from controlled excavations scattered over the entire site area would be an inefficient strategy and provide little useful information regarding the use of Mount Williams and the associated features. As a result the only controlled and screened excavations were performed at the three concrete firing pads extending south from Mount Williams, and at the 1945 skeet range north of Mount Williams, their principle purpose being to recover spent cartridges and examine the construction and use of these features.



*Figure 16—Site mapping prior to machine grading.*

The initial work involved identifying all firing range features and clearing them of vegetation for mapping and photographing. Most of this work was done with shovels, with details exposed with smaller tools. Once clear, the excavation of 1 x 1 meter units began immediately adjacent to the 3 firing pads. These pits were not excavated to great depth since the soils were shallow and unlikely to possess meaningful vertical stratigraphy. Excavated earth was screened through .25 inch mesh. Over 2,000 shell casings were recovered and many of these, as expected, displayed federal arsenal head stamps and dates representing WWII era military issue cartridges including 30-06 rifle and machine gun ammunition, 30 cal. M1 carbine ammunition, and 45 cal. pistol ammunition. These casings help differentiate the type of weapons used on the range as well as differential use of the firing pads for certain types of weapons. In addition, excavation and examination of the southernmost firing pad provided evidence of a use of the firing range that is not mentioned in available documentation: training aircraft maintenance crews in “gun harmonization” or adjusting the aim of fighter wing guns so that the bullet streams to converge at a fixed point for maximum effect.

Once the hand excavations at the firing pads were completed, archaeologists directed the contractor's earth moving equipment as it cleared vegetation from the rest of the site area. This was to expose and document any other foundations or historic features that might be present as well as to facilitate the preparation of a site plan. This work also allowed the field crew to identify the original red clay roadbeds accessing the firing range area. Later, archaeologists monitored the demolition of concrete pads to determine their method and sequence of construction.



*Figure 17—View looking south from the summit of Mount Williams after the entire NNAS machine gun and rifle range had been cleared by machine grading. The three firing pads extending south from the mound can be clearly seen, as well as the clay roadbed for the base access roads. The target trench and several target stands at the base of the mound are in the foreground. The mounded area in the distance is spoil dirt from blading to the east. The inset shows the same area prior to blading.*



*Figure 18—View of target handling trench looking west southwest during track hoe excavation. Earth surrounding the target stands was later removed by hand.*

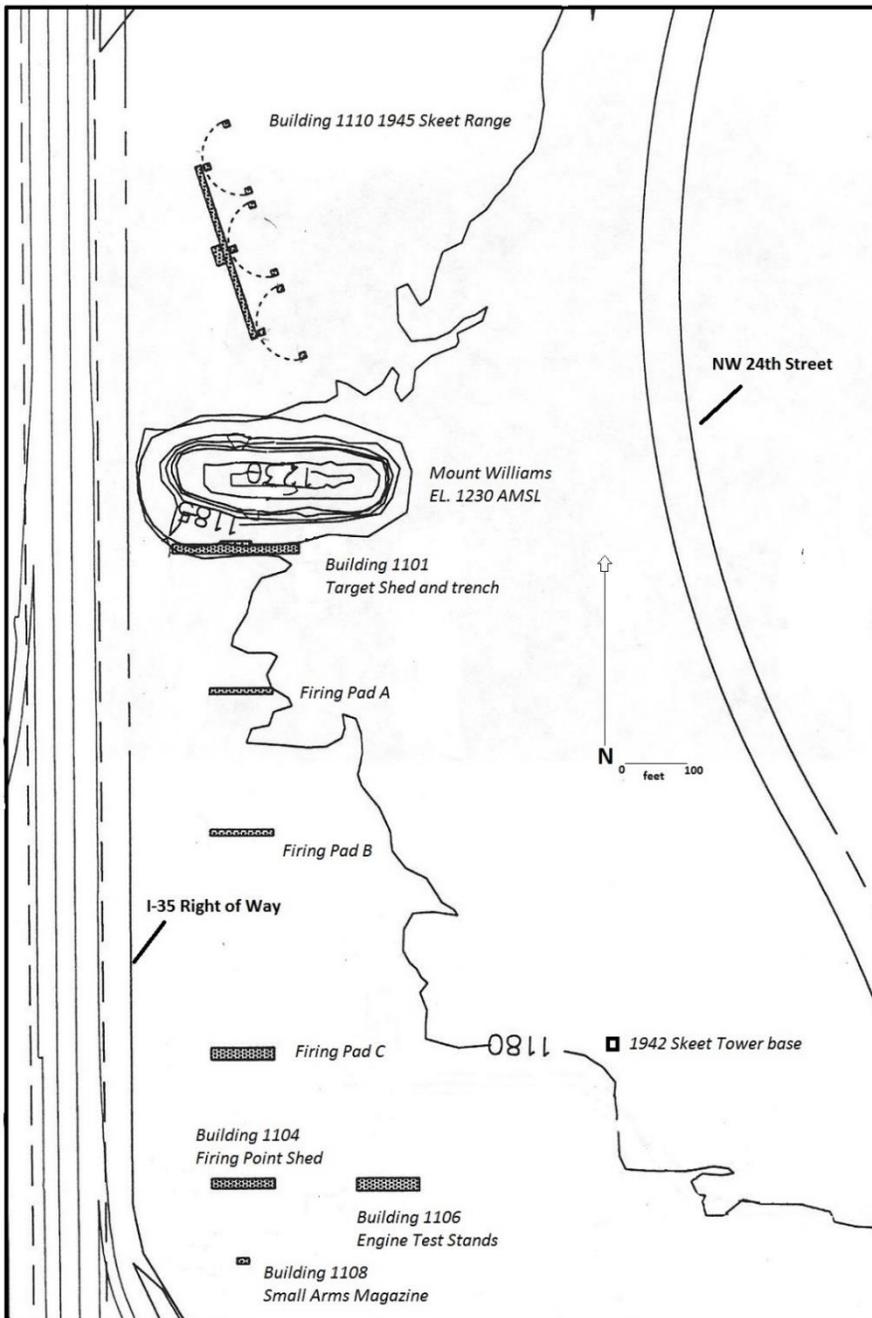
The excavation of the target trench in front of Mount Williams involved the use of machines to remove the bulk of the material. The archaeologists used hand tools to excavate earth from around the individual target stands. Earth was not screened from this work, but bullets and shells that were seen were collected. Due to time constraints, we were unable to complete excavation of the target shed or bunker underneath the mound.

Mount Williams itself had suffered much from dirt borrowing over the years. This had removed much of the east end and cut a large slit trench through the center. The steep, nearly vertical face of the mound was heavily overgrown limiting access. However, a small sample of 85 bullets was recovered by a metal detector survey over a limited area on the south face of the mound. This bullet sample as well as a sample of approximately equal number recovered from the fill in the target trench provides additional information regarding the ammunition types used on the range. Due to the WWII era recycling and the subsequent collecting of shell casings on the firing pads, the bullet sample from the mound is perhaps a more accurate sample of types of ammunition used on the range than shell casings. In fact, although the use of .50 cal. machine guns at the firing range is suggested by archival sources, the only evidence of this munition from our work is the recovery of a metal jacket from a 50 cal. round removed from the mound.

The 1943-1944 Navy plans of the NNAS also depicted a small skeet shooting tower east of the firing range pads. Small concrete pads once supporting this structure remained, but little else. Skeet shooting served as preliminary training for anti-aircraft and aerial turret gunnery. We initially did not plan on conducting extensive work on the large skeet range built in 1945 north of Mount Williams because it was likely used primarily after the war was over. However, because this feature appeared to be fairly well-preserved we had the construction contractor blade the area north of Mount Williams to expose it for mapping. Once it was cleared of vegetation, we excavated controlled 1x1 meter units adjacent to each of the five firing stations on the three rings to identify the types of shells and other munitions that were used.



*Figure 19—View looking north from the east side of Mount Williams showing the 1945 skeet range after blading and the excavation of 1x1 meter controlled units. Screened backdirt from the test pits can be seen at each firing pad. The inset shows the skeet range immediately after completion in 1945.*

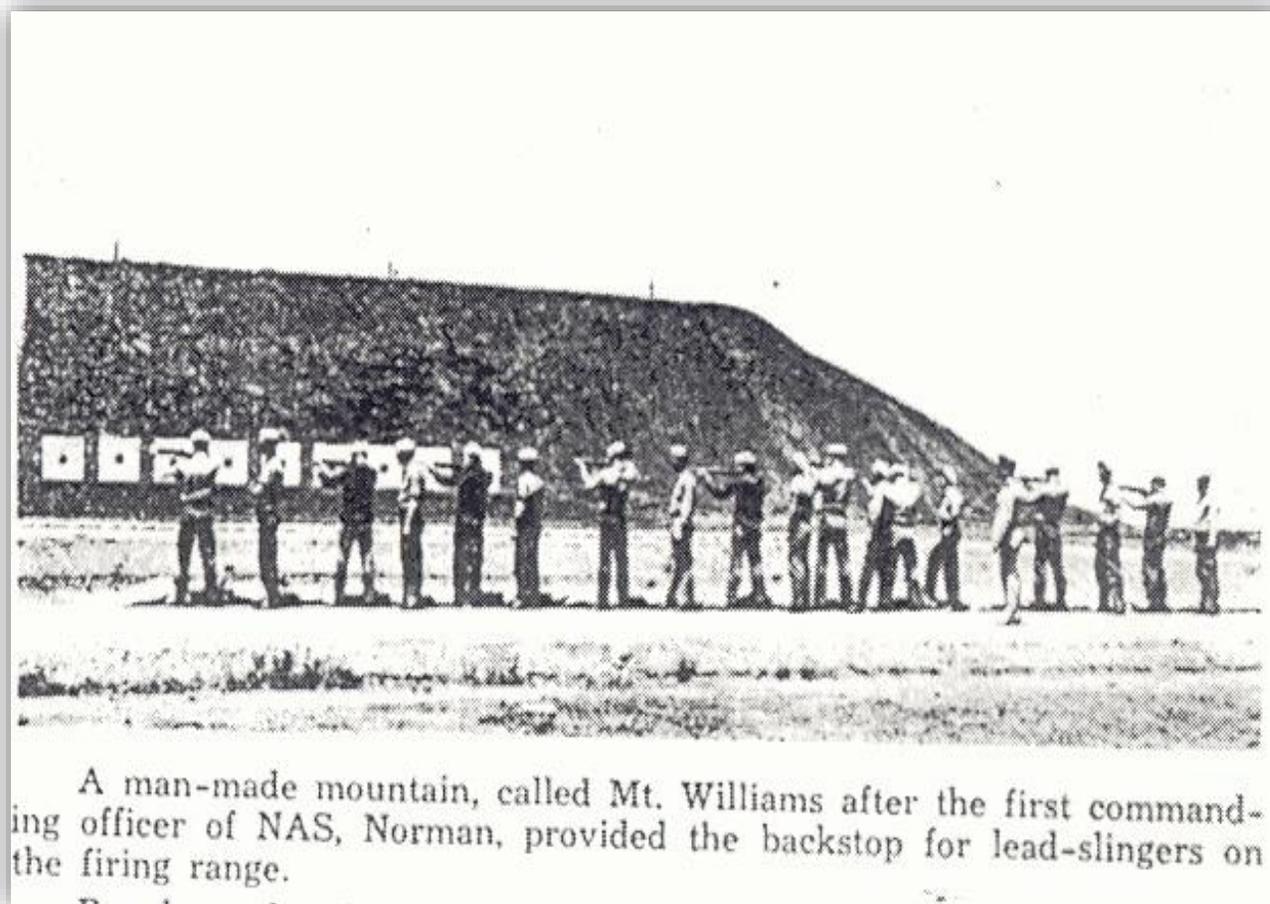


## Principal Features and their Purpose

For the purposes of this study, the investigated portion of the NNAS can be divided into two functional areas:

**The NNAS Machine Gun and Rifle Range** complex was built in 1942 including Mount Williams itself, its associated target shed and target handling trench, three associated firing pads extending south from Mount Williams, a small arms magazine, a small skeet tower, and other features referred to on original base maps as an engine test stand, incinerator, and firing point shed. It covers a large area extending approximately 1250 feet south from and including Mount Williams. A road constructed of red clay and limestone gravel was constructed along the west edge of the target range. Feeder roads extended off this road to each firing pad as well as the firing point shed, small arms magazine and engine test stand. Parking areas of red clay and limestone gravel 16-18 feet in width extended along the south side for the length of each pad.

Figure 20—Overall view of investigated area as mapped by Glover-Smith-Bode (1996), modified to include the location of fragmentary skeet tower base recorded during 2005-6 investigations



*Figure 21—Wartime photograph of Mount Williams in the Norman Log, the newsletter of the NNAS, showing a line of sailors practicing with rifles. Despite the photo's poor quality, three short structures can be seen projecting from the mound's level summit. These may be signals to assist aviators using the nearby airfield orient themselves. At least nine targets are apparent and, judging by the angle at which men at the west end of the firing line are aiming, it would seem that additional targets may be off-camera to the left.*

**The large skeet range built in 1945** to the north of Mount Williams, covering approximately 350 x 100 feet, is the other area. Treating this as a separate area of the site has some historical relevance, since the skeet range was not built until 1945, and the possibility exists it was not available for use until the war was over. This feature was also far more extensive than the small skeet tower south of Mount Williams that preceded it.

In this context, it is worth noting that the Navy declared Purcell Naval Air Gunners School, including its associated skeet and firing ranges, surplus in February 1946. Although there is no documentation to support this, the possibility exists this large skeet range may have been built at the NNAS to accommodate some of the gunnery training formerly done at Lexington, since the Navy initially planned to keep the Norman Air Station open.

