

BROOKS AIR FORCE BASE, BUILDING NO. 140
(Brooks Air Force Base, Biosystems Research Laboratory)
2350 Gillingham Drive
San Antonio
Bexar County
Texas

HABS TX-3521-E
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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN BUILDINGS SURVEY
SOUTHWEST SYSTEM SUPPORT OFFICE
National Park Service
U.S. Department of the Interior
PO Box 728
Santa Fe, New Mexico

HISTORIC AMERICAN BUILDINGS SURVEY
BROOKS AIR FORCE BASE, BUILDING 140
(BROOKS AIR FORCE BASE, BIOSYSTEMS RESEARCH LABORATORY)

HABS No. TX-3521-E

Location: 2350 Gillingham Drive, Building 1
San Antonio
Bexar County
Texas

~~USGS Southton, Texas Quadrangle (7.5')~~

~~Universal Transverse Mercator Coordinates: 14-552867-3246455~~

Google Earth Lat/Long 29.348346, -98.455834

Present Owner: Brooks Development Authority (BDA)

Present Occupant: Air Force Institute for Environment, Safety, and Occupational Health Risk Analysis (AFIERA)

Present Use: AFIERA Occupational Environmental Laboratory

Significance: Building 140 (Biosystems Research Laboratory) was the center of cellular and molecular research at the U.S. Air Force School of Aerospace Medicine (USAFSAM) at Brooks Air Force Base (AFB). Building 140 housed specialized laboratories that were used to investigate tissue slice metabolism; steroid synthesis; fat analysis; amino acid identification, and low-level radiation, among other research. USAFSAM scientists provided key metabolic and nutritional studies concerning space food in the 1960s that proved essential to the Air Force and the National Aeronautics and Space Administration's (NASA) plans for extended space missions. The building currently houses the AFIERA Occupational and Environmental Health Laboratory.

PART I. HISTORICAL INFORMATION

A. Physical History:

1. Date(s) of erection: 1963-64
2. Architect: Smith, Hinchman & Grylls Associates, Inc.
3. Original and subsequent owners: Air Force
4. Builder, contractor, suppliers: Unknown
5. Original plans and construction: Original drawings by the firm of Smith, Hinchman & Grylls, Associates are on file with BDA, 8030 Challenger Drive, Brooks City-Base, Texas.

BROOKS AIR FORCE BASE, BUILDING 140
(BROOKS AIR FORCE BASE, BIOSYSTEMS RESEARCH LABORATORY)
HABS NO. TX-3521-E
(Page 2)

6. Alterations and additions: Building 140 has undergone minor changes to interior finishes and spatial arrangements. A major addition was added to the south side of the building in 1984 to be used as the Occupational and Environmental Health Laboratory.

B. Historical Context:

Building 140 (Biosystems Research Laboratory) was among six buildings erected during the second phase of construction (1961-1964) at USAFSAM, Brooks AFB. The multiple-building complex represented the base's expanding role and mission as one of the largest aerospace medical research centers in the world. With research and development goals ranging from space to warfare, USAFSAM has played a central role in the mission of the Air Force as well as NASA. Though the USAFSAM campus was constructed in 1959, the history of Brooks AFB has involved multiple missions beginning with the training of Army pilots in World War I to reserve flight training during the Cold War.

Establishment of Brooks Field and Early Aviation Training, 1917-31

Established on an 873-acre tract of land in San Antonio, Texas, in November 1917, Kelly Field No. 5 grew out of the increasing wartime need for cadets and trainers. In February 1918, the airfield was officially renamed Brooks Field in honor of Cadet Sidney Johnson Brooks, Jr., a San Antonio native who died in a plane crash at Kelly Field No. 2 in 1917. The new commander of Brooks Field, Major Henry Conger Pratt, oversaw the installation's mission of preparing up to 5,000 airmen for wartime service in Europe. In addition, Brooks trained flight officers as teachers of a new British training regimen known as the Gosport System, which utilized innovative controls and speaking tubes to improve communication between instructors and cadets while in the air. The use of the Gosport system at Brooks Field convinced the War Department in October 1918, to incorporate the experimental system at Brooks Field into all Army airfields.¹

