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Environmental Affairs Division, Historical Studies Branch

Historical Studies Report

Texas General
Aviation

Prepared By Ralph Newlan



Texas General Aviation

March 2008



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as a sub-contractor for
Michael Baker Inc.
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Texas General Aviation

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INTRODUCTION

This report presents information gleaned from limited archival research and reconnaissance-level field investigations conducted at general aviation airports within the state of Texas (see *Appendix A*). The data gathered during the study enabled the production of the following document, which is intended to serve as a field guide that will aid in subsequent reconnaissance-level documentation and evaluation of historic-age resources at general aviation facilities that are currently included in the Texas Department of Transportation (TxDOT) Aviation Division's (AVN) statewide airport system.

The document first presents a step-by-step guide to conducting research and reconnaissance-level field investigations at the subject airports. It then presents an historic background/context that outlines relevant themes related to the history and evolution of general aviation in the state of Texas. The context also relates these themes to the built environment. As directed by this project's scope of work, the context presents a synopsis of information contained in an earlier context that was authored by Lopez Garcia Group in 2006 (please contact TxDOT Environmental Affairs, Historical Branch for copies of the Lopez Garcia Group context). The information gleaned from the Lopez Garcia Group context was augmented by reconnaissance-level research that Baker staff conducted at a sampling of airports within the TxDOT AVN's general aviation airport system. Following the context is a list of property types expected to be found at general aviation airports. This section includes narrative descriptions of each identified property type. Illustrative photos of the most common property types have also been provided in *Appendix B* of this report. Finally, the report proffers an evaluation methodology that provides the framework for assessing the significance of documented aviation resources.

The Austin office of Michael Baker Jr. Inc., served as the project's prime contractor and prepared this report for submittal to TxDOT under WA # 576 16 SH 004. The Baker team was lead by Senior Professional Historian Ralph Newlan, who served as the Project Manager, contributed to the preparation of the report, and conducted fieldwork at a number of the airports. Professional Historian Jennifer Ross and Assistant Historian Laura Caffrey undertook most of the fieldwork, historical research, and report preparation. Austin-based cultural resource management firm Prewitt and Associates, Inc. served as subcontractors to Baker on the project and assisted in the survey fieldwork.

The information provided in this report is intended for use in regulatory compliance and coordination as per the requirements of the Antiquities Code of Texas as amended, the National Environmental Policy Act of 1969 (NEPA) as amended, the National Historic Preservation Act of 1966 (NHPA), as amended, the Department of Transportation Act of 1966, and their implementing regulations.

OBJECTIVE

According to the most recent Texas Airport Directory, currently there are 381 airports in the TxDOT AVN statewide airport system. Of this total 266 are designated as general aviation airports. The TxDOT AVN Department was established in 1991 and charged with the task of assisting "cities and counties applying for, receiving and disbursing federal and state funds" for the approximately 400 aviation facilities within Texas' airport system. The division also participates in the Federal Aviation Administration's State Block Grant Program, with responsibilities for the federal improvement program for general aviation airports" (Texas, Department of Transportation, 2007). The system's general aviation facilities were established between 1916 and 2002 and have, over time, hosted a range of military, civil, industrial,

recreational, and agricultural functions. A small number also served as private airfields. Due to different periods of establishment, the range of functions hosted by the airports over time, and in some cases, their location, they vary in size and include an assortment of different buildings types and subtypes. Each also plays its own unique role within the development and evolution of aviation in Texas. As stated in the previous section, the primary goal of this report is to provide a guide that will aid in the reconnaissance-level documentation and evaluation of historic-age resources at these airports. To this end, the report provides the framework for the establishment of facility-specific historic contexts and themes in addition to general guidelines for the identification, and classification, and evaluation of the airports' historic-age resources.

DATA GAPS

As defined by the project's scope of work, the information presented in this report is based primarily upon reconnaissance-level survey and research efforts conducted at a limited sampling of airports within the TxDOT AVN system as well as an earlier historic context on general aviation in Texas. Therefore, it is likely that additional studies undertaken at TxDOT AVN's remaining airports will provide new information that may serve to further develop the historic context and property type discussion. Additionally, future research efforts should be undertaken at repositories such as the National Archives and Records Administration in order to identify relevant primary-source archival resources including records from the Army Quartermaster General (Record Group 92, 1774-1985), the Office of the Chief of Engineers (Records Group 77, 1862-1973), and the Bureau of Yards and Docks (Record Group 71, 1784-1963) related to military aviation. Primary-source information related to the development of general aviation can be obtained from Civil Aeronautics Board (Record Group 197, 1931-1985), Federal Aviation Authority (Record Group 237 1922-1992), and the Department of Transportation (Record Group 398 1958-1992) records, also located at the National Archives. Finally, the Texas State Library holds records of the Texas Aeronautics Commission. However, due to construction activities at the library during this report's research efforts, these files were not available for public use. Future research efforts should consult these files.

SURVEY METHODOLOGY

The survey methodology presented below provides a step-by-step guide for conducting research and fieldwork for reconnaissance-level surveys at the airports. The following methodology is based on the results of survey efforts undertaken at sampling of airports within the TxDOT AVN statewide general aviation airport system. These reconnaissance-level surveys included the collection of data and the documentation and assessment of a range of property types at facilities of differing sizes, dates of development, and functions. Because only a sampling of the system's airports have been subject to study, future survey efforts may reveal previously unidentified property types, functions, etc. and therefore may require more in-depth research efforts and/or field investigations. Additionally, because each field survey is unique to a certain extent, the survey team may need to slightly modify the below field and/or research methodology. Consequently, the following methodology should not serve as an absolute catch-all, but merely as a guide to collect the minimal level of information necessary to accurately assess the architectural and/or historic significance of the airports targeted for reconnaissance-level study.

RESEARCH METHODS

Prior to field visits, baseline data – including airport property boundaries, any previously-designated historic resources, and general historic background of the facility – should be gathered in order to properly conduct the reconnaissance-level field study. The following sources of information should therefore be consulted to gather the required data while in the office, before fieldwork is initiated:

1. TxDOT AVN to obtain pertinent documents from the 5010 Master Records and Deed Land Files. The TxDOT intranet to acquire airport layout plans, master records (current and previous), airport property maps, terminal area drawings, and land use maps. These records provide property boundaries, building footprints, names/uses of buildings, transfers of ownership, dates of establishment, etc.
2. TxDOT website online (http://www.dot.state.tx.us/services/aviation/airport_brochures_ek.htm) to acquire Economic Impact Brochures. These brochures contain information outlining the total economic impacts that the daily operation of each airport currently has on the state and local economies. Specific information provided includes number of runways, type of airport, and airport tenants
3. Handbook of Texas online (<http://www.tsha.utexas.edu/handbook/online/>) for relevant background information. This resource typically provides general historical information for the city and county associated with the targeted airport. In some cases the Handbook of Texas online also provides airport-specific information.
4. Texas Historic Sites Atlas online (<http://atlas.thc.state.tx.us/>) to identify any previously-designated National Register of Historic Places (NRHP) properties, Recorded Texas Historic Landmarks (RTHLs), State Archeological Landmarks (SALs), and Official Texas Historical Markers (OSHM) within airport boundaries.

5. Google Maps (<http://maps.google.com/maps>), Google Earth, and Local Live online (<http://maps.live.com/>) to acquire local street maps and aerial images/views.
6. Topozone online (<http://www.topozone.com/>), Teraserver online (<http://www.teraserver.com/>), or similar for USGS maps of each targeted airport.

While in the field, the survey team can consult the following sources in order to gather additional information necessary for the development of each airport's historic background:

1. Local repositories of information including libraries, historical societies, and museums for airport-specific information at a reconnaissance-level effort.
2. On-site interviews with airport staff or other knowledgeable individuals to gather general historic information including changes in function, facility name changes, changes in ownership, etc. Note if the airport originally served as a military installation.
3. Documents from airport manager including plans, maps, histories, historic photos, property record cards, etc. if available. Please note that if these documents are available but personnel prohibit their removal from the airport's premises or if their size precludes photocopying, the historian can record the document with a digital camera.