## Mount Williams

This is the most prominent feature of the entire site, a large earthen embankment used as the backstop for gunnery practice. Although no records of its original dimensions survive, based on contemporary 1942-1944 maps and a photograph taken in the 1960s (Figure 14), the earthen berm may have been almost 400 feet in length and approximately 175 feet wide at the base when in use. It appears to have been roughly rectangular along the base with rounded ends, flat topped, and in the neighborhood of 25 feet tall. Based on the single available contemporary photograph (Figure 21), the mound appears to have been faced in bare earth and little or no volunteer vegetation was allowed to grow on it.

Prior to our work at the NNAS, it was commonly believed by locals - and asserted by the University - that a significant portion of Mount Williams had been destroyed when I-35 was built through Norman in 1959-1960. However, based on our research, it appears that little, if any of the mound was removed as part of the highway construction. Figure 22, to the right, is a portion of the 1943 Navy plan of the NNAS. This shows the base perimeter road and boundary fence and, to the east, the internal circulation road used to access the firing range, including the target shed at the base of Mount Williams. When this plan is compared with the internal circulation roadbed exposed during our excavations (Figure 17) it is apparent that the main north-south road ("Main Street" on Figure 22) is well outside the I-35 right-of-way fence. In fact, it would appear that the current I-35 right-of-way fence lies very close to the historic boundary of the NNAS.

Of course, the possibility exists that the oval on Figure 22 is merely a schematic representation of the "earth embankment", but even if it extended completely to the base perimeter, only a few feet would have fallen within the highway construction right-of-way. Judging by an early 1960's photograph of the mound that shows the west end somewhat degraded (Figure 14), the possibility exists that some borrow dirt may have been taken from the west edge of the mound as part of highway construction, but this would appear to have been minimal.

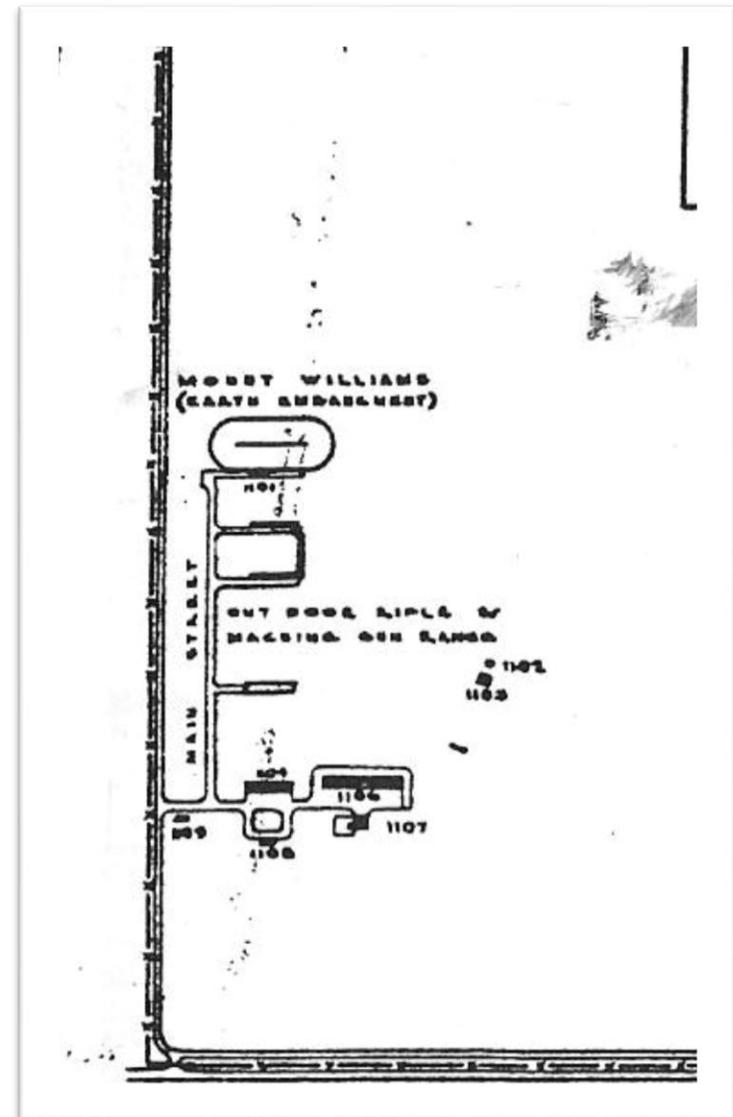


Figure 22—Detail of 1943 US Navy plan of NNAS showing Perimeter Road, internal roads, Mount Williams and the Outdoor Rifle and Machine Gun Range.

### **The Mount Williams Target Shed (NNAS Building 1101)**

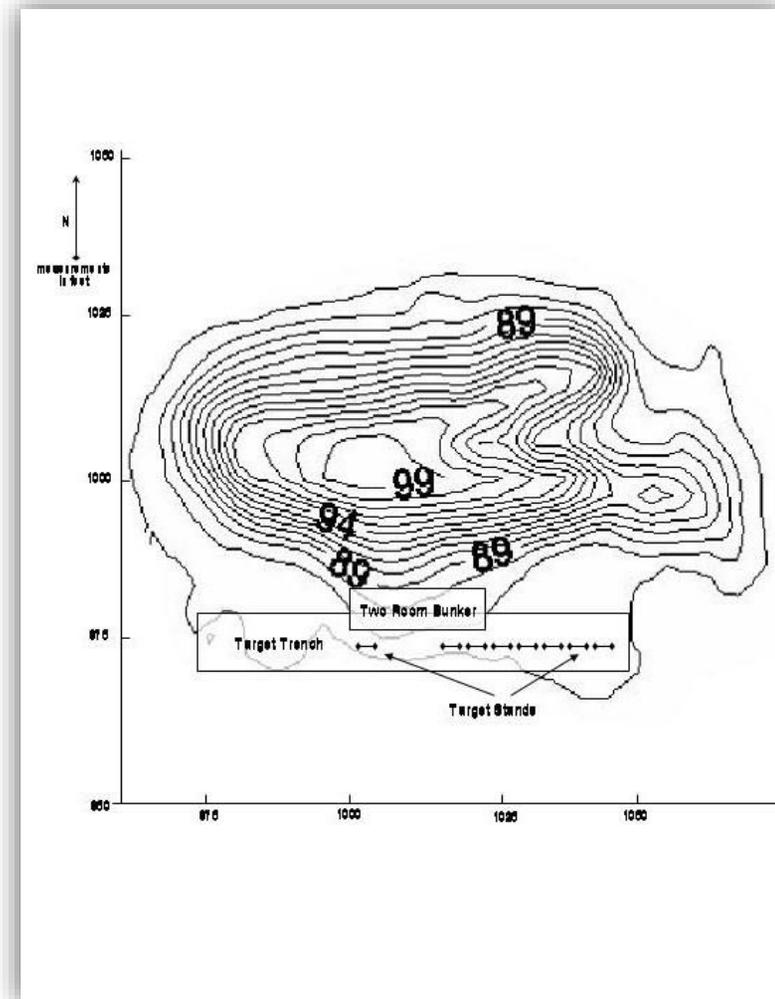
It is unclear if Building 1101 shown on base plans refers only the two room shed or bunker beneath Mount Williams, or if it also includes the large target handling trench in front of the shed. Since the Navy did not provide any other numbers for the trench feature, this report will use the designation, "Building 1101", to refer to all features associated with the shed and target trench. The features that comprise Building 1101 are described below.

**Target Handling Trench.** This feature consists of a 250 ft. long excavated concrete trench with its front (south), wall facing the firing pads. This is a substantial engineered structure made of reinforced poured concrete.



*Figure 23— "V"-shaped drain looking west along back wall of target handling trench at base of Mount Williams. Photo was taken from the roof of the target shed (bunker)*

The south wall of the trench is approximately 10 feet high on the interior face. When it was built, the exterior face of the wall probably extended about 3-4 feet above the ground surface. The exterior face slopes, but the interior face is vertical throughout its length. An 8 foot wide concrete floor extends the length of the trench. Except where the target shed bunker was placed, the rear wall slopes to the north toward the base of the mound. In these areas, the trench is approximately 10 feet wide at the top. The trench has a "V"-shaped concrete drain along the top of the rear wall, which slopes sufficiently to permit water to flow away from the



*Figure 24— Location of target trench and bunker (shed) shown in relation to topographic map of Mount Williams in its current condition. Note the extent of disturbance to the east end of the mound, including a large trench extending toward the center of the feature.*

trench. This feature may also have served to keep eroding soil from the mound out of the trench. A rectangular drain outlet is also located in the floor of the trench that connects to a circular underground pipe or conduit. Since this feature is well below the surface of the ground, the trench may have been equipped with a pump of some sort to carry water away.



*Figure 25—Interior of target handling trench nearing conclusion of excavations looking east. Inset shows floor drain after excavation, looking west. Target Shed (bunker) is to the right, rectangular drain (still unexcavated) is on the floor foreground, and a group of target stands are still being excavated in the background. Dark staining on the trench wall indicates the depth of soil in the feature prior to excavation. The slightly lighter stain above that shown on the bunker marks high water from flooding. Based on fine laminations observed in the fill, it appears that most, of not all, of the soil in the trench and bunkers was deposited by the gradual washing of soil into the trench.*

**Target Shed.** The target shed or bunker is a rectangular reinforced concrete structure set into the rear (north) wall of the target handling trench. It is exactly 50 feet long on the exterior, and is centrally located in the target trench. The bunker is 8 wide and the front face is 9 feet, 4 inches tall.

The shed has two internal rooms that were presumably occupied by personnel who operated the targets when firing was underway, and equipment storage. Each room has a doorway and small window. The doorways are identical, each measuring 8 feet, 4 inches tall and 4 feet wide. The original doors are no longer present, but mounting apparatus for sliding doors survive above each doorway. A photograph taken during the 1993 survey (Figure 14) shows the remnants of one wooden door. Both doors slid to the user's left to open. When closed, they were secured with small metal latches affixed to concrete face of the shed. The windows of both rooms are bricked over, probably after operations at the target bunker ceased.

The east room is the larger of the two, interior measurement being approximately 28 by 7 feet. The west room measures approximately 19 by 7 feet inside. During our investigations, the interior of the bunker was filled with as much as 4 feet of soil. Due to time constraints, we were unable to excavate either room, but more than likely they had been emptied of any furniture or equipment when the Navy closed the air station. The trench was accessed by a ground level entrance on the west end; the east end was enclosed. A clay and gravel roadbed extended to the entrance, allowing jeeps and other small vehicles access to the centrally located target shed.



*Figure 27—West end of target trench looking east. This view clearly shows the downward sloping concrete drain on the back wall and the sloping south side of the front wall facing the target stands. Both the exterior and interior surfaces of the front wall were liberally covered with 1960's and 1970's graffiti.*

*Figure 26—Interior of bunker west room, unexcavated. Staining shows the depth of standing water in the room when flooded. Both rooms contained debris suggesting they had at times housed homeless people*

**Target Stands.** The trench was equipped with a number of steel target handling stands, eight of which were still present in various states of repair during our investigations. Seven of these stands were concentrated in the eastern half of the trench; one was isolated in to the west. It would appear that more stands were present when the target range was in operation: at least nine targets are shown grouped together in the wartime photograph (Figure 21). These stands were affixed to the floor of the trench with bolts that could be removed if desired. A variety of materials were used in the fabrication of these stands. Most stands operated with a counterweight system to raise and lower the targets above the concrete wall. Many of the stands retained the counter weights in position at the base of the stands and three retained remnants of the apparatus to hold the targets. Two basic types of fabrication are apparent, angle iron and steel pipe. Each type is described below:

**Angle Iron Target Stands.** Six stands of this type were present. The best-preserved example was recovered for detailed examination (Figure 28). The main structure of this stand was assembled from paired angle irons connected at the top and bottom by 2.5 inch steel pipes. The pipe is braced to the angle irons at the bottom for additional strength. The frame is 9 feet, 3 inches tall and 6 feet, 10 inches wide. Steel brackets for holding the bottom of a target were still in place in what would have been the raised position. The brackets were raised and lowered by what appears to have been a pulley mechanism comprising geared hand cranks and a cylindrical counter weight. A chain would have been used for this purpose. No chains were still attached to this example, but others exhibited fragmentary chains in soil fill surrounding them.



*Figure 28—Excavated target stand. Heavily rusted metal on the bottom half of the stand indicates the depth of fill surrounding the structure. The original intention was to preserve this stand for possible donation to the Oklahoma History Center. Unfortunately, this artifact was stolen from an outside storage area at the Oklahoma Archaeological Survey before it could be cleaned and prepared for donation.*



**Pipe Target Stands.** The frames of two fragmentary stands at the eastern edge of the trench were constructed primarily of pipe. Both frames of one example were still present during our investigations; the other was represented by only a single surviving frame. These frames were fabricated of 2-inch steel pipe connected at the top with plumber's fittings and a small connecting length of pipe. The bottoms of the frames were bolted to the concrete floor. Each frame was 8 feet, 4 inches tall and 1 foot, 7 inches wide. A functioning stand would have consisted of two such frames. Heavily decomposed wood was evident at the bottom of the stands, suggesting that each frame may have been further braced by wooden boards connected a central post. The apparatus for raising and lowering targets consists of four hollow pipe segments that slid up and down on the frames. Brackets and fragments of wood noted in the fill suggest that each pair of pipe sliders was connected by wooden supports upon which targets were placed. A fragmentary steel cable remains attached to one of the sliding elements and a pulley was recovered from the fill surrounding the pipe sliders.