In May 1919 the Observation School at Camp Ben Wise in San Antonio, which trained cadets in the use of aerial observation, moved to Brooks Field. As one of five national balloon observation schools, Brooks Field provided surveillance along the U.S.-Mexico border utilizing the 16th Airship Company and the 4th and 5th Balloon companies. The balloon and airship program at Brooks Field, despite the initial investment of manpower and expense, proved to be a short-lived experiment for the San Antonio region. Several accidents involving explosions forced the school to close in 1922.²

The decision to remove the Balloon and Airship Observation School was part of a 1920 Army Reorganization Bill which stipulated that all flight training for the country would be centered in San Antonio air fields, including Brooks Field. By June 1922, Brooks Field was classified as the only Primary Flying School in the country as a result of the consolidation of two former flying schools in California and Florida. From 1922-31, Brooks Field earned the reputation of being one of the premier aviation training sites in the country and was responsible for developing the young Army Air Service at a crucial period of its growth.

The system established in 1922 required all military aviators to begin their basic flying training at Brooks Field, with the graduating class moving on to the Air Service Advanced Flying School at Kelly Field. The

BROOKS AIR FORCE BASE, BUILDING 140
(BROOKS AIR FORCE BASE, BIOSYSTEMS RESEARCH LABORATORY)
HABS NO. TX-3521-E
(Page 3)

graduating classes at Brooks later formed the basic structure of the Air Corps for decades to come. The school graduated numerous important aviators including Charles Lindbergh, Frank M. Hawks, Nathan Twining, Jimmy Doolittle, and Barney Giles. Instructors at Brooks were among the most experienced and talented aviators in the country, including Claire Chennault of the famed "Flying Tigers," Russell Maughan and Elwood Quesada.³

In addition to its celebrated graduates and instructors, Brooks Field was also the site of important advances in aviation. In April and September 1929 Brooks Field held public demonstrations of one of the earliest paratroop warfare experiments. In 1930, Colonel William C. Ocker devised a device allowing pilots to fly "blind" with the use of instruments inside the cockpit.⁴

School of Aviation Medicine (SAM), 1926-31

In 1926, SAM was relocated from Mitchell Field, New York to Brooks Field in an effort to improve pilot performance and to learn firsthand from pilots about the medical factors affecting flight. From 1926-31, flight surgeons at SAM generally acted as physicians first and teachers second; their main responsibility was to direct physical examinations to determine the condition of cadets for flying.

In 1931, SAM and the Primary Flying School moved to the newly created Randolph Field in San Antonio, Texas, ending Brooks Field's important aviation training mission. In the 1930s, Brooks was designated a center for observation training and housed several observation squadrons. Escalating tensions in Europe led to the establishment of an Air Corps Advanced Flying School in early 1941, which focused on training pilots in observation skills using single-engine aircraft. Because of lessons learned early in World War II, the Army Air Corps reassessed the importance of aerial observation, placing greater importance upon bombing and pursuit aircraft training. As a result, in 1943, Brooks Field began a training program for the new B-25 bomber, which greatly aided the war effort. Brooks Field became Brooks AFB in 1948 and assumed a new postwar mission as a reserve flight training center which it maintained until 1960 when all flight activities ceased.⁵

SAM: the Space Program to Vietnam, 1959-69

In 1959, SAM, now known as the School of Aerospace Medicine (SAM) was reassigned to Brooks AFB as part of a new Air Force mission to consolidate its aviation and space medicine efforts at one base. From 1959-69, Brooks AFB, as part of the Aerospace Medical Division (AMD), played a key role in providing NASA and the Air Force with innovative and important space medicine research, ensuring the success of the country's efforts in space exploration. Research at Brooks AFB utilized a range of laboratories and research facilities to perform experiments ranging from altitude and pressure experiments to space food nutritional studies. In addition to direct contributions to NASA's Mercury, Gemini, and Apollo programs, Brooks focused much of its space medicine efforts on the Air Force's military space program, the Manned Orbiting Laboratory (MOL). By the mid-1960s, researchers and physicians at Brooks AFB increasingly became involved in the Vietnam War, forcing SAM and AMD to manage dual missions of space and warfare.