FIELD DOCUMENTATION

In addition to gathering baseline data before conducting the fieldwork, prior to the field visit, the airport manager should be contacted to make arrangements for the field survey. Once in the field, the survey team should document all properties built in 1970 or earlier within the Area of Potential Effects (APE). Through consultation with TxDOT ENV, TxDOT AVN, and the Texas Historical Commission (THC), the APE for all airports subject to the current study was determined to be the current legal boundaries. The survey should also include a limited Study Area on parcels immediately adjacent to the airports in order to identify any extant World War II-era resources that are outside of the present airport boundaries that may have been related to the airport. The field survey should include the following steps:

1. Using the most recent airport layout plan and/or property map, consult with appropriate airport staff and identify/confirm the current property boundaries. As stated above, the APE for the survey is the airport's current property boundaries.
2. Contact appropriate airport staff to identify any potentially sensitive areas within the property boundaries – i.e. defense contactors, correctional facilities, or other lessees – and to identify any local interested parties/groups – i.e. historical societies. If possible, dates of construction should also be confirmed with airport staff.
3. Identify all pre-1971 resources within the airport's current legal boundaries. Note current use/function and, if possible, identify original use of the targeted resources.

4. Photograph all identified pre-1971 resources within the airport's current legal boundaries individually. Take sufficient exterior photos to convey the architectural information required to assess the targeted building. For example, photos should depict the property's condition, physical appearance, and character-defining features. All principal facades should be documented, typically with two opposing oblique views. Interior photos taken should only be taken to record significant architectural details or features. Take contextual photos to illustrate the relationship of resources to one another, overall integrity issues, etc. only as needed.
5. Using provided sample survey form (see attached *Appendix C* for sample survey form), record baseline physical data needed to adequately describe and assess the targeted resource. Give each documented resource a unique Resource ID number.
6. Using airport layout plans or property maps, key Resource ID number to building footprint depicted on map. If the building footprint is not depicted, pencil in/note its location on the field map.
7. Assess parcels adjacent to airport boundaries to identify and note any extant World War II-era resources that may have been related to the airport. Take contextual overview photos to illustrate the types, age, and integrity of extant resources if there appears to be related World War II-era resources present within the study area. Any resources documented within the study area should be noted on a map and given a unique Resource ID. The naming system for these resources should be different than the system of nomenclature that is utilized for the resources documented within the project's direct APE. Because these resources are not within the APE, it is not necessary to assess their eligibility for listing in the National Register of Historic Places (NRHP). They must, nonetheless, be included in the project report's inventory and site forms for informational purposes.

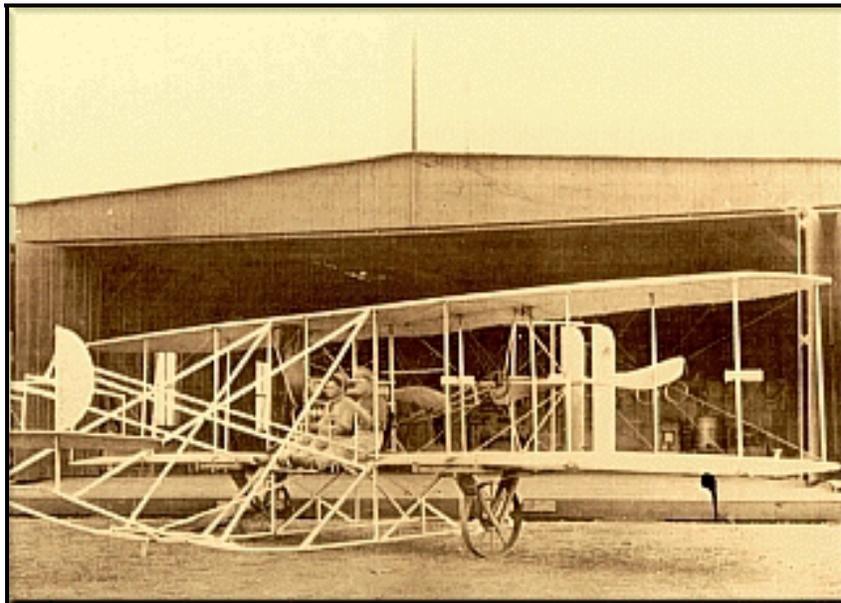
HISTORIC CONTEXT

THE DEVELOPMENT AND EVOLUTION OF GENERAL AVIATION IN TEXAS

THE EARLY DAYS OF FLIGHT IN TEXAS

Aviation in Texas can be traced as far back as 1865, the year that glider flyer Jacob Brodbeck reportedly piloted a plane over Galveston. Over the next several decades, attempts at flight varied in success and typically were undertaken by aviators manning either dirigibles or primitive lighter-than-air flying machines (DeFreese-Emery et al. 2006, 5). It was not until 1903, the year that Orville and Wilbur Wright accomplished the first recorded successful heavier-than-air flight in Kittyhawk, North Carolina, and the subsequent sale of the first private airplane in the country in 1909, that modern powered aircraft emerged as a viable means of personal and commercial transportation in the United States. Also during the first decade of the 20th century, the government initiated efforts to utilize the airplane for military/national defense purposes, beginning with the establishment of the Aeronautical Division of the Army Signal Corps in 1907. The connection between the military and the development of general aviation in this country would prove crucial during the first half of the 20th century, as the nation's involvement in two major world wars fueled innovations in both airplane technology and airport design (DeFreese-Emery et al. 2006, 5-7).

Early on, Texas was considered to be one of the nation's most desirable states for flight due to its relatively flat terrain and mild climate. For these reasons, in 1910, the government relocated its primary Army Signal Corps flight training facility from North Carolina to Fort Sam Houston in San Antonio. (see *Figure 1*). It was at this facility that Lieutenant Benjamin D. Foulois along with a detachment of nine men undertook the earliest military flights in Texas (DeFreese-Emery et al. 2006, 5-7).



*Figure 1. Circa 1911 Army Signal Corps hangar at Fort Sam Houston, TX.
Source Fort Sam Houston Museum.*

The success of the facility led the United States War Department, in 1911, to dedicate its first appropriation for military aviation. Specifically, the government allocated \$125,000.00 for aviation development. In 1914, construction began on a new training center at Fort Sam Houston for the Army Signal Corps' First Aero Squadron. Also in 1914, the United States Army Airways established an additional military air facility in Fort Worth. The airfield served as an experimental helium extraction plant for the United States Bureau of Mines and the Army (DeFreese-Emery et al. 2006, 25). Two years later, in 1916, siblings Eddie, Jack, Marjorie, and Katherine Stinson entered into a lease with the city of San Antonio for 500 acres and established Stinson Field (now Stinson Municipal, SSF), Texas' first major civilian aviation facility. As was the case with many early private airfields, Stinson Field was later utilized during World War I and World War II for pilot training. Stinson Municipal, SSF is currently included in the TxDOT AVN system and remains as one of the state's earliest established airfields.