*Figure 29—Target stand consisting of two free standing pipe frames. The frames may have been connected at the top by a wooden board attached to the angle connectors visible in the picture. Targets were raised and lowered by pipe sliders. Severely decomposed wood identified— but not recoverable — during the excavation appears to have connected the pairs of sliders and supported the targets.*



*Figure 30—Firing Pad A, looking west, showing machine gun mounts arrayed along front edge (facing Mount Williams) and 1x1 meter screened excavations to sample ammunition casings. Pad B is identical in all respects*

**Firing Pads.** Three rectangular concrete firing pads are placed in a line south from the Mount Williams target shed, parallel with the long axis of Mount Williams.

These features are not given identifying numbers on original Navy plans, but their main purpose as pads for weapon firing at Mount Williams is obvious. As such, they are best considered functionally associated with Building 1101. The two pads closest to Mount Williams (Pads A and B) are identical. Each pad is 110 feet long 10 feet wide.

The farthest pad (Pad C) is also 110 feet long, but is wider – 30 feet. Although Pad C differs in some characteristics from the other two, all three were constructed in the same basic manner and that process is described here rather than repeated with each pad description. The firing pads consist of 16-inch thick concrete slabs constructed on concrete footings 15 inches thick and 3 inches deep. Each pad had rectangular features believed to be weapon mounts embedded along the north edge and set back about 1 foot from the north edge. The mounts are 3 x 4 feet in size and are centered at 10 foot intervals from the east end of each pad. It appears the mounts were actually constructed prior to pouring the surrounding slab. This is indicated by the fact that mounts were made of 8" thick poured concrete with ½" rebar placed at 8" intervals along each edge extending into the adjacent slab. This rebar served to anchor the mounts into the concrete firing pad as it was poured.

Each mount had eight T-shaped metal slots embedded in them which we believe were used to accommodate weapon supports. The metal slots were 4" long and 2" wide. Two slots were embedded near the east and west edges of each mount 6" from the north edge. The slots are placed at 45 degree angles with the top of the "T" placed toward the outside edge of the mount. The top of the "T" is wider than the remainder of the slot and may have served to insert the stand and slide it into the narrower slot to secure it.

A group of three metal "T" slots occur in each southern corner of the concrete mount. The larger number of slots and their grouping suggests they may have served to absorb recoil from the weapons they supported. There is a 5 foot long lip on the edge of the firing pad in front of each mount, together with casts left by metal posts.



*Figure 31—Weapon mounting system in Pad A, looking north (toward Mount Williams).*



*Figure 32—Lip and post casts in front of each weapon mount.*

Based upon available photographs of firing ranges at other World War 2 installations, these lips may have held a wall or parapet in front of the gunner. Alternatively, they may reflect a temporary structure that helped hold the mounts in proper alignment while the surrounding slab and footings were poured.

Pad C, the farthest firing pad from Mount Williams, was constructed in the same basic manner as the other two pads, and also had four concrete weapon mounts identical to those at Pads A and B along its front edge. However, it had some significant differences which we believe are related to the types of ordinance and other training that occurred there. Not only was it wider than the other two (30 feet), it possessed features that were not present at the others.



Figure 33—Pad C looking west.

Figure 56 (shown later) is a plan showing the layout of all the features on Pad C. As will be discussed, we believe a variety of maintenance and ordinance training activities involving aircraft were undertaken at Pad C, none of which have been mentioned in available documents or photographs of the site.

Figure 34—Pad C Typical tie down. Inset shows the suggested installation of a modern commercially available aircraft tie down for comparison purposes.

A series of four paired tie-downs, similar as those still commercially available to secure aircraft to outdoor parking surfaces, are located directly behind each weapon mount. Each of the eight individual tie downs consists of a circular steel loop or eyebolt that has been cast into oval depressions in the concrete surface. Three other tie downs are located exactly midway between each pair of tie downs at the back edge of Pad C. Approximately 1 foot in front of these three tie downs are features that consist of two I-beams that have been sheared off at the base. These are within a rectangular area of unsmoothed concrete.



## Firing Pad Use

The best contemporary description of activities undertaken at Mount Williams is a brief statement in the 1944 *“Smooth Log”* yearbook of the NNAS: *“The department’s outside [firing] range is back-stopped by ‘man-made’ Mt. Williams, near the eastern edge of the station. Used for rifle and machine gun practice, ordnance and security watch personnel have already seen extensive practice on this course.”*

The *Smooth Log* further notes that a large indoor firing range was also built at the NNAS, which was used pistol and rifle firing and weapon safety. A brief note in the *“Norman Log”* base newsletter states that “regular cadet classes used the range plus required familiarization of weapons by both officer and enlisted persons.” One of our major goals was to identify the general range of activities base personnel and trainees undertook at the Mount Williams firing range.



Figure 35—Pad C, paired I-beam feature and tie down at back of pad, looking east.

In order to help determine the types of weapons discharged from each of the three the firing pads three contiguous 1x1 meter excavation units were excavated in front of each weapon mount, and a large sample of spent shell casings was recovered. It is recognized, however, that some types of weapons may be underrepresented in these collections because brass casings were systematically collected and recycled during the war, In addition, shells were collected by amateur weapon enthusiasts after the base was closed. We considered it likely that these previous collecting activities may have favored larger and more readily visible items, such as shells from .50 cal. Machine guns and .30 cal. weapons. Thus, our sample tells if a certain type of ammunition was fired from the firing pads, but it probably fails to identify others.

Because of these sampling issues, our interpretation of how the firing pads were used is based as much on their physical characteristics, the limited documentation regarding these features at the NNAS that was available, and comparison with photographs and written materials relating more generally to ordnance and gunnery training during the Second World War. As such, some of our interpretations must be seen as reasonable speculations, rather than definitive observations.

The only other available contemporary document that indicates the purpose of the firing pads is the caption on the official base plans prepared in 1942, 1943, and 1944. The 1942 plan refers to the features extending south of Mount Williams as a “Machine Gun & Rifle Range”. In 1943,

this is an “Outdoor Rifle & Machine Gun Range”, and in 1944, it is again called a “Machine Gun & Rifle Range”. Thus, it is clear that the Navy intended the Mount Williams firing and familiarization range for target practice with rifles (and presumably with service-issue pistols as well), and the discharge of machine guns. What this does not tell us is what types of machine guns were used at the range, whether they were used for target practice by prospective aircraft gunner trainees, or if a major purpose of machine guns at the firing range was to train ordinance men and machinists mates in the servicing, operation, and adjustment of the weapons.

There are two photographs on file at the Cleveland Historical Society (CHS) that are described as depicting .50 cal. machine guns being tested or fired at the NNAS or the NATTC. One (Figure 36) shows trainees loading a machine gun. This has a caption, “students preparing to skeet shoot”, which is unlikely given the semi-enclosed setting and the clearly fixed mounting of the weapon. The other, labeled “Sailor shooting on the firing range while another watches” (see Appendix 1) is intriguing. The photograph shows no landmarks that would clearly identify where it was taken. Although it possibly was taken at the NNAS Mount Williams range, a caption for this image in Schrems and Maddux (2016) describes this as depicting machine gun training at the Purcell Naval Air Gunners School, which is more likely. Although not taken at the NNAS, Figure 37, below, shows US Army trainees using machine guns supported on a mounting system similar to that indicated by the brackets on Pads A, B, and C.



Figure 36—CHS photograph showing machine gun training



Figure 37—US Army photograph showing soldiers practicing with .50.cal machine guns mounted on supports similar to those believed to be used at the Mount Williams target range.

<b>PAD A Cartridge Case Types</b>	<b>1937</b>	<b>1941</b>	<b>1942</b>	<b>1943</b>	<b>1945</b>	<b>1951</b>	<b>1922- 1938</b>	<b>1887- 1934</b>	<b>1922- 1983</b>	<b>1898- pres</b>	<b>1875- 1940</b>	<b>1880- pres</b>	<b>1911- pres</b>	<b>1887- 1911</b>	<b>1932- pres</b>	<b>1900- 1945</b>	<b>1932- 1944</b>	<b>Total</b>
<b><u>30-06</u></b>			1															<b>1</b>
Twin Cities Ordnance			1															<b>1</b>
Denver Ordnance			3															<b>3</b>
Lake City Arsenal				2														<b>2</b>
Rem. Arms/Union Metallic Cartridge <sup>1</sup>													1					<b>1</b>
<b><u>M1 .30 cal</u></b>			8	27														<b>35</b>
Western Cartridge Company			8	27														<b>35</b>
Lake City Arsenal						1												<b>1</b>
<b><u>.22 cal</u></b>							13			49	107							<b>13</b>
Federal Cartridge Company							13			49	107							<b>13</b>
Western Cartridge Company																		<b>49</b>
Winchester											107							<b>107</b>
Peters Cartridge Company								45										<b>45</b>
Federal Cartridge/Montgomery Wards									28									<b>28</b>
Union Metallic Cartridge												100						<b>100</b>
Remington Arms													36					<b>36</b>
<b><u>.45 cal</u></b>	13	8	12		1													<b>34</b>
Frankford Arsenal	13	8	12		1													<b>34</b>
Rem. Arms/Union Metallic Cartridge <sup>1</sup>													2					<b>2</b>
Western Cartridge Company			22															<b>22</b>
Federal Cartridge Company						4												<b>4</b>
Remington Arms		1			2													<b>3</b>
<b><u>.38 cal</u></b>																		<b>21</b>
Rem. Arms/Union Metallic Cartridge <sup>1</sup>													21					<b>21</b>
Winchester Repeated Arms															6			<b>6</b>
Western S&W (Smith & Wesson)														1				<b>1</b>
Peters SPL								1										<b>1</b>
<b><u>Other</u></b>																		<b>1</b>
Winchester Repeated Arms St. Louis															1			<b>1</b>
Rem. Arms/Union Metallic Cartridge <sup>1</sup>													4					<b>4</b>
Winchester Baringer																	1	<b>1</b>
Union Metallic Cartridge												1						<b>1</b>
Super K .44 Magnum										1								<b>1</b>
Federal Monark									1									<b>1</b>
Western .25-20 cal										1								<b>1</b>
Western .44-40 cal										1								<b>1</b>
DWM K-K 471 <sup>2</sup>																1		<b>1</b>
Winchester .300 cal												1						<b>1</b>
<b>Total</b>	<b>13</b>	<b>31</b>	<b>24</b>	<b>29</b>	<b>3</b>	<b>5</b>	<b>13</b>	<b>46</b>	<b>29</b>	<b>52</b>	<b>107</b>	<b>102</b>	<b>64</b>	<b>1</b>	<b>7</b>	<b>1</b>	<b>1</b>	<b>528</b>

<sup>1</sup> Rem=Remington

<sup>2</sup> DWM=Deutsche Waffen Munitionsfabriken

Figure 38—Pad A Table Showing cartridge cases identifiable as to type, date, and manufacturer recovered from excavation units.

**Pad A.** This pad is the closest to Mount Williams - 200 feet south of the target trench. Based on the apparent size of Mount Williams in Figure 20 and the angle of the photograph, it would appear the sailors are firing their rifles from this feature. No apparatus relating to the presumed machine gun mounts are evident in the picture. This is not surprising, however, since it is obvious from the weapon mounting brackets that weapons could be easily mounted and removed.

A total of 528 cartridges that could be identified as to manufacturer and date range were recovered from the excavations at Pad A. Almost all (522) of the identifiable cartridge types have date ranges that cover the 1942-1946 period during which the NNAS was active. However, 375 shells are from .22 cal. weapons that are not necessarily from standard military issue pistols or rifles, and 292 of these are from types that are still being manufactured. It is therefore suspected that most, if not all, of the .22 cal. shells reflect post abandonment use of Pad A by civilians or informal recreational target shooting by base personnel.

The memoir of one cadet at NNAS mentions that he and other prospective pilots were issued .38 cal. handguns and were required to train on them. Relatively few .38 cal. casings were recovered (29) but they all could have been fired from the standard 1941 Smith & Wesson M&P .38 or 1942-1943 Smith & Wesson "Victory" model revolvers that were standard issue to naval aviators. Similarly, the .45 cal. cases, most of which date from a narrow 1937-1945 range, probably reflect target practice by shore patrol and other officers using the standard military issue Colt M1911 automatic pistol. The small number of M1.30 cal. cases all reflects target practice by men using the standard military issue M1 semi-automatic carbine. Again, the date range for all but one of these cartridges is in the 1942-1943 period.

The only identifiable cartridge type that is possibly consistent with machine gun use at Pad A is the 30-06 Springfield cartridge. This was in standard use for a variety of U.S. rifles and machine guns throughout the first half of the 20<sup>th</sup> century, including the M1919 Browning 30.cal machine gun and its aircraft version, the .30 AN/M2. The .30 AN/M2 was the standard machine gun on US aircraft in the immediate pre-war period (both in fixed forward-firing mounts and as a hand-trained defensive weapon). By 1941 it was being replaced as the primary fixed weapon on all US fighter aircraft by the larger .50 cal. machine gun, but it continued in limited use as a flexibly mounted defensive weapon and for training. Most probably the primary machine gun use was test firing to provide prospective ordinance trainees and cadets with basic familiarization with this weapon, its maintenance, and operation. There is no mention in contemporary sources that prospective aircrew gunners actually trained at Mount Williams, primarily because the nearby Purcell naval air gunner school served this purpose.