The USAFSAM Campus

BROOKS AIR FORCE BASE, BUILDING 140
(BROOKS AIR FORCE BASE, BIOSYSTEMS RESEARCH LABORATORY)
HABS NO. TX-3521-E
(Page 4)

In 1952, with its intention to relocate the crowded facilities at Randolph AFB to Brooks AFB, the Air Force required a new master plan accommodating the new "Aeromedical Center." Early in the planning stages, officers of the Air Force Headquarters in Washington, D.C., had a clear notion of the type of facility they wanted, distinguishing it from other Air Force installations: "Consideration should be given to permanence and preeminence of this facility as an academic institution . . . The quality of construction should be comparable to that of the leading medical institutions in the United States."⁶ In designing the master plan for such an institution, officers of the Headquarters of the Air Force made an unqualified recommendation for the St. Paul, Minnesota firm of Ellerbe & Company, which already had two years experience with an earlier Brooks AFB master plan:

The Ellerbe Company, because of the design over the past twenty-five years of the varied and highly specialized diagnostic research and hospital facilities for the Mayo Clinic at Rochester, Minnesota, is considered eminently qualified to continue this project.⁷

As early as 1952, the Air Force had foreseen the need to divide construction of the new USAFSAM facilities into at least two phases. An "Analysis of General Master Plan, Brooks Air Force Base, Texas" notes that once the first segment of building was complete, the aeromedical program activities would be able to continue without disruption while additional facilities are added. Older structures, including World War I and II temporary buildings, were used to augment the first five buildings while waiting for completion of the complex. In 1956, Colonel Frese, Commander of the Air University at Maxwell AFB, Alabama, suggested that the USAFSAM complex might ultimately be augmented by 50% more buildings than were stipulated for the first building phase. In April 1958, a memo produced by the Ad Hoc Committee on Aeromedical Expansion (presumably made up of scientists and department heads from the Randolph AFB School of Aviation Medicine) noted facilities already in the planning stages for the second phase of construction. These included a "Clinical and Experimental Research Dental Building," a "Library, Biometrics and Records Repository Building," a vivarium, and a primate testing, holding and breeding facility. Committee members were urged to identify any special facilities they would need for their work. By June 1959 the Air Force completed a document titled "Construction Project Justification Data," outlining proposed requirements and purposes for a number of new buildings. Of seven proposed structures, six were built.

Design work on the second phase of building began soon after the first five buildings were occupied by USAFSAM during the summer of 1959. The six buildings (including Building 140) constructed during the second construction phase, from 1961-64, were designed by the firm of Smith, Hinchman & Grylls of Detroit, Michigan. No records of contracts between the firm and the Air Force have been located, and indeed, Smith, Hinchman & Grylls may have been yet another subcontractor to Ellerbe & Company, which was still involved with base-wide planning for Brooks AFB. Smith, Hinchman & Grylls (today known as SHG Incorporated) was founded in 1853 by architect Sheldon Smith, and is Michigan's oldest architectural firm. Prior to their involvement in the USAFSAM project, the firm had designed numerous prominent buildings in downtown Detroit, including the Penobscot Building (1928), the forty-floor Guardian Building (1929), and the J.L. Hudson Company Department Store (1948). In 1952, the firm built three major buildings for the University of Michigan campus at Ann Arbor: Mason Hall, Haven Hall, and Angell Hall Auditorium. Smith, Hinchman & Grylls' work at Brooks AFB may have been a major point of departure for the firm, which later became well-known for laboratory designs, including the Los Alamos National Laboratories in New Mexico, the Naval Air Warfare Center Advanced Systems

BROOKS AIR FORCE BASE, BUILDING 140
(BROOKS AIR FORCE BASE, BIOSYSTEMS RESEARCH LABORATORY)
HABS NO. TX-3521-E
(Page 5)

Integration Laboratory in Maryland, and numerous university laboratory facilities.