WORLD WAR I AND ITS IMPACT ON AVIATION IN TEXAS

In August 1914, when World War I began in Europe, there were only 14 military airfields in the country and aviation played only a minor role in armed forces operations. However, in 1916, the United States Congress passed the National Defense Act. This legislation allocated \$13,281,666.00 for the development of aviation, which included "research, development, and construction of aircraft and facilities" (DeFreese-Emery et al. 2006, 8). Texas was one of the primary beneficiaries of this economic windfall and distinguished itself as one of the nation's leaders in aviation during this period. By wars end, there had been more pilots and other aviation personnel trained at installations in Texas than in any other state (Dallas Morning News 1945-1946, 287). San Antonio emerged as the state's center of aviation training activities during the war due to the establishment of a concentration of Army airfields including Fort Sam Houston, the Kelly Field complex, Brooks Field, and Camp Wise within city limits. Additional army airfields established in Texas during World War I included Carruthers Field (near Dallas, now closed), Ellington Field (Houston, currently under military and civil operation), Barron Field (near Fort Worth, now closed), Rich Field (near Waco, now closed), Call Field (Wichita Falls, now closed), Fort Bliss (El Paso, under military operation), Penn Field (Austin, now closed), and Taliaferro Field (near Fort Worth, now closed) (DeFreese-Emery et al. 2006, 9). The state's military aviation system also included a network of smaller auxiliary facilities that functioned as ground schools, cantonment camps, supply depots, or aviation repair depots. The shift from the strictly observational role that aircraft initially fulfilled during World War I to combat uses fueled innovations in aircraft design during the war years. Also, standard designs for aviation-related buildings and structures and overall airfield layout were established during this period (see *Figure 2*). Detroit-based architect Albert Kahn in conjunction with the Construction and Repair Division of the U.S. Army Quartermaster Department developed these plans, which called for a standard army airfield to be built within a "one square-mile section of land" that included at least one runway (DeFreese-Emery et al. 2006, 10). The installation's hangars were typically the most prominent buildings and fronted directly on the flight line while the remaining buildings were located in "parallel rows behind the hangars" (DeFreese-Emery et al. 2006, 10).



Figure 2. Circa 1918 aerial view of Taliaferro Field, a WWI army airfield located north of Fort Worth, Texas. Photo depicts standard army airfield layout. Source, Abandoned and Little-Known Airfields.



Figure 3. Hangar 9 at the former Brooks Field (currently Brooks City Base), San Antonio, Texas erected in 1918. Example of a Series 600 Signal Corps Mobilization wood-frame hangar. Source, Brooks City Base.

Two standard-plan hangar types were designed during this time (see *Figures 3 and 4*). The earliest of the two types, the Series 600 Army Signal Corps Mobilization Hangar, was a temporary wood-frame building that measured 66' x 122', had a gambrel roof, and was clad with wood siding (DeFreese-Emery et al. 2006, 10). These hangars, which were first erected in 1917, could house from six to eight planes (Garner 1993, 30). The second hangar type, the U.S. All-Steel Hangar, was a steel-frame, gabled-roof building with "pre-fabricated 66' steel roof trusses" and was "produced in 20' modular bays measuring 14' in height that could be put together to form multiple configurations depending on need" (DeFreese-Emery et al. 2006, 10). Original exterior wall materials included corrugated metal, wood, and brick.



Figure 4. Circa 1917 US All-Steel Hangar at Fort Sam Houston, San Antonio, Texas. Source, National Park Service.

Similar to the hangars, support buildings at Army airfields, including barracks, latrines, warehouses, administrative buildings, classrooms, dancehalls, etc., were typically built according to the standardized Army Quartermaster Series 600 mobilization plans (Garner 1993, 30). In general, these buildings were strictly utilitarian in appearance. They were typically one or two stories in height and utilized wood-frame (either plank or stud framing) construction. Exterior walls were clad with either wood board-and-batten or shiplap siding, roofs were most often gabled, and foundations were pier-and-beam (Garner 1993, 30). The standard plan for the Quonset Hut, which was based upon the British Nissen Bow Hut, was also introduced during this period (Garner 1993, 30). Although most early Army airfields utilized these building and layout plans during World War I, variation occurred according to the type of materials available, location, and the type of aircraft to be housed.

When World War I ended in 1918 and the armed services were demobilized, the decommissioning of war-surplus transport and training aircraft significantly increased the number of planes and parts available to the civil/general aviation market when compared to the period before the war. Despite these conditions, in 1920, the nation had only 145 municipal airports with a total of 87 commercial aviation businesses (DeFreese-Emery et al. 2006, 11).

THE INTERWAR PERIOD AND TEXAS AVIATION

Military Aviation

In addition to the government's decommissioning of war-surplus aircraft at the close of World War I, many of the nation's military airfields either remained under military ownership but were placed into inactive/maintenance status or were classified as surplus assets and transferred to non-federal municipal entities. However, 13 major military installations, including four located in Texas – Brooks Field, Kelly Field, Ellington Field, and the airfield at Fort Bliss – remained as active military operations due to their strategic importance. In fact, much of the military's flight training activities were consolidated at Brooks Field, Kelly Field, Ellington Field, and Fort Bliss and all four installations were made permanent military airfields by the mid 1920s. Also, during this period, the Army Air Service established the Model Airways as the first nationwide air system (Bakse 1995, 9). The service, which provided government sponsored scheduled cargo and passenger flights within a network of nationwide airfields, utilized Fort Worth's Barron Field as a landing/refueling point (B26 Peacemaker Museum).

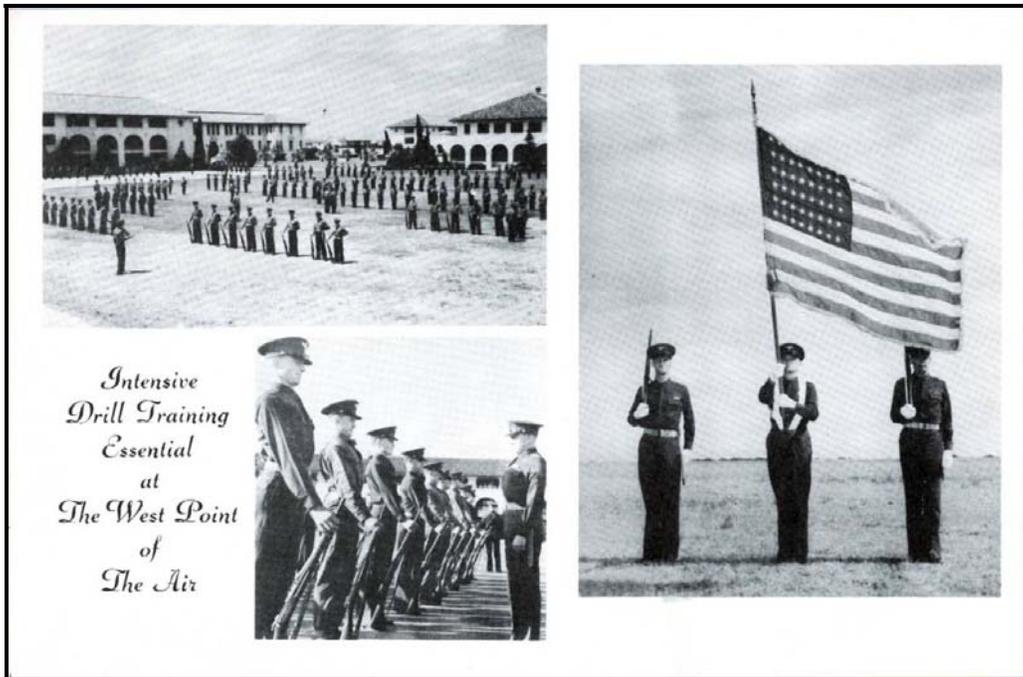


Figure 5. Postcard dating from ca. 1940 depicting drill training at Randolph Field. Source, postcardpost.com.

In 1926, in an effort to continue to develop military aviation, Congress passed the Air Corps Act, which proposed to increase the nation's armed forces by 1,800 airplanes, 1,650 officers, and 15,000 enlisted men by 1931. As a direct result of this act, a number of Air Corps ground facilities, including Brooks Field, were expanded and improved with the addition of new permanent buildings. Standard plan types erected during this construction program included the 110' x 200', 110' x 120', and the 110' x 240' hangar (DeFreese-Emery et al. 2006, 12). These steel-frame, gabled-roof hangars were clad with corrugated metal, terra cotta, or stucco cladding. A new airfield layout airfield layout that clustered all buildings on the edge of the airfield was also developed during this period (DeFreese-Emery et al. 2006, 12).