**Pad B.** This pad is identical in design and construction to Pad A, and is situated approximately 200 feet farther from the Mount Williams target trench as Pad A. A total of 636 cartridges from Pad B could be definitively identified as to manufacturer and date of manufacture. All but 8 cartridges have date ranges that cover the 1942-1946 the NNAS's active wartime occupation. As at Pad A, the preponderance (532) of the identifiable shells are from .22 caliber weapons that would not have been standard military-issue pistols or rifles. In general the type and frequency of ammunition apparently discharged at Pad B is similar to that seen at Pad A. Among military types, .30 cal. shells predominate, most likely reflecting target practice with M1 carbines. The relative proportion of 30-06 cartridges that would have been fired from machine guns is marginally higher than Pad B, but given the small sample size and the likelihood that many shells were salvaged during the war, this difference is probably insignificant. In general we believe that both Pad A and Pad B were used primarily for weapon familiarization and target shooting by base personnel, and not any specialized training associated with the operation of aircraft guns.

<b>PAD B Cartridge Case Types</b>	<b>1937</b>	<b>1942</b>	<b>1943</b>	<b>1944</b>	<b>1946</b>	<b>1951</b>	<b>1954</b>	<b>1880- pres</b>	<b>1911- pres</b>	<b>1922- 1983</b>	<b>1898- pres</b>	<b>1875- 1940</b>	<b>1887- 1934</b>	<b>1913- 1938</b>	<b>Total</b>
<b><u>30-06</u></b>															
Denver Ordnance		4													4
Lake City Arsenal			1												1
Rem. Arms/Union Metallic Cartridge <sup>1</sup>											2				2
St. Louis Ordnance	1		1												2
Super Speed SPRG											1				1
<b><u>M1 .30 cal</u></b>															
Western Cartridge Company		15	57	3	2										77
Western Repeating Arms				6											6
Evansville Chrysler			10												10
Lake City Arsenal						5									5
Peters Cartridge Company			2	2											4
Federal Cartridge Company				1											1
Union Metallic Cartridge			1												1
<b><u>Remington .30 cal</u></b>															
Rem. Arms/Union Metallic Cartridge <sup>1</sup>											4				4
<b><u>.22 cal</u></b>															
Rem. Arms/Union Metallic Cartridge <sup>1</sup>								79							79
Federal Cartridge Company										91					91
Western Cartridge Company											259				259
Winchester												41			41
Peters Cartridge Company													10		10
Remington Arms									31						31
<b><u>.45 cal</u></b>															
Rem. Arms/Union Metallic Cartridge <sup>1</sup>											1				1
<b><u>.38 cal</u></b>															
Western .38 Special											1				1
<b><u>Other</u></b>															
Western Cartridge Company/351-SCR											1				1
Super Speed .22 Hornet							1								1
Western 256/Newt by Western Cartridge Co.														3	3
<b>Total</b>	<b>1</b>	<b>19</b>	<b>72</b>	<b>12</b>	<b>2</b>	<b>5</b>	<b>1</b>	<b>79</b>	<b>31</b>	<b>91</b>	<b>269</b>	<b>41</b>	<b>10</b>	<b>3</b>	<b>636</b>

<sup>1</sup> Rem=Remington

Figure 39—Pad B Table Showing cartridge cases identifiable as to type, date, and manufacturer recovered from excavation units.

<b>PAD C Provenience</b>	<b>.30-06 cal</b>	<b>.30 cal (M1)</b>	<b>.30 cal (Rem<sup>1</sup>)</b>	<b>.45 cal</b>	<b>.22 cal</b>	<b>Other</b>	<b>Total</b>
<b>M1</b>							
Overburden	1	13					14
Unit 1 L-1	2	16				1	19
Unit 1 L-2		9					9
Unit 2 L-1	1	3					4
Unit 2 L-2		2					2
Unit 3 L-1	1	7					8
Unit 3 L-2	1	3					4
<b>Subtotal</b>	<b>6</b>	<b>53</b>				<b>1</b>	<b>60</b>
<b>M1-2</b>							
Overburden		6					6
50x1 L-1		6			1		7
50x1 L-2		1			1		2
<b>Subtotal</b>		<b>13</b>			<b>2</b>		<b>15</b>
<b>M2</b>							
Overburden							
Unit 1 L-1	2	11					13
Unit 1 L-2		2					2
Unit 2 L-1		9					9
Unit 2 L-2							
Unit 3 L-1	3	5	2				10
Unit 3 L-2		4	2		1		7
<b>Subtotal</b>	<b>5</b>	<b>31</b>	<b>4</b>		<b>1</b>		<b>41</b>
<b>M2-3</b>							
Overburden		7					7
50x1 L-1	3	7					10
50x1 L-2		1					1
50x1 L-3		1					1
<b>Subtotal</b>	<b>3</b>	<b>16</b>					<b>19</b>
<b>M3</b>							
Overburden	4	34	1		1		40
Unit 1 L-1	4	17	2		1		24
Unit 1 L-2		2					2
Unit 2 L-1	1	9	2	1	1	1	15
Unit 2 L-2		1					1
Unit 3 L-1	1	7	6				14
Unit 3 L-2		2					2
<b>Subtotal</b>	<b>10</b>	<b>72</b>	<b>11</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>98</b>
<b>M4</b>							
Overburden	3	2	1				6
Unit 1 L-1	3	7	4			1	15
Unit 1 L-2	1	4	3				8
Unit 2 L-1	4	7	1			1	13
Unit 2 L-2							
Unit 3 L-1	2	5	4				11
Unit 3 L-2	2	8					10
<b>Subtotal</b>	<b>15</b>	<b>33</b>	<b>13</b>			<b>2</b>	<b>63</b>
<b>M5</b>							
Overburden	1	3	1				5
Unit 1 L-1	3	8	2	4			17
Unit 1 L-2		12	3		2	1	18
Unit 2 L-1	4	7	1			3	15
Unit 2 L-2	1	2					3
Unit 3 L-1	2	13			4		19
Unit 3 L-2			4		2		6
<b>Subtotal</b>	<b>11</b>	<b>45</b>	<b>11</b>	<b>4</b>	<b>8</b>	<b>4</b>	<b>83</b>
<b>Total</b>	<b>50</b>	<b>263</b>	<b>39</b>	<b>5</b>	<b>14</b>	<b>8</b>	<b>379</b>

<sup>1</sup>Rem=Remington

**Pad C.** Pad C differs in many respects from the other firing pads in size, features, and the types of ammunition apparently discharged. All of this suggests it supported more varied functions than Pads A and B. As previously noted Pad C is deeper (30 feet instead of 10). It has weapon mounts similar to those on Pad A and B, suggesting that some use was made of Pad C for firing hand-aimed heavy machine guns. However, it is also equipped with tie downs identical to those still used today to secure parked aircraft. As will be discussed, we believe Pad C was a more general purpose structure devoted to various aspect of test firing hand-trained and fixed forward firing aircraft machine guns.

As can be seen on Figure 40, the .22 cal cartridges that are so prevalent at the other two pads are extremely rare from the excavations at Pad C, indicating that this feature was not used for recreational shooting, either by base personnel or civilians post-abandonment. The preponderance of ammunition expended appears to have been .30 cal, both from M1 carbines and machine guns. This is also distinctly different from the other two pads.

The locations of the tie downs on Pad C are strongly indicative of activities requiring an airplane to be held stationary in a horizontal position, presumably for a variety of possible maintenance and ordinance training activities. Three possible maintenance locations on the pad are possible, but only two could be employed simultaneously, since they overlap in the center. Each location features two groupings of tie downs that would help brace the wing in place, and a third for the rear fuselage and tail. Immediately in front of the rear tie down was a apparently structure of some sort consisting of two I-beams. Presumably this was a support for the tail to hold the airplane in a horizontal position.

Figure 40—Pad C. Basic shell types recovered from excavations

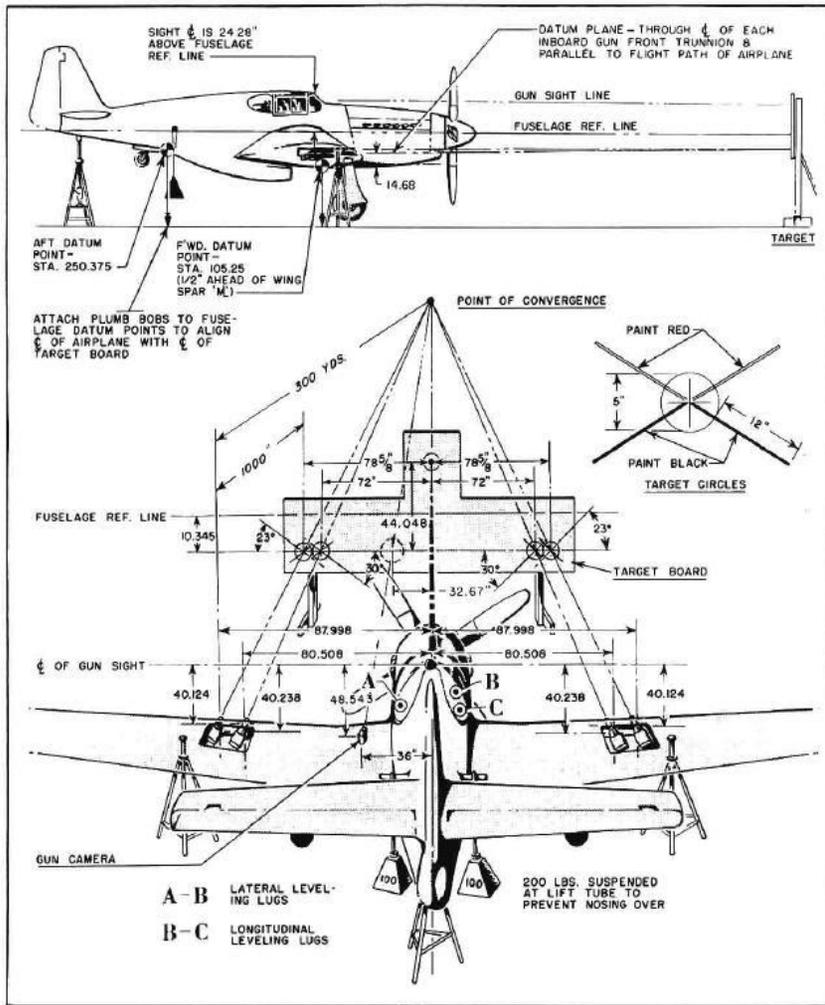


Figure 41—Page from a Royal Air Force (RAF) manual depicting the process for preparing a lend-lease P-51B for gun harmonization. In this case note that the entire airplane is supported on tripods with weights used to hold it steady. A special target board is located near the plane with targets calibrated to the gunsight and guns converging 300 yards out.

Although there is no direct photographic evidence for aircraft at the Mount Williams firing range, we believe the tie downs and their locations offer good circumstantial evidence for this. Chief among the activities we believe may have been undertaken at Pad C was training aircraft ordinance crews in the maintenance and operation of aircraft guns.

Fighter aircraft built through the 1930's typically had their machine guns (usually two) mounted in the forward fuselage in front of the pilot, and synchronized to fire through the propeller disk. Mounting the guns closely together in the fuselage greatly simplified the pilot's task in aiming and scoring damaging hits on an enemy plane because the guns were mounted in front of the pilot's gunsight and the bullet stream was compact. In many aircraft, this also allowed the pilot some direct access to the guns to clear jams. However, few machine guns could be mounted in the fuselage and the synchronization apparatus slowed their rate of fire.



Figure 42—US Navy F4F Wildcat being prepared for gun harmonization, location unknown. Note use of portable supports to brace wing and support tail, and chocks to hold plane in place on its own landing gear. Man at the cockpit is preparing gunsight and those at the tripod are adjusting the wing guns (US Navy)

By 1940-41, most US (and British) fighter aircraft had their fixed forward-firing guns located in the wings, rather than in the fuselage. Mounting the machine guns in the wings resolved many of the problems associated with the former arrangement by allowing as many as eight machine guns in a fighter without having to be synchronized to miss the plane's propeller blades. But this introduced a new problem: bullet streams from wing guns were widely separated, meaning that without adjustment to converge at a set range, they would be parallel and far less likely to result in serious damage or destruction to the enemy plane if hits were scored. To resolve this problem the US and Britain designed their aircraft so the the wing machine guns could be adjusted, in order that the bullet streams from the wing guns and the pilot's view through the gun sight would converge at the same spot in space. This spot typically varied between 200 and 600 yards and was adjustable on the ground based on pilot preference and other tactical factors. The process for doing this was called "gun harmonization". Based on available sources, there apparently was no single "correct" process for setting an aircraft up for harmonization, the details varying depending on local situations.

Given the notably "windy" conditions at the NNAS mentioned by a number of base personnel as well as by the authors of "Building the Navy's Bases in World War II: History of the Bureau of Yards and Docks and the Civil Engineer Corps, 1940-1946", the liberal use of tie downs to stabilize aircraft at Pad C would not be unexpected.

Although we believe that training in gun harmonization may have been a major purpose for Pad C, it must be admitted that there is little direct evidence for this other than the aircraft tie downs. No available contemporary NNAS publication such as the "Norman Log" or "Smooth Log" mentions the presence of aircraft at the Mount Williams firing range. Also, the nearly complete absence of .50 cal. ammunition at the target range (only one bullet casing recovered from the face of Mount Williams itself) is problematic, since most aircraft used for this purpose would have carried .50 cal. machine guns, not the .30 cal. weapon that is indicated in the shell samples. However, a few aircraft types known to be present at the NNAS (SNJ trainers and SBD scouts) were equipped with .30 cal. weapons. Also, spent .50 cal. rounds used at the firing range - including for aircraft ordinance training - would have been carefully collected by the Navy for recycling, so the absence of shells from the small excavation samples may not be significant.