The buildings designed by Smith, Hinchman & Grylls for the second phase of construction at USAFSAM include: Building 140 (Biosystems Research Laboratory); Building 150 (Professional Building); Building 155 (Research Library); Building 170 (Bioastronautics and Biodynamics Laboratory); Building 175 (Bionucleonics Laboratory); and Building 185 (Vivarium Support facility). All the buildings conform with the precedent set by C.H. Page & Son, using steel construction with brick veneer and extruded aluminum fenestration in the International Style.

Building 140

Building 140 was constructed in 1964 for use by USAFSAM in order to meet the overall goal of developing new weapons and to meet the nation's increasing need for space research. The building's specific function was to provide a facility for cellular and molecular research in biochemistry, biophysics, cellular biology, microbiology, pharmacology, physical chemistry, and physiology.⁸ Consisting of about 150 rooms including walk-in incubators and refrigerators, study cubicles and offices, Building 140 mostly housed specialized laboratories, such as the: tissue slice metabolism laboratory, starch gel electrophoresis laboratory; steroid synthesis laboratory; fat analysis laboratory; clinical serum protein laboratory; amino acid identification laboratory; and low-level radiation laboratories.

The laboratories in Building 140 allowed researchers to study environmental factors and stresses related to human flight on a cellular and molecular level. From these studies, researchers were better able to understand human reactions to flight stresses, a capability that was vitally important considering the nation's increasing emphasis on space travel. In addition, pharmacology studies at Building 140 were carried out with an "emphasis on [the] action of drugs which maintain or improve desired response, as well as drugs to protect man against stresses and noxious agents encountered in Air Force operations."⁹

Building 140 provided key metabolic and nutritional studies concerning space food in the 1960s as part of the Air Force and NASA's efforts to keep astronauts in space for extended periods (30 days or longer). MOL, an Air Force sponsored military manned space laboratory, required crews to perform flight and research functions in space for extended periods, meaning astronauts would need enhanced nutrition. Long-term spaceflight, with factors such as weightlessness, confinement, reduced pressure and changes in temperature, exposed an astronaut's metabolism to unique stresses. Dr. John E. Vanderveen, the scientist selected to lead SAM's research efforts in nutrition and human metabolism studies, led a group of 40 medical, dietary and biological specialists.¹⁰ Experiments related to nutritional studies occurred in several laboratories at SAM; researchers at Building 140 focused their efforts on the long-term physiological effects of space food consumption. Results from these experiments enabled dieticians and preparers of food to better understand the body's ability to absorb nutrients in a space environment.

Building 140 continued in the 1970s and 1980s to pursue metabolic and physiological research related to Skylab and the Space Shuttle. Currently, the building is used as AFIERA's Occupational and Environmental Health Laboratory and no longer performs cellular and molecular research.

PART II. ARCHITECTURAL INFORMATION

A. General Statement:

1. Architectural character: Building 140 was designed in the International Style to complement the five existing buildings in the area. It is long and low in profile, with a single level and a rectangular plan that has almost doubled in area thanks to the 1984 addition of the occupational and environmental health laboratory. Building 140 is typical of Smith, Hinchman & Grylls' designs for Brooks AFB in the use of brick exterior facing, rhythmically accented by vertical, aluminum-framed window openings with upper and lower porcelain enamel metal panels in a bright blue color. The building sits on a raised concrete pedestal and has a flat roof.
2. Condition of fabric: Building 140 is in good condition.