A 1928 survey of the nation's aviation training facilities identified the need for the government to consolidate aviation training activities. In response to this need, Randolph Field was established in San Antonio, Texas in 1930. The installation, which was built at a cost over \$11,000,000 and eventually became known as the "West Point of the Air" due to the large number of cadets trained at the installation in the interwar years, initially hosted primary and basic flight training as well as the School of Aviation Medicine (Dallas Morning News 1945-1946, 287). In 1939, Randolph Field established the Civilian Pilot Training Program (CPTP). Specifically, the CPTP utilized 20 municipal and county airports within the state to provide primary flight instruction to Army Air Force cadets (DeFreese-Emery et al. 2006, 13). Of the 20 CPTP airports that date from the Interwar Period, 11 currently remain in operation as general aviation airports within the TxDOT AVN system (DeFreese-Emery et al. 2006, 13). Naval aviation also emerged in Texas during the Interwar years with the establishment Naval Air Station (NAS) Corpus Christi. The installation was located on the Corpus Christi Bay and was built between 1938 and 1941 (DeFreese-Emery et al. 2006, 13). In addition to the main station, NAS Corpus Christi eventually added three auxiliary airfields and 25 outlying fields (DeFreese-Emery et al. 2006, 13).

Civilian Aviation

As previously stated, there were only a small number of municipal airports and commercial aviation-related enterprises in the U.S in the years immediately following the end of World War I. However, the large number of pilots trained during World War I and surplus planes remaining from the war were among the factors that led these numbers to dramatically increase to include 357 civilian-owned aviation businesses by the mid-1920s. In Texas alone, by 1925, there were 200 privately-owned planes responsible for contributing a total of \$500,000.00 to the state's economy that year (Dallas Morning News 1925, 193). Additionally, although there were no scheduled passenger flights offered at this time, the state's larger population centers all had equipped airfields that offered some level of commercial passenger service (Dallas Morning News 1925, 193). It cannot be doubted that the strong presence of military aviation in the state during the war and the number of former military airfields that had been transferred to civilian ownership in Texas at wars end fueled these impressive numbers (Dallas Morning News 1925, 193). Despite the growing number of privately-owned planes, pilots, and civilian-owned aviation businesses, municipally- and privately-owned airfields during this period typically consisted merely of a grass, dirt, or cinder flight strip with few additional built resources, unless they happened to be decommissioned military airfields that had been transferred to civilian ownership.

Building upon advances in aviation made during World War I, civil aviation throughout the United States during this period embraced such diverse occupations as sport flying, airmail, commercial passenger service, aerial surveying, barnstorming, crop dusting, and flight instruction. Additionally, business aviation, driven primarily by the expansion of the state's oil industry, flourished during the 1920s. Early aviation was largely unregulated with pilots and airplanes under no federal control (Moffett et al. 2002, E2). However, the rapidly increasing number of pilots in the country in addition to a number of highly publicized airplane crashes in the early 1920s led the government to enact the first aviation-related federal regulatory legislation in the United States in 1926. Known as the Air Commerce Act, this legislation charged the Department of Commerce with the responsibility to "foster air commerce, designate and establish federal airways, establish and maintain navigational aids, license pilots, inspect aircraft, and investigate crashes." The act also established the Aeronautics Branch of the Department of Commerce to monitor civilian airways, aircraft, airports, and pilots (Moffett et al. 2002, E2).

One of the most significant and profitable civilian uses for aviation that emerged during the Interwar Period was the transport of mail by airplane. Beginning in May 1918, the Army Signal Corps initiated the first airmail service in the United States. Later that year airmail service was transferred to the United States Post Office Department (Moffett et al. 2002, E3). By 1925, the government passed the Airmail Act, which removed the responsibility of airmail service from the United States Post Office and instead contracted airmail delivery solely to private commercial airlines and civilian pilots. These contracts were often lucrative and served as the “lifblood” of fledgling airlines during this period (Kutner, 2001). In Texas airmail service began in 1926 with the first flight departing from the Fort Worth Municipal Airport (currently known as Meacham Field), through Oklahoma City, and ending in Chicago (Dallas Morning News, 1939-1940, 257). The company that flew this historic route, the National Air Transport, was based out of both Love Field in Dallas and the Fort Worth Municipal Airport. Although viewed as largely an “experiment” in 1926-1928, by 1929, airmail had expanded to include four governmental contracts held by three companies in Texas. These companies included the National Air Transport Company which connected Dallas and Chicago; Texas Air Transport (TAT) which delivered mail between Dallas-Fort Worth to San Antonio; and Tammany Gulf Coast, which operated between New Orleans and Houston (Dallas Morning News 1929, 376). All airmail routes in Texas were also marked with signal lights during this period. In addition to the expansion of airmail, by the end of the 1920s, Texas’ civilian aviation network had grown to include one commercial airline that offered scheduled flights. This line was operated by TAT and offered flights between Dallas-Fort Worth and Wichita Falls (Dallas Morning News 1929, 376). Also approximately 60 municipal airfields in the state offered charter “aerial taxi service” during this period (Dallas Morning News 1929, 376). By 1930, the Southern Air Transport System had been established within the state and expanded airmail service to include Galveston, Dallas, Brownsville, San Antonio, and El Paso. The system included Texas Flying Services, Gulf Air Lines, and TAT (DeFreese-Emery et al. 2006, 15-17).



Figure 6. Postcard of Dallas Municipal Airport, Love Field showing terminal building and Braniff planes. Source, postcardpost.com.

By the early 1930s, civilian operated mail service in the state had expanded to include five mail contracts held by two airlines, American Airways and the National Air Transport (Dallas Morning News 1931, 142). These routes connected Texas with New York, Chicago, and major population centers in Mexico and Central and South America (Dallas Morning News 1939-1940, 257). In 1933, the government temporarily cancelled airmail contracts due to fraud and, for a short time, transferred airmail services back to the Army. A year later, the federal government passed the Air Mail Act, which not only returned airmail services back to private companies, but also reduced the fees paid to private companies for these services. As a result, airmail service no longer proved profitable and many airlines in the United States turned their focus from government-funded airmail contracts to developing commercial passenger travel (DeFreese-Emery et al. 2006, 15-17). Despite the passage of the act, airmail in Texas remained as lucrative sector in general aviation, with its two largest carriers, American Airways and Braniff Airways headquartered in the Dallas-Fort Worth Metroplex. Braniff Airlines was originally established in Oklahoma City in 1928 and was known as the Oklahoma City-Tulsa Airline. In 1929, the company was renamed Braniff Airlines and, in 1934, the same year it received an large airmail contract from the government, moved its headquarters from Oklahoma City to Love Field in Dallas, Texas (Kutner, 2001). Eventually, Braniff Airways emerged as the state's most significant airmail carrier during the Interwar Period.

Despite the deepening financial crisis caused by the Great Depression, the state boasted six airlines with regularly scheduled passenger service, nine commercial airports, and 56 municipal airports by the mid 1930s (Dallas Morning News 1936, 337). Profits from commercial passenger airline services contributed to the expansion of a number of previously-established airports in Texas including the Fort Worth Municipal Airport (currently known as Meacham Field), which added an impressive new hangar and terminal building for American Airways (later American Airlines) during the 1930s (see *Figures 7 and 8*).



Figure 7. Fort Worth Meacham American Airways Hangar, erected in 1933. Source, Baker.



Figure 8. Fort Worth Meacham Field American Airways Terminal, erected in 1937 (no longer extant). Source, B26 Peacemaker Museum.

Additional federal efforts were made to expand and improve aviation facilities across the U.S during the Interwar Period, both military and civilian, by allocating funds to expand and improve airports nationwide with the installation of new runway lighting, landing surfaces, and radio wave stations. The Work Projects Administration (WPA), Public Works Administration (PWA), Federal Emergency Relief Administration (FERA) and the Civil Works Administration (CWA) undertook many of these improvements (Moffett et al. 2001, E10). The projects were jointly sponsored by the federal and local governments and work relief funds were rewarded only to projects that were deemed significant to the “nation’s commerce and defense” (CAA, 1944, 20). For example, the terminal building at Stinson Field in San Antonio, Texas (now Stinson Municipal, SSF) was constructed using WPA labor ca. 1935 (see *Figure 9*).



Figure 9. Circa 1935 terminal building at Stinson SSF Municipal Airport. Source, www.postcardpost.com.