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*Figure 43—View of RAF Spitfire undergoing gun harmonization, with simple target board installed in foreground. The discs on the board have been placed in order to harmonize the guns so that their lines of fire converge on a point 250 yards from the aircraft. The four small outside discs are the harmonizing points for the plane's four .303 Browning machine guns, while the larger discs inboard of these are for the two 20mm cannon. The upper center spot is for the pilot's reflector sight, and the lower spot to the left of center is for the camera gun (World War II Today – ww2today.com – edited by Martin Cherrett).*

Despite the lack of unequivocal supporting documentation, we believe training ordinance and maintenance crews with the aircraft armament is the most likely explanation for the features on Pad C. The 30 foot distance between the front sets of tie downs is consistent with the wingspan of navy fighters of the period and the structure at the rear is well placed to support the rear fuselage of the aircraft. Presumably the tie down behind the structure was used to brace the tail against the support – which may have been height-adjustable. The aircraft could have either rested on their landing gear as shown in Figure 42, or elevated on movable supports as on the training diagram shown in Figure 41. Presumably, the airplanes at Pad C were further held in place with movable braces such as those shown on Figures 41 and 42. A variety of aircraft types could have been used for this training, but based on characteristics and availability, F4F Wildcats are perhaps the most likely since they mounted a battery of four wing guns and by mid-war they were being replaced in front-line naval service by more advanced aircraft.



Figure 44—Firing Point Shed (Building 1104) looking west.

this feature in Glover-Smith-Bode (1996), the superstructure was destroyed by an April, 1949 tornado. This is further demonstrated by a 1957 Aerial photograph of the target range (Figure 46) that shows no evidence for a roof remaining. No detailed excavations were performed at this feature.

#### **Firing Point Shed (NNAS Building 1104)**

This feature consists of a 110x20 foot concrete pad located approximately 250 feet south of Pad C. It is described on the US Navy base map as a “firing point shed”, and a 1945 aerial photograph of the NNAS indicates that it was roofed. It was presumably used by range officers supervising and controlling operations at the firing range.

During the initial 1993 investigation, the pad and surrounding area was overgrown and littered with corrugated asbestos-board panels that presumably represent wall or roof sheathing. Upon clearing during the 2005-6 investigations, 24 square holes in the concrete pad that once held support posts for a roof were identified. The rear and sides were probably walled in with asbestos panels with the front facing the firing range all or partially open. According to the description of

## Engine Test Stands (NNAS Building 1106)

This feature is located approximately 100 feet due east of Building 1104. It consists of several concrete pads laid adjacent to each other that together comprise a paved surface that is approximately 135x40 feet in size. Within this large area are a series of ten cells defined by low concrete barriers. Six of these contain thick rectangular concrete platforms exhibiting the cut-off remnants of steel pipes that would have supported aircraft engine test stands. Interspersed within the row of test stands are similar cubicles that lack engine support apparatus.

These were presumably stations where crews stood while operating and testing the engines. The test stand block

itself measures approximately 115x15 feet and is surrounded by a series of poured concrete walkways or floors. The walkways along the west and south sides of the test stands are approximately five feet wide. A much wider pad borders the east side. The paved surface north of the test stands was much wider, consisting of a five foot wide walkway adjacent to the test stands and a separately poured 15 foot wide pad forming the north edge of the entire facility. Presumably, the wide north pad was used by officers and men supervising or viewing the test stand activities.



*Figure 45—Engine Test Stands (Building 1106) looking east*



*Figure 46—Portion of 1957 aerial photograph showing the southeast corner of the NNAS. Although of indifferent quality, this image is probably the clearest available that shows the firing range in a condition approaching that during the operation of the base. Mount Williams is well shown, as is the target trench associated with Building 1101, and the Small Arms Magazine (Building 1108) and the Engine Test Stands (Building 1106) are apparent as ruins. Several buildings associated with the 1945 Skeet Range north of Mount Williams (Building 1110) are apparently still standing and possibly still in use. The former base boundary road is still present, as well as the internal system of roads and paths accessing the features. Several other small cleared areas, pads, or structures are visible in this picture. One structure due south of the Engine Test Stands would be the base incinerator, which was no longer extant during the archaeological work. Other small objects appear to lie west of and on the Firing Point Shed (1104), but the former roof is missing. These objects are not shown on wartime navy maps of the base. This, together with the very visible roads and paths, suggests that organized activities at the firing range may have continued for at least a few years after the NNAS was turned over to the University of Oklahoma. Likely users could have been University security personnel, Norman police, University ROTC cadets, and military reservists.*



Figure 47—Small Arms Magazine (Building 1108), looking north

### Small Arms Magazine (NNAS Building 1108)

This is a small rectangular concrete pad divided into two compartments. Low stem walls form the outside of the building and the base for a wall between the two rooms. The entire structure is approximately 10x20 feet in size. Scraps of concrete masonry littered the area surrounding this feature area in 1993, probably remnants of the walls. According to Glover-Smith-Bode (1996) Building 1108 was severely damaged by an April 1949 tornado and abandoned. Shadows seen in the 1957 aerial photograph of the NNAS (Figure 46) indicate that the structure was at least partially still standing in 1957. Sometime thereafter it was demolished, leaving only the foundation.

### Other Features south of Mount Williams

Three other structures are identified in original 1943-1944 base plans. These include a “Material Shed” (Building 1102), a “Skeet Tower” (Building 1103), and an “Incinerator” (Building 1107).

No evidence of Building 1102 was identified during the original 1993 ODOT field survey, the historic survey performed by Glover-Smith-Bode (1966), or the 2005-2006 work. Presumably it was a small and insubstantial structure that left no substantive remains.



Figure 48—Skeet Tower (Building 1103), looking north



Figure 49—Skeet Tower (Building 1103) support pad detail



Figure 50—Shattered skeet in vicinity of Building 1103.

Building 1103, the Skeet Tower, was also not observed during the original 1993 or 1996 investigations. The tower was apparently in use for only two years and was demolished in 1945 by the Navy after the large skeet range north of Mount Williams was completed. The base plans do not show any other features associated with the tower, suggesting that this feature was not a significant focus of training activities. Going into the 2005-2006 work, it was our presumption that no remains associated with this tower would have survived. However, during topsoil removal by the contractor in the mapped location of Building 1103, we identified and photographed four concrete pads that formed the foundation for a square-based steel I-beam tower measuring approximately 15x15 feet at the base.

Each pad is roughly 2x2 feet in size. Observation of the surrounding area also resulted in the discovery of large quantities of shattered skeet and a small remnant of wiring in pipe conduit. No evidence of any superstructure for the tower was evident, other than steel I-beams imbedded in the foundation pads. It is perhaps noteworthy that Building 1103 is the only feature associated with Mount Williams that is not aligned in the cardinal directions, but instead is skewed at a 45 degree angle.

No evidence whatsoever of the Incinerator (Building 1107) was seen during the 2005-2006 work, nor was it documented in Glover-Smith-Bode (1996). This was somewhat surprising because, as recorded in 1993, it was a substantial and partially subterranean concrete structure. During the 1993 survey we noted that the interior was filled with deep standing water and it is possible that sometime between 1993 and 1996 the university demolished it as a safety hazard. For whatever reason, this structure was no longer extant in 2005, even as a foundation, ruin, or pile of debris.

## 1945 Skeet Range Complex

Skeet shooting was an integral part of primary air gunnery training during the Second World War. Its purpose was to teach prospective gunners (such as those manning hand-trained or turreted defensive machine guns in bombers and observation craft) the skills to “lead” enemy aircraft in the same way a duck hunter leads his prey.

During primary aptitude training, prospective trainees generally stood at set locations and fired standard shotguns at launched skeet discs. Those men who performed well could request assignment to a more advanced training center, such as the Purcell Naval Air Gunner School near Lexington. Such primary aptitude training was likely the purpose of the original single skeet tower south of Mount Williams.



Figure 51—Overview of 1945 Skeet Range looking north from Mount Williams, showing location of features mentioned in the text.



*Figure 52—1945 Skeet range looking WSW. What we presume to be the main command/control house comprising the concrete pads and partial stem walls in the background. Immediately in front of the house (toward the camera) is a straight inner walkway that connects to all three firing arcs. The path immediately in front of the camera is the base of the central firing arc and the foundation for a secondary control station for that arc.*

1103), this was a very large and substantial facility containing a central command house equipped with plumbing and septic system, four tall skeet launching towers, and three separate firing arcs, each containing a central control station and five separate firing pads. The small inset on Figure 18 shows the skeet range as completed, including walls separating firing arcs from each other. The location of firing pads and skeet towers would have allowed trainees to fire at moving targets from all aspects and directions – approaching, parallel to, and heading away from the gunner – and conceivably to switch fire at two targets coming nearly simultaneously from different directions.

In 1945, a new, substantially larger skeet range was built north of Mount Williams. We initially did not plan to investigate this feature in detail since it was - at best - only marginally associated with Second World War training at the NNAS.

However, toward the end of the 2005-2006 field work we asked the construction contractor to clear vegetation from the skeet range to permit more complete photography of the site. Subsequently we excavated a series of 1x1 meter test pits adjacent to the each shooting location (15 firing pads in all) to obtain a basic sample of weapons fired at the range. Due to time and schedule limitations, we were unable to investigate the complex in detail further.

Compared with the original isolated skeet tower southeast of Mount Williams (Building

This training complex would have only been in service for a few months before the final decision to close the NNAS was made, so it is somewhat surprising it was even constructed at all. As mentioned elsewhere, we believe the 1945 range may have been built when the Navy still intended to keep the NNAS open, to perform more advanced air gunnery training after the nearby Lexington gunnery school was closed in February 1946. In the event, the NNAS itself was also closed in March 1946. Several of the skeet towers and the main building are still in evidence as standing structures on the 1951 aerial photograph of the NNAS (Figure 46) and several access roads/paths to the range are still apparent. This suggests that the range may have been maintained for a short while by the University for recreational use.



*Figure 53—View from center of central firing ac looking WNE showing foundation for skeet towers*



*Figure 54—1945 Skeet Range - presumed plumbed washroom at rear of command house, looking WNW*

The sample test pits adjacent to the firing pads provided the expected results: shotgun shells of various gauges dominated the collection, accounting for 1243 items. Of these, 12 gauge shells predominated. Somewhat surprisingly, a small number (14) of spent bullet cartridges was also recovered from the skeet range, equally divided between .22 cal. and M1-30 cal. ammunition. It is unlikely this reflects a systematic training exercise, since hitting skeet with a rifle bullet is no mean feat. More likely, the small numbers of bullet shells represent infrequent recreational shooting from the pads.

<b>Shotgun Gauge</b>	<b>12</b>	<b>16</b>	<b>20</b>	<b>28</b>	<b>.410</b>	<b>Unknown</b>	<b>Total</b>
<b>Arc 1</b>							
Pad 1 L1	6	1				1	8
Pad 2 R1	177	17	13			5	212
Pad 3 R1	317	17	22			6	362
Pad 4 L1	47	2	6			1	56
Pad 5 R1	8						8
<b>Subtotal</b>	<b>555</b>	<b>37</b>	<b>41</b>			<b>13</b>	<b>646</b>
<b>Arc 2</b>							
Pad 1 R1	2		4			2	8
Pad 2 R1	68	1	1			5	75
Pad 3 R1	18	2	18			1	39
Pad 4 R1	1	1					2
Pad 5 R1	3	4	2				9
<b>Subtotal</b>	<b>92</b>	<b>8</b>	<b>25</b>			<b>8</b>	<b>133</b>
<b>Arc 3</b>							
Pad 1 L1	6		1				7
Pad 2 R1	93		14	1	3	2	113
Pad 3 R1	49	3	10				62
Pad 4 R1	94	3	5		1		103
Pad 5 R1	155	5	17	1	1		179
<b>Subtotal</b>	<b>397</b>	<b>11</b>	<b>47</b>	<b>2</b>	<b>5</b>	<b>2</b>	<b>464</b>
<b>Total</b>	<b>113</b>	<b>56</b>	<b>1044</b>	<b>2</b>	<b>5</b>	<b>23</b>	<b>1243</b>