B. Description of Exterior:

1. Overall dimensions: As originally constructed, Building 140 was rectangular in plan and measured 254'-0" x 110'-9". In 1984, a 23,000 square foot addition was appended to the south facade the building. The current building measurements are 254'-0" x 220'-9". The building consists of a single floor with a partial basement and a penthouse.
2. Foundation: Building 140 has a concrete pier-and-beam foundation with continuous perimeter wall. Foundation piers are spaced 20'-6" east-west and 20'-7" north-south.
3. Walls: Exterior walls are face brick with structural clay tile backing.
4. Structural system, framing: The first floor is constructed of a concrete slab, beams, and one-way floor joists. Steel wide-flange columns and beams support a steel bar joist roof structure with metal deck.
5. Porches, stoops, balconies, bulkheads: A short flight of steps leads to a recessed entry porch at the primary entrance to Building 140, on the north facade. Exterior features associated with secondary entrances on the south and west facades include a concrete stair and landing supported by a central pylon with welded steel pipe handrail and guardrail. A concrete ramp with welded steel pipe handrail leads to a secondary building entrance at the loading dock on the east facade.
6. Chimneys: Numerous laboratory vent hood exhaust stacks penetrate the roof.

BROOKS AIR FORCE BASE, BUILDING 140
(BROOKS AIR FORCE BASE, BIOSYSTEMS RESEARCH LABORATORY)
HABS NO. TX-3521-E
(Page 7)

7. Openings:

- a. Doorways and doors: The primary entrance to Building 140 consists of a pair of aluminum-and-glass doors set within an aluminum-frame storefront with fixed-glass sidelights.
- b. Windows and shutters: Fixed-glass windows extend the full height of the facade on all sides. Each window consists of a fixed-glass light with porcelain-enamel steel spandrel panels above and below, set in an aluminum frame.

8. Roof:

- a. Shape, covering: Building 140 has a flat roof, covered with built-up roofing.
- b. Cornice, eaves: None.
- c. Dormers, cupolas, towers: A penthouse measuring 41'-2" x 82'-0" houses the building's air conditioning and other mechanical equipment. The penthouse is constructed of steel wide-flange columns, beams, and purlins and corrugated steel deck. Wall surfaces are clad in insulated metal panels. The roof is flat with built-up roofing.

C. Description of Interior:

1. Floor plans:

- a. First floor: The interior is partitioned into laboratories, study cubicles, and support areas, accessed by double-loaded corridors.

2. Stairways: An enclosed single-flight metal stairway connects the basement, first floor, and penthouse levels.

3. Flooring: Typical flooring is vinyl tile on concrete.

4. Walls and ceiling finishes: Ceilings are suspended 2' x 4' acoustical tile.

5. Openings:

- a. Doorways and doors: Hinged solid-core flush wood doors are typical.
- b. Windows: Building 140 has no interior windows.

6. Decorative features and trim: None.

BROOKS AIR FORCE BASE, BUILDING 140
(BROOKS AIR FORCE BASE, BIOSYSTEMS RESEARCH LABORATORY)
HABS NO. TX-3521-E
(Page 9)

D.E. Peter, M.B. Cliff, J. Freeman and K.L. Kane. Geo-Marine, Inc., Plano, Texas, L-3.

² Brooks Air Force Base, *The First Seventy-Five Years*, (n.p., 1992).

³ Brooks Air Force Base, *Commemorative Program, Pride in the Past, Faith in the Future – Brooks Air Force Base, 1917-1992*, (San Antonio Press, 1992), p. 9.

⁴ Freeman, “Historic Context,” L-23.

⁵ *Commemorative Program*, 1992.

⁶ Department of the Air Force, HQ, Washington DC to Chief of Engineers, Department of the Army, (June 5, 1952), Edward H. White II Museum of Aerospace Medicine in Hangar 9 at Brooks City-Base.

⁷ Department of the Air Force HQ to Chief of Engineers, Department of the Army, Revision of “Advance Planning FY53” Document. Various Minor Changes, (June 12, 1952), Edward H. White II Museum of Aerospace Medicine in Hangar 9 at Brooks City-Base.

⁸ Department of the Air Force, “Department of the Air Force, Construction Project Justification Data, June 19, 1959,” Edward H. White II Museum of Aerospace Medicine in Hangar 9 at Brooks City-Base, p. 5.

⁹ Ibid.

¹⁰ “Powder and Pill Make Space Age Milkshake Meal—S.A. Researchers Who Have a Key Role in U.S. Space Food Program Are Starting a New Test,” *San Antonio Express*, May 22, 1966.