By 1938, the number of airports in Texas stood at 133. This total included “52 municipal, nine commercial, 24 intermediate, 12 military, 31 auxiliary, and five miscellaneous” aviation facilities (Dallas Morning News, 1939-1940, 257). Commercial aviation in Texas provided nearly 500 jobs with a yearly payroll of \$1,500,000 (Dallas Morning News 1939-1940, 257). The state’s primary commercial aviation activities were concentrated in north-central Texas, with Love Field in Dallas and Meacham Field in Fort Worth serving as the state’s primary commercial hubs (Dallas Morning News 1939, 193). Also, there were six regularly-scheduled lines operating within the state by the late 1930s that connected Texas with major population centers on the east, west, and south coasts in addition to Mexico and Central and South America (Dallas Morning News 1939, 193). The state’s general aviation airports not only served its large urban centers, but also provided service to many of its smaller towns. These airports hosted both larger commercial air traffic and Fixed Base Operators (FBOs), which were service centers that provided charter flights, flight training, “repair and maintenance, and sold aviation fuel and oil” for civilian flight (DeFreese-Emery et al. 2006, 17). All major air routes were lit and radio service and reliable weather reporting was widely available by the late 1930s (Dallas Morning News 1939, 193).

THE NATIONAL AIRPORT PLAN

Although aviation services reached almost every major urban center in the United States in the Interwar Period, as late as 1938, there existed no coordinated effort to develop a nationwide plan to establish a unified airport network. On the contrary, the location of civilian airports in the United States up to this point was typically determined by municipal governments or business-minded private individuals. With the potential for a war in Europe looming, the federal government determined that the “development and maintenance of an adequate system of airports

and seaplane bases” was a “matter of national concern” (CAA 1944, 20). Therefore, in 1938, Congress passed the Civil Aeronautics Act which not only established the Civil Aeronautics Authority (CAA), but also called for National Airport Plan that would provide “a report on the airport situation together with recommendations for future Federal policy (CAA 1944, 20). This act sought to develop aviation facilities that were “important to the maintenance and safe and efficient operation of air transportation along the major trade routes of the Nation and to those rendering special service to the national defense” (CAA 1944, 20).

With the enactment of the Civil Aeronautics Act of 1938, all civil aviation responsibilities were transferred from the Commerce Department and placed under the purview of the CAA. In addition to being charged with the responsibility of regulating “air traffic control, airmen and aircraft certification, safety enforcement, and airway development,” the CAA was tasked with undertaking a study to assess the nation’s existing municipal airports and reporting on the necessity for establishing a national airport system (DeFreece et al 2006, 32-34). As a result of this survey, the CAA determined that county’s airport network was inadequate and therefore proposed to increase the number of airports in the United States and to improve already existing facilities. Specific recommendations for the improvement of airports were initially outlined in an Airport Survey Report, which the CAA submitted to Congress in 1939. The report recommended that \$499,500,000.00 be allocated for improvement activities including construction, alteration and repair of existing buildings, and the acquisition of property (CAA 1944, 20). However, due to the threat of United States’ involvement in World War II, the government soon shifted its focus from an the establishment of a national airport system for municipal/civilian uses to a more strategic expansion of its military aviation facilities. In 1940, the government granted the military authorization to begin expanding and improving civil aviation airports as needed for defense purposes. To this end, Congress appropriated \$40,000,000.00 for “construction or improvement” at 250 sites (CAA 1944, 23). By 1944, these numbers had dramatically risen to include a Congressional appropriation of \$199,740.00 for the establishment or expansion of airports at 668 locations. In the same year, the CAA, by then known as the Civil Aeronautics Administration, submitted the National Airport Plan to Congress (CAA 1944, 23).

The National Airport Plan of 1944 updated the 1939 survey report and provided further recommendations for improving the nation’s airport system. The plan stressed the need to improve the nation’s airports system not only for the wartime use, but also looked to the future, noting the growing importance of aviation to local and national economies and the need for flexibility in transitioning these facilities to civilian/municipal use following the conclusion of the war. In order to fully meet the needs of the predicted expansion of civil aviation in the postwar period, the plan recommended that \$1,250,000,000 be allocated for the construction of 3,050 new airports and the improvement of an additional 1,625 existing fields (CAA 1944, 1). This effort would span a 5 to 10 year period and would be funded jointly by federal and non-federal public entities (CAA 1944, 1). The type/size of airport built within a community would be based upon population and any existing or projected economic activities that could benefit from a nearby aviation facility. The plan also divided the country into regions, with Texas grouped with New Mexico, Oklahoma, Arkansas, and Louisiana in Region 4. With a recommended allotment of \$266,967,710 Region 4 was second only to the Northwest Region in the amount of funding proposed for airport construction and/or improvement. Of this allotment, the plan proposed that \$52,490,731 be apportioned to Texas for the improvement of 123 exiting airports while another \$68,432,421 was proposed for the construction of 213 new airports (Dallas Morning News, 1945-1946:287). Texas’ total proposed expenditure was the largest for any state.

Finally, the 1944 plan established a system of airport classification that was based upon the type of aircraft operations and length and width of runways or landing strips at each existing and planned facility (see *Figure 10*). Specifically, this system outlined five sizes of airports. Class I airports were the smallest airfields and could accommodate “private owner small type” airplanes (CAA 1944, 8). These airports generally lacked runways, but had landing strips that ranged from 1800’ to 2700’ in length and 300’ in width (CAA 1944, 9). Class II airports were suited to accommodate “larger type private owner aircraft and smaller transport aircraft for local and feeder service” (CAA 1944, 9). Runway length at Class II airports ranged from 2500’ to 3500’ and landing strips between 3500’ to 4500’. Class III airports serviced “twin-engine transport aircraft” and had runways that measured between 3500’ and 4500’ in length or landing strips that were between 3700’ and 4700’ in length. Class IV and Class V airports were major airports that accommodated the largest aircraft then in use (CAA 1944, 9).

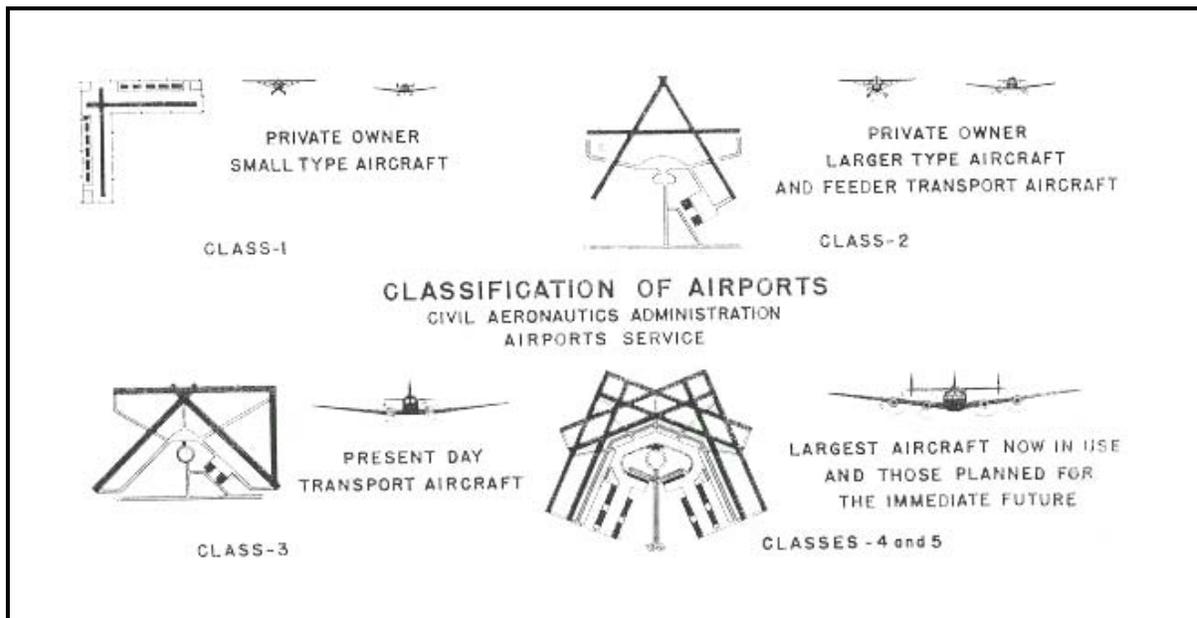


Figure 10. CAA airport classification from the 1944 National Airport Plan. Source, CAA.