Figure 55—1945 Skeet Range, shotgun shell gauges s recovered from test pits

# NNAS Mount Williams Firing Range Feature Plans and Elevation Drawings

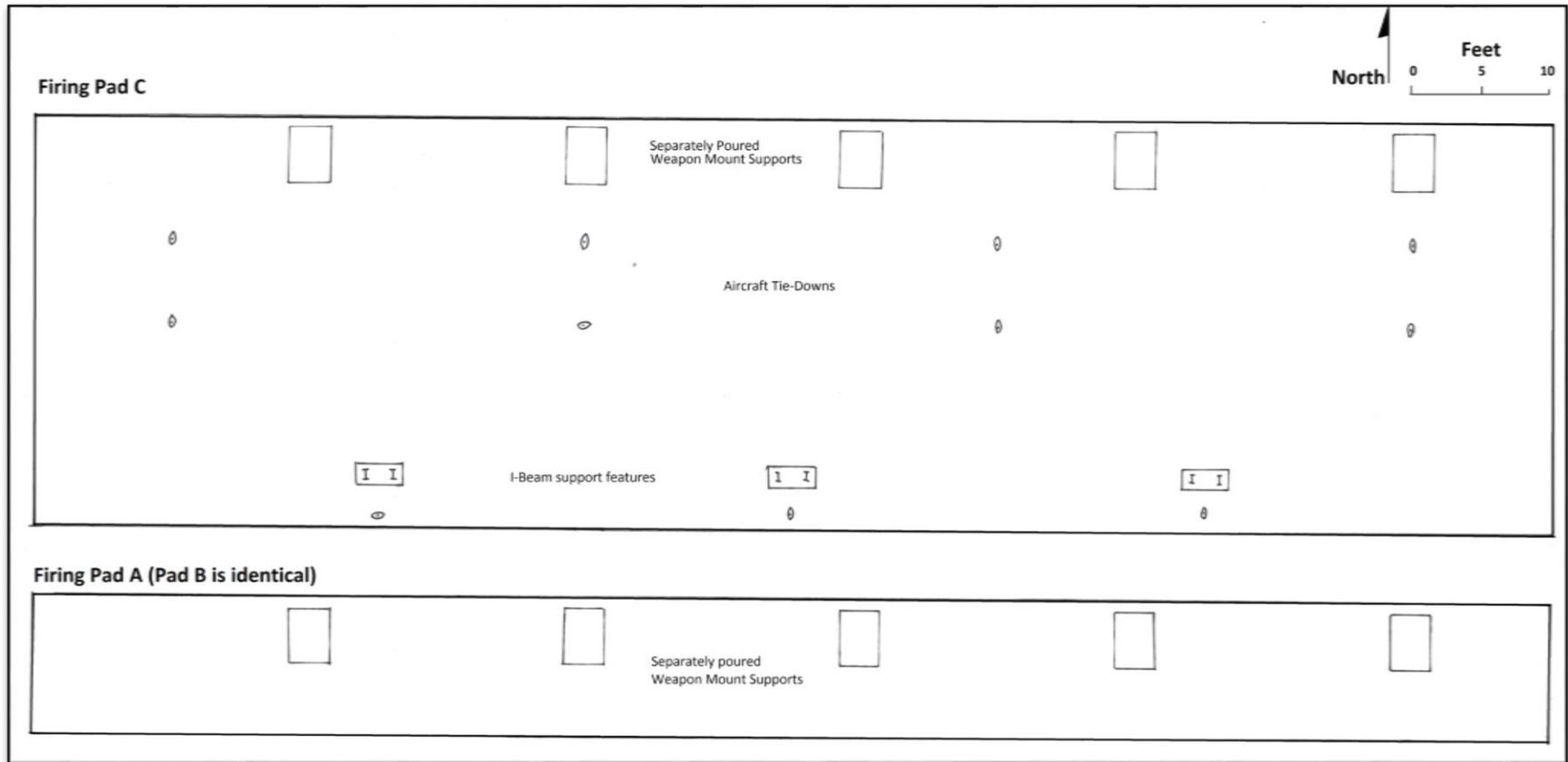


Figure 56—Plan view of Firing Pads A and C (Pad B is identical to Pad A in all key respects). Rectangular features along the north edge of the firing pads are the separately poured concrete supports containing weapon mounting brackets. These brackets presumably held removable supports for the test-firing of hand-trained .30 or .50 caliber machine guns. Figure 31 is a photograph showing the bracket details. The eight small oval features behind the weapon mounts on Pad C are tie-downs believed to be used to stabilize aircraft wings with the aft fuselage/tail assemblages held in place horizontally on the I-beam supports located toward the rear of Pad C between each pair of wing tie-down. The single tie-down behind each I-beam support was presumably used to brace the aircraft tail on the support.

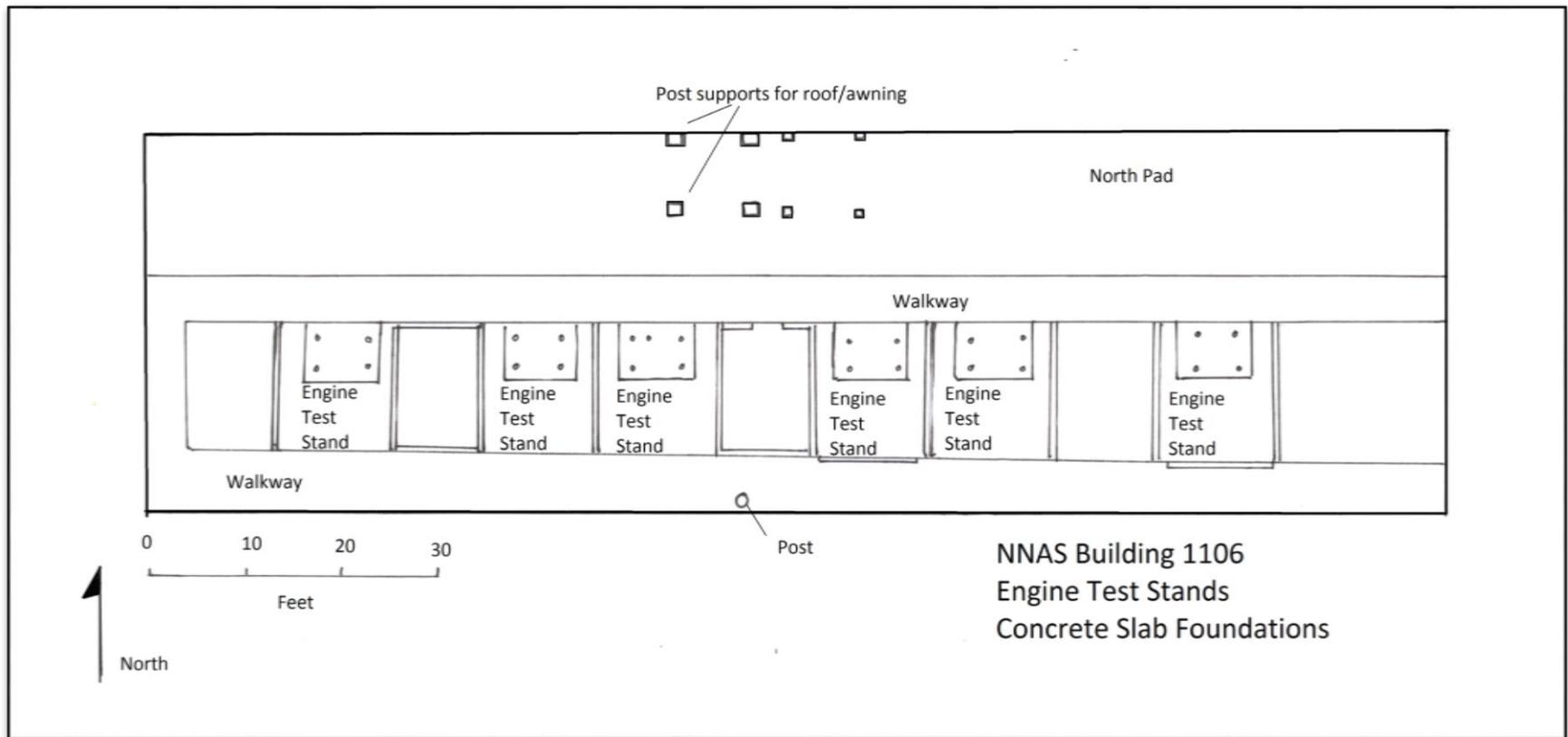


Figure 57—Plan view of NNAS Building 1106, Engine Test Stands. This feature contained six separate aircraft engine test stands together with adjacent compartments in which personnel operating or servicing the engines would have stood. Many test stands and compartments were separated by low concrete stem walls that presumably supported partitions of some sort. The entire complex of stands was surrounded by several separately poured concrete walkways and pads.

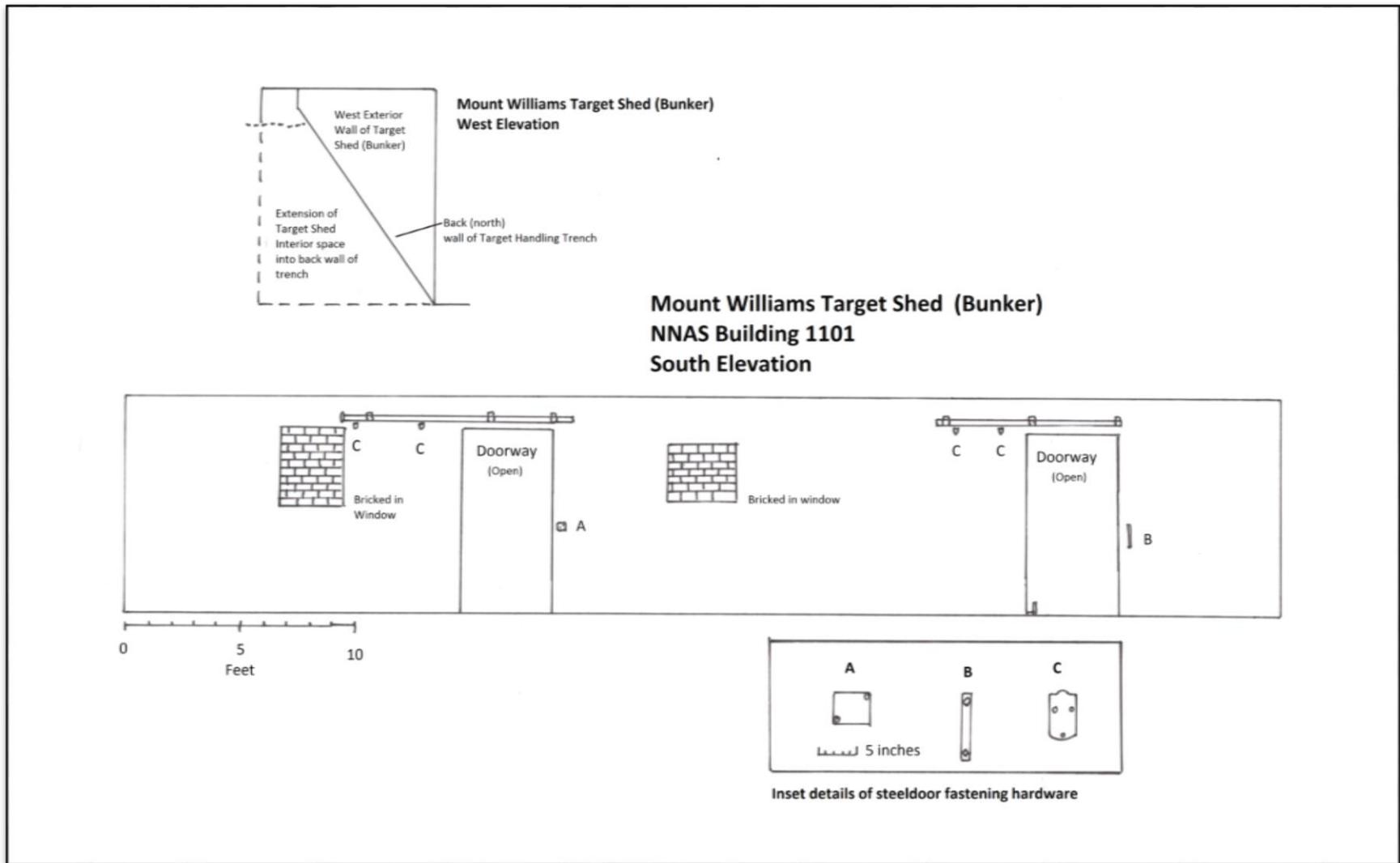


Figure 58—South and west elevations of Mount Williams Target Shed (Bunker), NNAS Building 1101. Although the remnants of a sliding wooden door was still affixed to the mounting apparatus over one doorway in 1993, this was no longer present during the 2005-2006 excavations. The bunker was divided into two rooms, both of which contained approximately 4 feet of accumulated soil.

# CHAPTER 4 – SUMMARY AND CONCLUSIONS

The Norman Naval Air Station (NNAS) and its sister Norman Naval Air Technical Training Center (NATTC) represented a substantial investment in Central Oklahoma by the U.S. Navy, in their own way as substantial as the US Army’s Tinker Field (now Tinker Air Force Base) was when it was initially established. At their peak operation in 1944-45, the two navy bases maintained a complement over 10,000 men and women, and the NNAS graduated over 6,500 men from its primary flight school. Although both the Naval Air Station and the NATTC were closed after WW2, the NATTC was reopened on a long-term basis during the Korean War and continued in operation for ground training activities until almost 1960, making Norman a “navy town” for over 15 years.

It is interesting to speculate how the NNAS, the City of Norman and the Oklahoma City metropolitan area might have evolved if the NNAS had not been closed in 1946. The Navy initially intended to keep the NNAS open after the war, but because the City of Norman and University of Oklahoma both desired to have the base closed, the Navy moved its operations to the Memphis Naval Air Station. Had local officials been supportive of keeping the NNAS open, there is a reasonable possibility the Navy might have maintained and expanded the NNAS, merged its operations more closely with the NATTC, and maintained a major presence in Norman for years thereafter.

In this context, it may be instructive to consider the history and post war development of the other five primary aviation training bases established at the same time as the Norman NAS.

Three bases, Ottumwa NAS, Hutchinson NAS, and Bunker Hill NAS were closed soon after the war ended and were never reactivated by the Navy.

The Ottumwa Naval Air Station (NAS) was established in 1942 as a primary flight school, with training commencing in 1943. Flight training officially ended in September 1945. It is interesting to note that, of 450 cadets still present at Ottumwa, 200 cadets were transferred to the Norman NAS, further indication that the Navy was at that time still considering keeping Norman open. In 1947 all aviation training activities were relocated to Pensacola NAS, and the base was transferred to the City of Ottumwa. Ottumwa remained strictly a primary flight school throughout the war.



Figure 59—View of Memphis NAS flight school complex in 1944. Note similarity in general layout to Norman NAS

The Hutchinson Naval Air Station (Kansas) was initially established in 1942 on the site of the Hutchinson state fairgrounds and municipal airport, and later additional land was purchased from local farmers, many of whom were Amish. Like the Norman NAS, the major purpose of the station was to provide primary flight training for naval aviation cadets. That instruction began on October 1, 1942, and continued until March 15, 1944, when the function of the base changed to advanced operational training for PB4Y *Liberator* bomber pilots and crews. By the end of November 1944 250 patrol plane commanders and 500 copilots had graduated from PB4Y training. However, the facilities at Hutchinson were insufficient to accommodate the training of both flight and maintenance personnel, resulting in the relocation of PB4Y maintenance training to the air station at Minneapolis, Minnesota and a new facility at Pensacola. Hutchinson NAS was closed in 1946 and never reactivated.