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1. Primary and unpublished sources:

Brooks Air Force Base, *Commemorative Program, Pride in the Past, Faith in the Future, Brooks Air Force Base, 1917-1992*. San Antonio Press, 1992.

Brooks Air Force Base, *The First Seventy-Five Years*. N.p., 1992. Edward H. White II Museum of Aerospace Medicine in Hangar 9 at Brooks City-Base.

“Department of the Air Force HQ, Washington DC to Chief of Engineers, Department of the Army.” June 5, 1952. Edward H. White II Museum of Aerospace Medicine in Hangar 9 at Brooks City-Base.

“Department of the Air Force HQ to Chief of Engineers, Department of the Army, Revision of ‘Advance Planning FY53’ Document. Various Minor Changes.” June 12, 1952. Edward H. White II Museum of Aerospace Medicine in Hangar 9 at Brooks City-Base.

Department of the Air Force, “Department of the Air Force, Construction Project Justification Data,” June 19, 1959. Edward H. White II Museum of Aerospace Medicine in Hangar 9 at Brooks City-Base.

San Antonio Express. May 22, 1966.

2. Secondary and published sources:

Freeman, Martha. “Appendix L: Historic Context: Brooks Air Force Base, An American Flying Field, 1917-46.” Geo-Marine, Inc., Plano, Texas, 1995.

E. Likely sources not yet investigated: The archives at the Edward H. White II Museum of Aerospace Medicine in Hangar 9 at Brooks City-Base, contain a wealth of documentation that merits further exploration.

F. Supplemental Materials:

LIST OF ACRONYMS

AFB	Air Force Base
AFRL	Air Force Research Laboratory
AMC	Aerospace Medical Center
AMD	Aerospace Medical Division
AMRL	Aerospace Medical Research Laboratory
ARL	Aeromedical Research Laboratory
BDA	Brooks Development Authority
BHF	Brooks Heritage Foundation
BRAC	Base Realignment and Closure
DOD	Department of Defense
HSD	Human Systems Division
ICBM	Intercontinental Ballistic Missile
MISS	Man in Space Soonest
MOA	Memorandum of Agreement
MOL	Manned Orbiting Laboratory
NASA	National Aeronautics and Space Administration
NHPA	National Historic Preservation Act
NPS	National Park Service
SACS	San Antonio Conservation Society
SAM	School of Aviation (Aerospace) Medicine
SHPO	State Historic Preservation Office

USAFSAM
WAC

U.S. Air Force School of Aerospace Medicine
Womens Air Corps

PART IV. PROJECT INFORMATION

A. Federal Agency:

Air Force
311th Human Systems Wing
Brooks City-Base
San Antonio, Texas.

- B. Project Causing Adverse Effect: The Brooks City-Base project is a cooperative partnership between the Air Force and the non-federal community in which the physical assets of the former Brooks AFB have been transferred from the Air Force to BDA, a local municipality under Texas statute. Under Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, and its enabling regulations 36 CFR 800, the transfer of Federal property is an adverse effect that must be mitigated via a Memorandum of Agreement (MOA) between the lead federal agency, the State Historic Preservation Officer (SHPO) and other consulting parties invited to participate in the consultation.

In consultation with the Texas SHPO, the Air Force determined that seventeen buildings at Brooks City-Base were eligible for inclusion in the National Register of Historic Places. The Air Force developed an MOA in consultation with the Texas SHPO, City of San Antonio and BDA to mitigate the adverse impact that transfer would have on the seventeen historic properties at the former Brooks AFB. The MOA was also signed by two concurring parties, the San Antonio Conservation Society (SACS) and the Brooks Heritage Foundation (BHF). The MOA stipulated multiple measures, including preparation of a Historic American Buildings Survey (HABS) Level II documentation report. The Air Force, through the 311th Human Systems Wing, hired Earth Tech, Inc. to oversee the preparation of HABS documentation. Under contract to Earth Tech, HHM Inc. of Austin, Texas, gathered historical and architectural information and prepared a historic context and the HABS forms.

The following individuals contributed to this report:

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