The 1944 National Airport Plan, overseen by the CAA, served as the impetus to drive the federal government’s efforts to establish a unified nationwide airport network and provided the framework for the classification and improvement of general aviation facilities throughout the early postwar period.

WORLD WAR II ERA AVIATION FACILITIES IN TEXAS

As early as World War I, the state of Texas proved to be a desirable location within which to establish military airfields (Dallas Morning News 1930-1940, 257). In the World War II era, many communities in Texas sought to take advantage of the state’s position, vying for the chance to host military aviation facilities not only for patriotic reasons but also for the economic boon that accompanied the establishment of such facilities. When the federal government determined that a site was ideally suited for the establishment of a military aviation installation, they typically purchased the land and funded the construction of all improvements therein, including buildings, runways, and infrastructure. Although the majority of military aviation facilities utilized in Texas during this period were established between 1939 and 1945, the government also purchased or leased a number of previously-established airfields and improved them for military use – i.e. the

Laguna Madre Ground Gunnery Range (Port Isabel-Cameron County Municipal Airport) and the Rockport, Aransas County Airport.

During World War II, there were more than 40 military airfields and stations in the state (Dallas Morning News 1951-1952, 57). These facilities hosted a range of functions related to assembly and/or overhaul work, regular operations, support operations, and/or training and included Army Air Force bases, ordnance plants, sub-bases, and auxiliary air fields; Navy air stations, sub-stations, and designated training stations; Coast Guard operating bases; and Marine Corps air stations (DeFreece et al. 2006, 18-20). Most World War II-era airports that are currently under the purview of TxDOT AVN served as either Army Air Force bases – i.e. San Marcos Army Airfield (San Marcos Municipal Airport), Childress Army Air Field (Childress Municipal Airport), and Hondo Army Airfield (Hondo Municipal Airport) – or smaller Army Air Force auxiliary airfields – i.e. Auxiliary Field No. I for GVT (Caddo Mills Municipal Airport) and Clear Springs Air Field (New Braunfels Municipal Airport) – and generally hosted functions related to flight training. One of these smaller airfields, known as Avenger Field in Sweetwater (now included in the TxDOT AVN system), hosted basic flight training for the Women’s Air Service Pilots or WASPs during the war. Texas, in fact, had the largest number of Army airfields during World War II and led the nation in the number of pilots trained per year (Dallas Morning News 1945-1946, 288). The largest airfields for Army aviation training in Texas during the World War II period were Randolph Field (now Randolph Air Force Base), Kelly Field (now Kelly Air Force Base), and Love Field (currently Dallas-Love Field). These airfields were significant at a national level and hosted functions that were critical to the United States’ wartime success. However, smaller installations such as San Marcos, Childress, and Hondo Army Air Force airfields also fulfilled important roles in the war effort, having provided aviation-related training to over 28,000 soldiers by war’s end and contributing to Texas’ role as one of the nation’s foremost centers for military flight training.

Civilian aviation throughout much of the country, with the exception of commercial passenger airlines, was effectively brought to a standstill under order of the War Department during World War II. Due to security concerns, only municipal airports that provided proof of 24-hour guard and hosted commercial passenger flights under approved flight plans were allowed to remain open for business (The USAF Auxiliary Civil Air Patrol). Additionally, all civilian pilots had their licenses revoked during the war years and were only permitted to fly after “proving their loyalty” to the United States (The USAF Auxiliary Civil Air Patrol). In an effort to utilize civilian pilots rather than grounding them, the US Army Air Corps established the Civil Air Patrol (CAP), a volunteer group of civilian pilots that was charged with conducting reconnaissance flights “at the United States borders and coastlines, monitored forests for fires, and performed other war-related missions” for civil defense purposes (DeFreece et al. 2006, 17). These CAP units were typically based at military-operated airfields (see *Figures 11 and 12*). Therefore, most municipal airports, unless they had been transferred to the government for use by the military or followed CAA stipulations, were shut down for most civilian uses throughout the war years.



Figure 11. Detail showing CAP insignia on World War II-era hangars at Pecos Municipal Airport, formerly Pecos Army Airfield. Source, Baker.



Figure 12. World War II-era CAP hangars at Pecos Municipal Airport, formerly Pecos Army Airfield. Source, Baker.

In Texas, however, some civil aviation facilities remained in operation during this period and, by 1944, the state had 294 civilian airports (the largest number of any state in the U.S.) and 1815 licensed civilian aircraft. Of the 294 airports, 80 were Class 1 facilities, 85 were Class II, 42 were Class III, and 88 were Class IV and Class V (Dallas Morning News 1945-1946, 287). Texas was also served by nine commercial airlines during World War II, including American Airlines, Braniff Airlines, Chicago and Southern Airlines, Continental Airlines, Delta Airlines, Eastern Airlines, Essair, Transcontinental and Western Air, and Pan-American Airways (Dallas Morning News 1945-1946, 287). Two of these airlines, American and Braniff, also initiated the shipment of fruits and vegetables from the Rio Grande Valley during World War II (Dallas Morning News

1945-1946, 287). Also during this period a small number of feeder/trade-route airlines were established to provide commercial passenger service to rural areas throughout Texas and Oklahoma (Dallas Morning News 1945-1946, 287).

Since the United States was in a state of mobilization during this period, the design of most buildings erected at the nation's military installations during World War II were based upon standardized plans. Standardized plans used by the Army and Air Corps, known as the Series 700 and Series 800 mobilization type plan, were based upon the earlier Series 600 plans employed during World War I (Garner 1993, 33). Although similar in appearance to their earlier World War I predecessors, the Series 700 and Series 800 mobilization type buildings utilized stud construction rather than plank framing and electricity, heating, and plumbing was available throughout (Garner 1993, 33). Similarly, the Navy also utilized standard plans adapted from earlier World War I examples. In general, World War II-Era buildings at military aviation installations, such as hangars, warehouses, barracks, mess halls, latrines, etc., were temporary wood-frame structures, designed to be easily assembled (Garner 1993, 33). These buildings typically had an expected life span of 5 to 7 years (Garner 1993, 33). In addition to ease of assembly, wood framing members and exterior cladding were often employed in building construction due to wartime steel shortages. One innovative building technology that was utilized during this period to alleviate the steel shortage was the "Lamella" or wood laminated arched roof truss. Initially developed in Europe in 1908 as a means to clear large spans, this system was first used by the military during World War I in hangars, drill halls, and theatres (Garner 1993, 52). During World War II, this roofing system was most prominently featured in the construction of a number of drill halls that were designed by noted architectural firm of Shreve, Lamb, and Harmon (Garner 1993, 52). The Lamella roofing system consists of "intersecting skewed arches made up of short members of laminated timbers" (see *Figure 13*). In Texas within the TxDOT AVN system, examples of this roofing system can currently be found at Big Spring McMahan - Wrinkle Airport and Port Isabel - Cameron County Municipal Airport. Each of these airports retains World War II-era, arched-roof hangars that utilize the distinctive Lamella trusses. These extraordinary buildings also display concrete buttresses, reinforced concrete-frame construction, and masonry exterior walls (see *Figure 14*).



Figure 13. World War II-era arched-roof hangar at Port Isabel Cameron County Municipal Airport. Detail showing "Lamella" wood interior trusses. Source, Baker.



Figure 14. World War II-era arched-roof hangar at Big Spring McMahon – Wrinkle Airport. Source, Baker.