The Bunker Hill Naval Air Station (Indiana) was established in 1942, originally as “Naval Air Station Peru”. It was renamed Naval Air Station Bunker Hill in 1943. Its only function during the war was as a primary flight school. Like Hutchinson and Ottumwa it was deactivated at the end of World War II and the flying field was turned over to farming. Although in 1954 the site itself was reestablished as a US Air Force Storage facility and then developed as Bunker Hill Air Force Base, the naval air station never returned. In 1968, it was renamed Grissom Air Force Base, after Virgil (Gus) Grissom, who died in the Apollo I fire. The facility is still in operation as Grissom Air Reserve Base.

Ottumwa, Hutchinson, and Bunker Hill were all relatively small and, unlike a number of the larger facilities, they housed a relatively limited range of activities that were either redundant or could be easily transferred to larger and better equipped facilities. All three bases were ideal “low hanging fruit” as the navy selected bases for closure during the postwar drawdown.

The other ends of the spectrum are Olathe NAS and Memphis NAS.

The Olathe Naval Air Station (Kansas) was established at Fairfax Field, which was already a naval reserve air base. The base was officially commissioned on October 1, 1942, as the United States Naval Reserve Aviation Base, Olathe, Kansas, but its name was changed on January 1, 1943, to the United States Naval Air Station in order to give it comparable status with other air bases. From 1942 through much of 1944 it served as a primary flight school, but in November its primary mission became that of training transport pilots and providing support facilities for the Naval Air Transport Service (NATS) which the navy had created in mid-December, 1941, to provide for the rapid transport of navy personnel and materials. NATS became one of the largest transport airlines in the nation, operating 28 regularly scheduled flights daily within the continental United States and also flew cargo, mail, men, and blood to the Atlantic and Pacific theaters. After the war Olathe was one of seventeen air stations designated for the training of naval reservists, and in this capacity it remained in operation for an additional 23 years after the end of the Second World War; not being closed until October 29, 1969, as an economy measure.

The Memphis NAS (NASM) was also one of the six primary flight schools established along with the NNAS in 1942. Although referred to as the Memphis NAS, it was actually established in Millington, Tennessee, a small city approximately 9 miles from Memphis, in a somewhat similar relationship as Norman is to Oklahoma City. Memphis NAS was planned and built to a very similar design as the Norman base, and during the Second World War, it supported a complement of approximately 10,000 cadets for both flight and ground crew training. The main base covered approximately 3,500 acres and, like the NNAS, it supported a large number (16) of outlying flying fields.

In early 1943 the Memphis NAS ground crew facility was renamed the Naval Air Technical Training Center (NATT), similar in function to the Norman NATTC; and in 1946 the headquarters of the Navy's technical training command was moved there. In 1947, all the operations of the NATT command were consolidated at Memphis. In 1949 the base ceased being a major flight training school and the airfield complex was eventually turned over to civil use. It is now known as the Millington-Memphis Airport. During the Korean War, a total of \$64,000,000 was spent on a six-year building program at Memphis NAS, replacing the "temporary" wartime buildings with permanent facilities. By the late 1950s almost thirteen thousand uniformed and civilian employees were on the station's payroll, and the base became one of the largest employers in Shelby County, Tennessee, with an annual payroll of \$39,000,000. During the Vietnam War, 23,000 trainees were assigned to NASM, which continued to provide service to the Navy into the 1990s. With the end of the Cold War, the Memphis NAS has been downsized, but as recently as 1993, the five thousand full-time uniformed and civilian employees and an equal number of students assigned to the base contributed to the estimated \$250 million annual value of the base to the local economy. NAS Memphis was re-designated Naval Support Activity Memphis September 30, 1995. The name was changed again to Naval Support Activity Mid-South October 1, 1998. Despite numerous waves of base closures and realignments, the naval establishment in Memphis remains a major employer and economic driver for the area.

In the case of both Olathe and Memphis, the bases diversified their operations relatively early and then assumed other important functions – transport operations at Olathe and Technical Training (the NATTC) at Memphis. They represented a larger investment by the navy and their operations remained of vital importance after the need for primary pilot training had abated.

Norman, with the separate NNAS and the NATTC bases, was home to essentially the same activities as Memphis during the war. The NNAS was apparently considered important enough as a flight school that the navy initially considered keeping it in operation. Five years after the end of World War II, both Norman bases were reactivated for the Korean Conflict. Although the NAS was permanently deactivated shortly thereafter, the NATTC remained in operation until 1960. This suggests that, had the city of Norman lobbied as hard to keep both bases active in 1945 as it did to get them in 1942, the bases might have expanded and consolidated their operations and become permanent institutions in central Oklahoma, perhaps becoming as important to the local economy as Memphis NAS became to western Tennessee.

The NNAS and NATTC aside, the fact is that many significant sites in Oklahoma related to the Second World War still remain. Some are well known and located on active bases, such as Fort Sill, the McAlester Munition Plant, and Tinker Air Force Base. Because sites such as these are still owned and operated by the Department of Defense or other Federal agencies, base construction and rehabilitation projects must comply with federal laws and rules, including the National Historic Preservation Act. Some facilities, such as Fort Sill, even maintain their own active historic preservation programs to oversee these activities. All this helps to ensure that potential historic properties on active military bases are identified and, if possible, preserved without impacting their primary military missions.

However, many sites, buildings, and structures associated with the war in Oklahoma are no longer under federal control – and some never were. They, like the Norman NAS and the Norman NATTC, are owned by municipalities, universities, state agencies, or private individuals and corporations. In many cases, the current owners of these facilities may be unaware of their historic significance, or not care. In some instances, World War 2 veterans or military historians may advocate for such sites, but the time will soon come when no people will be left that have a first-hand memory of the 1939-1941 period in Oklahoma.

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Our work at the former Norman Naval Air Station, as well as the earlier documentation projects at the base by Glover-Smith-Bode was only made possible because of agreements reached years before in what was thought to be a potential federally-funded road-building project. Had this road project not been undertaken and the resultant agreements not made, there would have been no historic documentation of the NNAS and the archaeological information in this report would not exist. Most non-federally owned World War-era properties will not be so lucky. It is critical that the historic preservation community, together with veterans' groups and others, build on oral historical documentation of the war years in Oklahoma and link this with a comprehensive survey of known wartime sites to assess their integrity and association with significant wartime activities. Until this is done, many such resources are liable to disappear from human memory and the potential for preservation.

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# Chapter 5 – Notes on Sources

## Chapter 1 – the Navy and Norman

This section draws heavily on several major secondary sources, as well as a number of articles in local newspapers such as the *Norman Transcript* and *Daily Oklahoman*, the NNAS *Norman Log* newsletter and *Smooth Log* yearbook, and several unpublished memoirs of former base personnel from online blogs or websites. Chief among these sources are the following:

### General Histories

- *Historical Survey US Naval Air Station*, Glover-Smith-Bode, Inc. (1996). This excellent volume was prepared for the University of Oklahoma as a result of the initial Section 106 consultation among the University, the Oklahoma Department of Transportation, and the Oklahoma State Historic Preservation Office. Contains an excellent record of buildings and structures of the NNAS and their condition in the early-mid-1990's
- *The History of Norman Naval Aviation Base*, Meacham & Associates, (1995). Excellent historical summary of the NNAS prepared for Glover-Smith-Bode, Inc., and included in their *Historical Survey US Naval Air Station*.
- *Building the Navy's Bases in World War II: History of the Bureau of Yards and Docks and the Civil Engineer Corps, 1940-1946*, Department of the Navy Bureau of Yards and Docks, (1946). Includes section discussing the construction of the Navy's primary flight schools including the Norman Naval Air Station and other Norman Naval facilities. Provides interesting information regarding employment, supply, and climatic conditions that affected construction of the Norman facilities.
- *The Bases. The Story of Norman's Naval Bases during 1942*. Breanna Edwards, (n.d.) Undated University of Oklahoma student paper, History 3503. Provides detailed local perspective on the building of the NNAS and other naval facilities in Norman based on review of 1942 articles in the *Norman Transcript*.
- *A Naval Base on the Prairie: Norman Oklahoma and WWII*. Cleveland County Historical Society online newsletter *The Round Tower*, (2014). Summary of the NNAS and NATTC, with particular focus on the role of WAVES at the bases.
- *Norman's Navy Years 1942-1959*. Sue Schrems and Vernon Maddux, (2016). Outstanding and informative photographic history of the Naval presence in Norman published in the Arcadia Press "Images of America" series of local photographic histories
- There are also several manuscript histories of the NNAS prepared by naval personnel dating from 1942 to 1945, titled *History of the Naval Air Station, Norman, Oklahoma*, unknown author (1942); *History of NAS Norman, 1 Jan 45 to 31 March 45*, unknown author (1945); and *History of NAS, Norman, Oklahoma 1 July 45 to 2 Sep 45*, R.C Young Commanding Officer (1945).

### Online unpublished Memoirs

- *Senior Birdman: the guy who just had to fly*, Eldon N Price, (2006). Contains interesting remembrances of Price's impressions of Oklahoma, Norman, the NNAS, flight training activities, and his off-duty activities in Oklahoma City and Norman.

- *Knights and Squires*, author and date unknown. No longer available online, a printout downloaded by the ODOT Cultural Resources Program in 2008. Contains personal reminiscences of a student aviator at the NNAS, focusing on his activities as a non-flying “Tarmac” and various impressions of base life.

### Miscellaneous

- *The Smooth Log*, (1944) US Navy Yearbook of the NNAS. Army and Navy Publishing Company, Baton Rouge. Contains numerous photographs of base operations and base personnel.
- *The Norman Log (various)*, US Navy NNAS Station Newsletters on file at the University of Oklahoma Western History Collection
- *Cleveland County Historical Society (CCHS)* files and online webpages contain several articles and many photographs related to the NNAS and NATTC.
- *Football! Navy! War!: How military “lend lease” players saved the college game and helped win World War 2.* Wilbur D. Jones, Jr., (2009). McFarland and Company, Jefferson, North Carolina. Provided a national historical perspective on the emphasis placed on football in the training of naval personnel in the Second World War, referencing the 1943 Naval Aviation Physical Manual directing these programs. Lists over 180 such base teams, including the NNAS Zoomers.
- *The Oklahoma Football Encyclopedia*, Ray Dozier, (2006). Sports Publishing L.L.C., Norman, Oklahoma. Contains specific information regarding the NNAS Zoomers and the University of Oklahoma.
- The Cleveland County Historical Society (CCHS) photographic archive provided many of the historic photographs used in this volume.

### Chapter 2 – Project Background

The majority of the sources in this section comprise written correspondence and negotiated agreements by, between, and among the Oklahoma Department of Transportation, the Oklahoma State Historic Preservation Office, the University of Oklahoma, and University North Park, L.L.C., on file at the Oklahoma Department of Transportation Cultural Resources Program. Specific laws and regulations mentioned in the text can be obtained through websites and links maintained by the Oklahoma State Historic Preservation Office and the ODOT Cultural Resources Program. The original technical report by the Oklahoma Department of Transportation that identified the historical significance of the NNAS and included the initial recommendations for preservation strategies is cited below:

- *Cultural Resources Survey, Cleveland County Project SH-77T, STP-14C(315); J/P 12548(04)*, J.D. Hartley (1993). Report on file at Oklahoma Department of Transportation Cultural Resources Program, the Oklahoma Archaeological Survey, and Oklahoma Historic Preservation Office.

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### Chapter 3 - Archaeological Documentation

In addition to the general historical works cited above, the sources used in this chapter are primarily guides used to identify shell cartridges and a few naval and military manuals used to help interpret the function of certain features. Chief among these are the following:

- Small-Caliber Ammunition Identification Guide (U) Volume 1 Small-Arms Cartridges up to 15mm DST-1160G-514-81-Vol 1 (U.) Defense Intelligence Agency (1984)
- *Cartridge Headstamp Guide – United States of America*. Harrington Aviation Museum Northhamptonshire, UK (n.d).
- *Manual for Fighter Gun Harmonization*. Headquarters, Army Air Forces, Washington (1945)

### Chapter 4 – Summary and Conclusions

- Most of the information regarding the Memphis Naval Air Station was taken from the online Tennessee Encyclopedia of History and Culture and websites of the Naval Support Activity MidSouth.
- *Naval Air Stations in Kansas During World War II*, R. Douglas Hurt, (1977), Kansas History: A Journal of the Southern Plains Vol 43, No. 3 Reproduced on the Kansas Historical Society webpage. An excellent article discussing both the Olathe NAS and Hutchinson NAS.
- *US Naval Air Station Ottumwa – Historical Timeline* (n.d.) Webpage of the Friends of Ottumwa
- *Bunker Hill and Grissom Air Force Base*, Tom Kelley (2016) Arcadia Press Images of Aviation.
- *Building the Navy's Bases in World War II: History of the Bureau of Yards and Docks and the Civil Engineer Corps, 1940-1946*, Department of the Navy Bureau of Yards and Docks, (1946)

### Appendix 1 – Other Naval Facilities in the Norman Vicinity

This Appendix draws heavily from two principle sources:

- *Norman's Navy Years 1942-1959*. Sue Schrems and Vernon Maddux, (2016) Arcadia Press "Images of America" (2016)
- Draft Final Proposed Plan - Former Purcell Naval Air Gunners School, Cleveland County, Oklahoma FUDS Project No. K06OK002101 Prepared for U.S. Army Engineering and Support Center, Huntsville, AL, by Parsons, Austin, Texas (2008)