Hangar plan types that were commonly erected at Army airfields during World War II included the standard Type DH-1 double aircraft hangar, the 120' Temporary Hangars, and OBH-2 Hangars. Standard-plan Naval hangars included the B-M Landplane and Seaplane Hangars. The landplane hangars “had a single hangar bay measuring 200’ by 200’, and was spanned by a steel flat-gabled truss at a height of 28’,” while the “seaplane hangar bay measured 320’ x 240’, and was spanned by a steel flat-gabled truss at a height of 38’” (DeFreece et al. 2006, 19-21).

CIVILIAN AVIATION IN TEXAS IN THE POST-WORLD WAR II ERA

With the close of World War II and the demobilization of the military’s operation combat units, many of the nation’s military airfields were classified as surplus assets, temporarily placed into inactive/maintenance status, and readied for transfer of ownership to non-federal public agencies, i.e. a “state, political subdivision of a state, or tax-supported organization,” as mandated by the provisions of the Surplus Property Act of 1944 (DeFreece et al. 2006, 22). The War Assets Administration was charged with overseeing airfield ownership transfers, which included the conveyance of ownership of all federal lands and standing buildings to non-federal public agencies, provided that the grantee could demonstrate that it had the funds necessary for the continued upkeep and operation of the facility and that it actively promoted the facility’s usefulness as an airport (CAA 1944, 2). The transfers also stipulated that if necessary, the government had the right to use the airport, especially in times of a national emergency. In Texas, the grantee or non-federal public agency was typically either a city or county government. The act also provided for surplus military buildings to be moved from one former military installation to a new location. For example, the municipal airport at Quanah, which was established in 1946, received a number of surplus World War II-era buildings that had been moved from the former Childress Army Airfield. The overall objective of the Surplus Property Act of 1944 was in keeping with the recommendations of the 1944 National Airport Plan, which, as stated earlier,

emphasized the importance of airports for not only for military uses, but for civil aviation purposes and the continued need to develop and improve the nation’s airport system.

The National Airport Plan also recommended that any state receiving Federal funds for the establishment or improvement of municipal airports designate an “official body” to act on its behalf (CAA 1944, 3). Therefore, in 1945, the Texas Aeronautics Act created the Texas Aeronautics Commission to serve as a liaison between the federal government and state airport interests in the continued development of aeronautics in Texas (Smith, 2001). The Texas Aeronautics Commission had no regulatory or licensing authority, rather it provided financial support for the “acquisition, development, operation, and maintenance of airports” in Texas (Smith 2001). It acted as the non-federal public entity that would provide funding upon the acquisition of funds from federal or legislative sources. In Texas, the majority of World War II-era military airfields were transferred to local governments for use as municipal airports. Therefore any new construction and/or improvement to existing buildings or structures at municipal airports following the transfer of ownership would most likely be funded by joint federal and non-federal government sources. As outlined in the 1944 National Airport Plan, requests for funding from the federal government would be approved by the CAA, provided the planned improvements met with CAA standards, and administered at the state level by the Texas Aeronautics Commission (CAA 1944, 2). The plan provided the impetus for Congress, in 1946, to pass the Federal Airport Act (FAAP), which provided \$500,000.00 in grants for the development of civilian aviation in the United States through the Federal Aid for Airports Program. The FAAP, which was subsequently supplanted by the Airport and Airway Development Act (ADAP) in 1970, was to be overseen by the CAA. Many of the state’s general aviation airports benefited from this funding during the postwar period including the current Marshall – Harrison County Airport, which received funding from the CAA for redevelopment as a Class II civil aviation facility in accordance with the National Airport Plan. The airport’s architect-designed, steel-frame terminal building was one of a number of resources erected during this CAA-funded building campaign (see *Figure 15*).



Figure 15. Circa 1955 postcard depicting the Harrison County Airport Terminal building. Source, Harrison County Historical Museum.

Although many former military installations were transferred to municipal ownership in the years immediately following the close of World War II, some of the airports retained military functions well into the Cold War period. For example, Connally Air Force Base (currently Waco TSTC) and Webb Air Force Base (now McMahon-Wrinkle Airport) both functioned as Army and then Air Force bases after World War II. In 1945, the Waco Army Flying School was deemed unnecessary and deactivated. In 1948, the facility was reactivated as a basic pilot training school and renamed Connally Air Force Base. Between 1951 and 1962 the installation provided training for navigators, radar operators and bombardiers. In contrast, the former Big Spring Army Air Corp Bombardier School, which was established in 1942, was transferred to municipal ownership in 1945, but was reactivated in 1951 as an Air Force Base. Renamed Webb Air Force Base, the installation served as a pilot training center. Each of these facilities hosted specialized training functions that were key to the state's Cold War efforts. While these installations were federally-owned during much of the Cold War period, they were eventually transferred from federal ownership and now serve as municipal airports within the TxDOT AVN system.

A number of factors, including a postwar population boom, advances in aviation technology made during the war, an increase in the number of trained pilots in the state, and the rise of the importance of air transport (both commercial and civil) to the state's economy fueled a rapid increase in number of civil/general aviation facilities in Texas during the postwar period. By 1948, there were 470 airports, 6804 registered aircraft, and 20,700 pilots in the state, up from just 133 airfields in 1939 (DeFreece et al. 2006, 23 and Dallas Morning News 1939-1940, 257). By 1951, Texas was home to the largest number of airports, the second largest number of licensed aircraft, and the third largest number of pilots in the United States (Dallas Morning News, 1952-1953, 288) and four years later, the number of registered civilian aircraft in Texas rose to over 11,000 (DeFreece et al. 2006, 24). As stated previously, many of the municipal airports in the TxDOT AVN system were established in the World War II-era or earlier while others, such as the

Mid-Valley Airport, were constructed after World War II. A number of these facilities served solely as municipal airports, hosting business/corporate travel, agricultural enterprises, flight schools, FBOs, etc. However, in order to remain financially solvent, the majority of municipal airports currently included in the TxDOT AVN system have hosted a range of different functions and tenants in the postwar period. In these cases, the city or county typically retained ownership of the property and maintained a portion for civil aviation while it leased surplus buildings and/or land to private enterprises (recreational, commercial, and industrial), non-profit organizations (i.e. museums and Meals on Wheels), or governmental entities (i.e. correctional facilities, state colleges, and the National Guard). Portions of the property may also have been made available to other county or city government departments.

Although some of the postwar functions hosted by municipal airports were mundane in nature and contributed minimally to local economies, a number of industrial aviation-related enterprises have played a significant role in their local communities due to the solid “employment base” they provided (Texas Department of Transportation, 2007). Although Texas had emerged as the third largest producer of aircraft in the country by the early postwar period, it was not until industrial aviation production facilities including Consolidated Aircraft Corporation, the Texas Engineering and Manufacturing Company (Temco), the LTV Corporation, and the Bell Aircraft Corporation constructed or expanded production plants in the Dallas-Fort Worth area during the 1950s and 1960s that the state solidified its status as a leader in the aviation and aeronautic industry (DeFreece et al. 2006, 22). Many smaller aviation-related commercial enterprises, such as Mooney Airplane Company at Kerrville Municipal, Air Tractor Incorporated at Onley Municipal, Ingram Flying Service at Dalhart Municipal, and Tusco at Galveston’s Scholes International established operations at several of the municipal airports with the TxDOT AVN system in the postwar period. One of the largest and most significant industrial enterprises within the TxDOT AVN system is L-3 Communications, located at Greenville Municipal Airport, Majors Field. Following a merger of several companies, Ling-TEMCO-Vought (LTV) moved to the airport property in the early 1950s. Upon its occupation of the airport, LTV initiated the construction of a number of specialized industrial buildings and structures and, by the 1960s, had established a complex in the southwestern portion of the airport. The company was later renamed L-3 Communication.

By the 1950s, landing and flight aids that had been developed by the military in the 1940s had been introduced to the civil aviation industry. Ground Controlled Approach (GCA) and Instrument Landing System (ILS) used radar to assist with landings (DeFreece et al. 2006:25). The Navy later introduced the Tactical Air Navigation (TACAN) system as an improvement to GCA and ILS system (DeFreece et al. 2006:25). Very high frequency Omni-directional Range (VOR) and Distance Measuring Equipment (DME), both developed by the military in the late 1940s, provided pilots in flight with the location of other airborne aircraft within the vicinity of their plane (DeFreece et al. 2006, 25).