# Appendix 1

## Other Naval Facilities in the Norman Vicinity

### The Naval Air Technical Training Center – Norman (NATTC)



*Figure 60—1945 view of aircraft lined up for outdoor maintenance demonstrations as part of an NATTC public open house. Aircraft in the foreground are Grumman F6F Hellcats and Vought F4U Corsairs. Other airplanes visible on the tarmac include a number of Grumman F4F Wildcats and two Douglas SBD Dauntless dive bombers missing their wings. In the background adjoining the shelter are a number of partially disassembled Vought OS2U Kingfishers with wheeled undercarriages instead of their usual floats (CCHS)*

In 1942, the US Navy acquired approximately 1,300 acres of undeveloped land southeast of the University of Oklahoma for the Naval Air Technical Training Center. The purpose of the base was to train ground personnel in a variety of specialized aircraft maintenance tasks, including ordinance, aviation machinist's mates, metalsmiths, rubberized equipment repair, and radar and radio operation. The facility was built concurrently with the NNAS, and the same logistic, construction and social issues that affected the NNAS as described in Chapter 1 also affected the NATTC. The NATTC was commissioned in December 1942, although all construction was not completed until early 1943. Locally, the NATTC came to be known as "South Base" to differentiate it from the NNAS at the north edge of Norman. Although under separate commands, the NATTC and the NNAS were able exchange personnel as required to facilitate training and operations. The NATTC lacked its own landing field for aircraft. This required many of the planes destined for ground training at the NATTC to be flown into the NNAS and then –

presumably - partially disassembled for transit south on the Santa Fe railway, which linked the two bases. The NATTC was also served by the Oklahoma Electric (Interurban) Railway. New cadets usually arrived at the NATTC via the main gate along the railway on the eastern boundary. The northern boundary of the base was along Timberdell road with an entrance gate on Jenkins. The western boundary of the navy property was along Chautauqua Road. The majority of the structures at the NATTC comprised barracks for enlisted personnel, WAVES, and trainees, aircraft maintenance shops, warehouses, recreational facilities for enlisted personnel, NCOs and officers, and an indoor and outdoor pool for recreation and training. The compact building complex was surrounded by open fields used for recreation and physical training, including a golf course and clubhouse. Over its nearly 15 years of operation the NATTC graduated a total of 74,332 men and women. Although much of the original roadway system survives today, occasionally with their original names commemorating famous ships or commanders, most other evidence for the NATTC has disappeared. The site is now part of the University of Oklahoma and home to the U.S. National Weather Center, other research facilities, and university housing.



*Figure 61—Oblique view of the Norman Naval Air Technical Training Center (NATTC) in the 1940's, looking southwest. Base entrance off US-77 is at left of photo. The entrance road (Constitution Avenue then as now) crosses the base golf course (now the University of Oklahoma golf course) and runs along the north side of the barracks area (CCHS).*

## The US Naval Hospital

Concurrently with the establishment of the NNAS and NATC, the Navy established a large, 600-bed Naval Hospital in 1942, located on the grounds of the NATTC but under a separate command. As depicted in the map at right, the facility was located south and east of the main NATTC complex. The hospital was one of the largest inland naval hospitals in the country and served personnel from bases throughout the central US. Later, casualties from the Pacific war were regularly brought by rail to the Norman hospital. Staff included as many as 60 medical officers, 50 nurses, and 160 corpsmen. The hospital and outpatient clinics also treated the dependents of naval personnel. These services included a dental clinic and maternity ward.

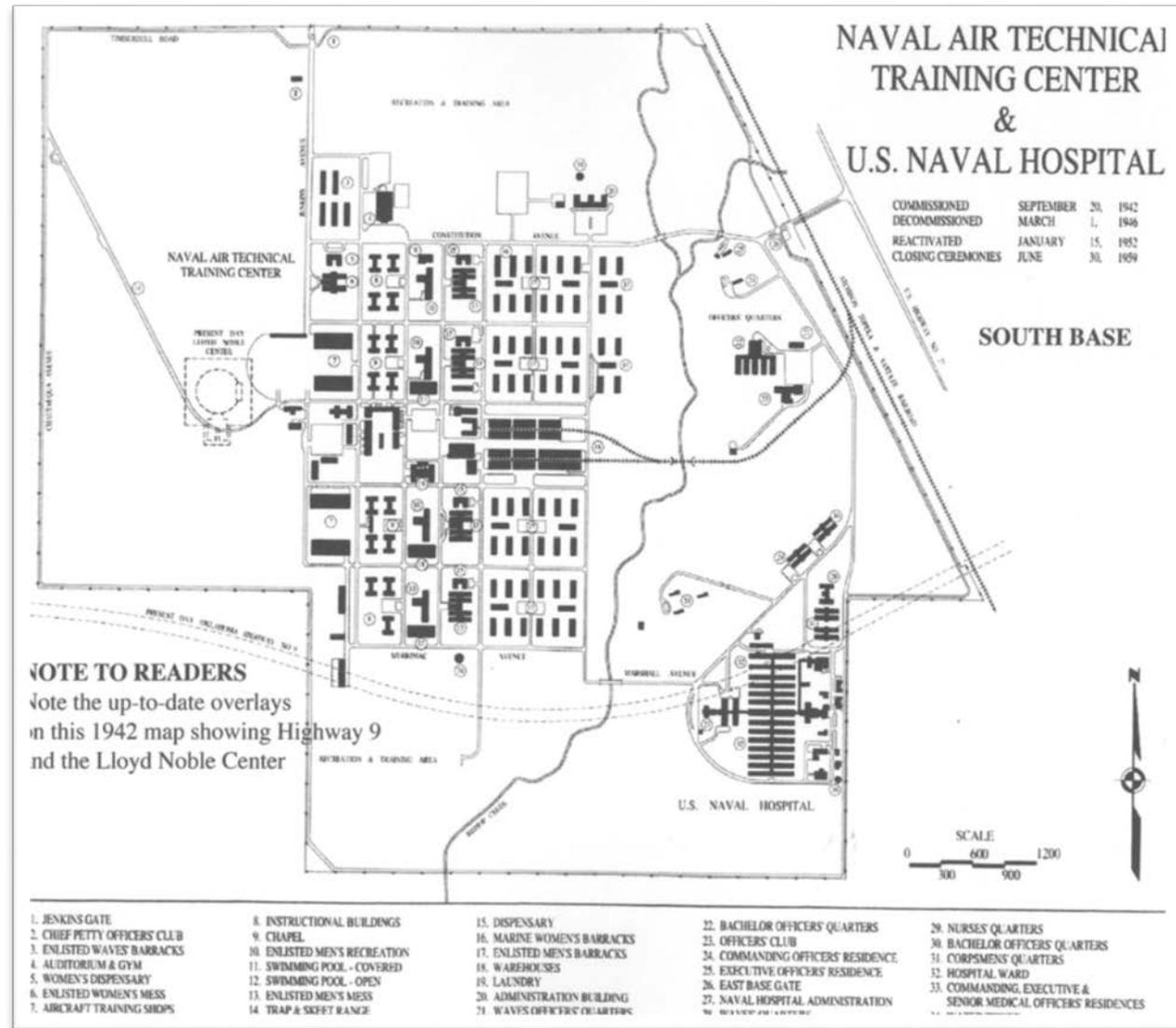


Figure 62—Map of NATTC and US Naval Hospital with modern route of SH-9 and the Lloyd Noble arena shown to orient readers (Bob Rice Photographs/CCHS)



*Figure 63—Main entrance to the Norman Naval Hospital, taken shortly after the initial phase of construction was completed in 1942 (CCHS)*

## The Purcell Naval Air Gunners School (NAGS)

In 1943, the Navy Department acquired approximately 8,554 acres near Lexington, Oklahoma, to comprise the Naval Air Gunnery School at Purcell. The purpose of the facility was to train prospective aircraft gunners as well as land or ship based personnel in various aspects of anti-aircraft gunnery, as well as in basic weapon proficiency.

The training ranges at the site included a trap and skeet range, three moving target ranges for .50 and .30 caliber machine guns, a primary machine gun range, a sighting range, a turret performance range, a .22 caliber range, a pistol range, and a short range. All of these ranges were located in the southern 1,840 acres of the site. In 1945 an aircraft rocket range was added in late 1945, although its exact location is unknown. It would appear that much of the property north of the firing ranges was kept undeveloped as an impact area for stray ammunition from the many firing ranges. Other facilities at the NAGS included range buildings, ammunition storage buildings, training buildings, barracks, and administrative buildings. There is no documentary evidence that the NAGS was used for air to ground gunnery training, however, it is possible that the aircraft rocket range may have involved the firing of air-to-ground rockets from aircraft at fixed targets on the ground. A total of 13,484 men graduated from the NAGS between 1943 and early 1946, when the facility was closed.

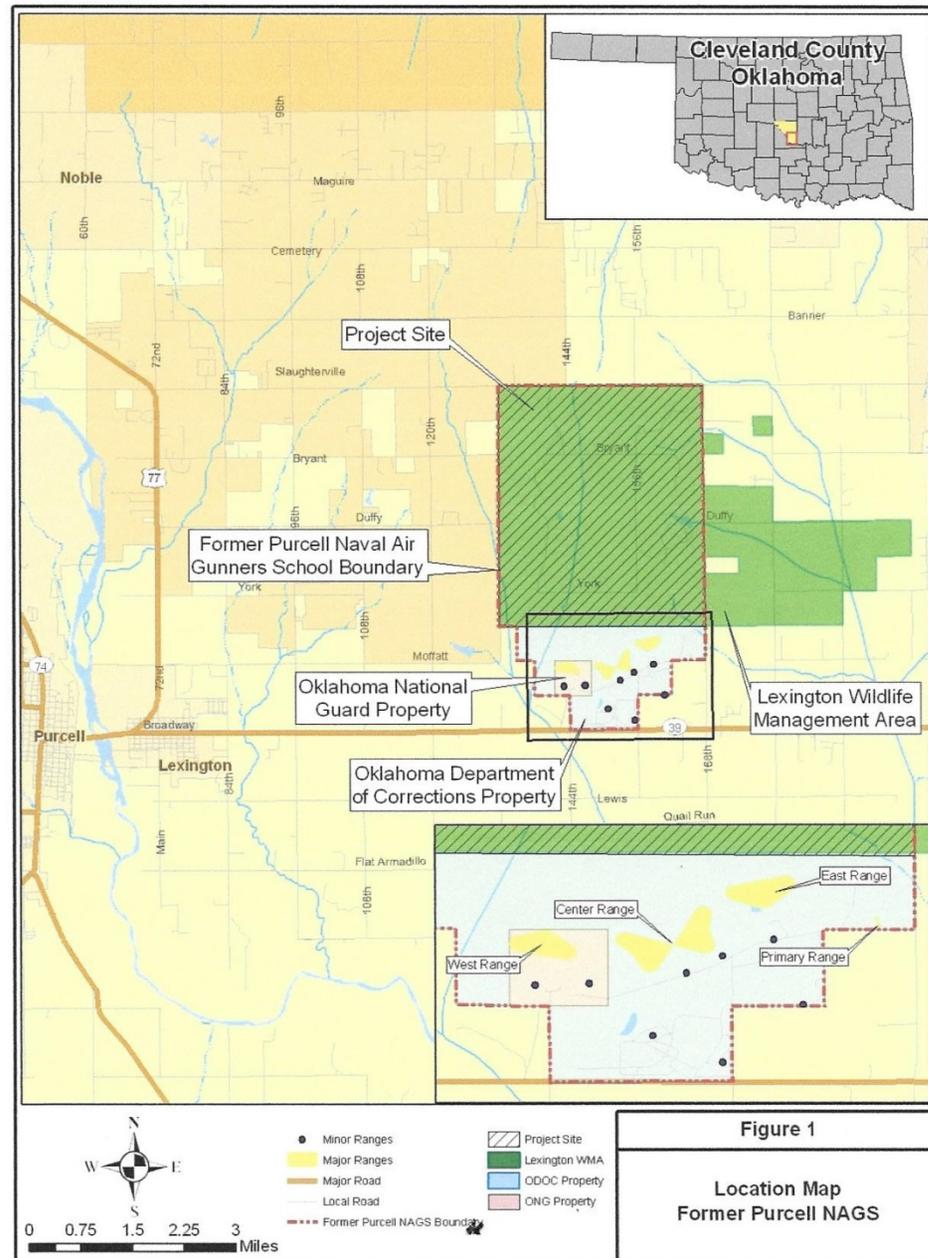


Figure 64—2008 map prepared for the US Army Corps of Engineers showing the location of the NAGS and its main firing ranges (Parsons/USACE)



*Figure 65—Turret performance range at Jacksonville Naval Air Gunners School, Florida, probably similar to the turret performance range at Purcell NAGS (US Navy)*

In March 1946, as the base began the process of shutdown, the Secretary of the Navy issued an interim use permit to the Oklahoma Department of Mental Health to use the base facilities. In 1949, 1,840 acres in the southern portion of the NAGS containing the buildings and firing ranges were sold to the State of Oklahoma and became a mental hospital for several hundred mental patients. In 1971, the Department of Mental Health transferred their facility to the Oklahoma Department of Corrections. Currently the Department of Corrections operates a minimum, medium and maximum security prison on the property. A small area is also owned by the Oklahoma National Guard. The Navy transferred the remaining 6,714 acres north of the main complex to the Federal Farm Mortgage Corporation, which later was incorporated into the Oklahoma Department of Wildlife Conservation's Lexington Wildlife Management Area.

As part of the Defense Environmental Restoration Program, the US Army Corps of Engineers (USACE) performed archival research and several field surveys of the former NAGS in 2003-2008. This discussion has drawn heavily from the USACE reports.



*Figure 66—Photograph believed to be showing trainee firing a .50 cal. machine gun at Purcell NAGS (CCHS)*