The postwar period also witnessed the end of the monopolies that the large transcontinental passenger airlines such as United Airlines, American Airways, TWA, and Eastern Airlines held on some major nationwide routes. As a result, in Texas, Braniff Airways, originally founded in 1928, expanded its passenger service routes and eventually emerged as the state’s primary carrier and the county’s sixth largest (DeFreece et al. 2006, 24-26). The number of feeder airlines within the state grew in the 1950s and 1960s with the expansion or establishment of several companies including Essair (Houston, 1945; later Pioneer Air Lines and Continental Airlines), Trans-Texas Airways (Houston, 1947; later Texas International), Central Airlines (Fort Worth, 1949; later

Frontier Airlines), and Slick Airways (San Antonio, 1946; later Airlift International) (DeFreece et al. 2006:23). The feeder airlines worked in conjunction with larger airlines to provide service to medium-sized and smaller towns throughout Texas. With the Airline Deregulation Act of 1978, which allowed the commercial airline companies rather than the government to set rates and flight schedules, service to a number of smaller population centers dropped off sharply as they were determined to be unprofitable by the airlines (DeFreece et al. 2006, 24-26). Moreover, several airlines that provided service to these smaller markets were forced out of business during the 1980s due to deregulation. Among these airlines was Braniff Airways, which ceased operations in 1982 due to financial insolvency. However, several other Texas-based airlines such as Texas International (later Continental Airlines) thrived as a result of deregulation (DeFreece et al. 2006, 24-26).

The 1980s also marked a major shift in the structure of the state's aviation regulatory body with the replacement of the Texas Aeronautics Commission with the Texas Department of Aviation in 1989. This new department not only held the same powers as the earlier established commission, such as overseeing grants for the development and improvement of airports across the state and the certification of air carriers, but was also charged with administering federal funds for non-reliever general aviation airports. Two years later, in 1991, the Texas Department of Aviation was placed under TxDOT's umbrella and was renamed the Aviation Division (AVN). TxDOT AVN's primary responsibility is to "assist cities and counties applying for, receiving and disbursing federal and state funds for reliever and general aviation airports. The division also participates in the Federal Aviation Administration's State Block Grant Program, with responsibilities for the federal improvement program for general aviation airports" (Texas, Department of Transportation, 2007). Currently TxDOT AVN's airport system is one of the nation's most extensive aviation networks, with "two of the top 10 busiest airports in the nation" and "303 public, general-aviation airports and 23 commercial service airports." Aviation in Texas rivals ship, rail, and auto transportation in overall economic benefit to the state, providing over "61,000 jobs, with 2.5 billion in payroll and 8.7 billion in total economic output" (Texas, Department of Transportation, 2007).

CONCLUSION AND SUMMARY OF SIGNIFICANT HISTORICAL THEMES

Within Texas, aviation has grown from its early 20th century role as a merely recreational hobby/curiosity to its current status as a major component of Texas' transportation network, contributing billions annually to the state's economy. The above context outlines this evolution, providing an historic background that presents several significant themes through which the historical significance of extant general aviation airports can be evaluated. These themes include:

- The birth of military and general aviation in Texas, 1910-1917
- World War I and its impact on aviation in Texas, 1917-1918
- The rise of civilian aviation in Texas, including the emergence of airmail, flight training, business travel, and commercial passenger service during the Interwar Period, 1919-1940
- The Interwar military buildup in the US and its impact upon the development of aviation in Texas, 1919-1940
- Depression Era New Deal work relief programs and their impact on the development of aviation facilities in Texas, 1933-1943

- World War II and its impact on aviation in Texas, 1941-1945
- Postwar industrial development at Texas general aviation facilities, 1945-1970
- The Postwar development within Texas general aviation facilities, 1945-1970
- Cold War military development in Texas and its impact on general aviation facilities, 1945-1991

PROPERTY TYPES

The field survey for this project, which included a sampling of TxDOT AVN’s 266 general aviation airports, identified a variety of resource types and forms that fulfilled a range of uses. Although the surveyed resources may be sited at different airports across the state and have different construction dates, they share many common features related to their use in fulfilling specific functions. The following summary presents a system of categorization that seeks to identify common features shared amongst the surveyed resources and group them into manageable units for the purpose of evaluation. These broad groupings or “Property Types” are based upon **original** function, use, and form and are taken from data categories proffered in the National Park Service’s *National Register Bulletin 16A: How to Complete the National Register Registration Form*. Specifically, the identified categories or Property Types include:

- DEFENSE
- INDUSTRY
- TRANSPORTATION
- RECREATION AND CULTURE
- AGRICULTURE/SUBSISTENCE
- DOMESTIC
- FUNERARY

These property type classifications are further divided into a number of different subcategories or “Subtypes” based upon the specific role each surveyed resource originally fulfilled within its associated airport, overall form/plan, and date of construction. Each Subtype then includes a list of identified associated resource types/forms. Finally, illustrative photos of the most common resource types/forms have been provided in *Appendix B* of this report.

Please note that the same resource types/forms may appear in different property type categories, i.e. “Hangars” appear in the DEFENSE, INDUSTRY, and TRANSPORTATION categories. Also, the same resource types/forms may appear in different Subtype categories, i.e. “Storage Buildings” appear in both the *Air Facility* and *Military Facility* Subtypes categories within the DEFENSE property type. Therefore, as stated earlier, when categorizing surveyed resources it is important to note both its **original** function and the function of its **associated airport** when it was built. For example, when categorizing the above-mentioned hangar, the surveyor should ask himself/herself if it was originally used at an Army airfield during World War II, constructed by a privately-owned enterprise to house the production of airplane parts, or if a privately-owned commercial airliner built it to house airplane maintenance activities. If constructed as part of World War II Army airfield, the hangar would be classified as a DEFENSE property while the privately-owned industrial hangar should be included in the INDUSTRY property type category. The hangar built by the privately-owner commercial airliner should be categorized as a TRANSPORTATION resource.

Because this section of the report provides a general description of property types and was based on a sampling of 33 airports within TxDOT AVN system, future investigations may identify additional property types. Consequently, the following property types should not serve as an absolute catch-all, but should be augmented as new resource types/forms are documented by subsequent field investigations.

DEFENSE

The DEFENSE property type category includes all government-owned resources that were operated by the military in support of the nation's defense efforts. Although the majority of airports included in TxDOT's AVN system currently hosts civilian functions, most were originally erected to serve as military airfields, armories, and/or training facilities. As a result, many of the airports retain an assortment of buildings and structures that were erected over an extended period of time. However, only the built resources that remain from the period in which their associated airport functioned as a military operation were categorized as DEFENSE properties. While the earliest of the documented DEFENSE resources were erected in the late 1930s, during the nation's build-up for World War II, the majority date from 1940-1945, the period in which the United States was actively involved in World War II. Additionally, a small number were built during the Cold War Era, between 1946 and 1971. Each documented resource within the DEFENSE property type category was further subcategorized as either an *Air Facility* or *Military Facility* based upon the specific type of military activity that its associated airport originally hosted. Generally speaking, if a property was built within an airport that was originally used for air-related military/defense purposes it was included in the *Air Facility* subtype, while the *Military Facility* subtype includes all non air-related military facilities. Within each of these subtypes fall a wide range of different plan types/forms. Whenever possible, these plan types/forms were grouped according to function in order to facilitate analysis.

Subtypes

Air Facility

The *Air Facility* subtype comprises resources at TxDOT AVN general aviation airports that originally hosted air-related military activities. In Texas, air-related military installations range from large air stations or airfields to smaller auxiliary airfields. Research and survey efforts identified various structures and building types within this subtype that originally housed a variety of air-related military activities, including aircraft operations, training, administrative support, service/maintenance, storage, domestic, human services, recreation, infrastructural support, and landscape. The following is a list of identified resource types/forms that fall within the *Air Facility* subtype.

- Hangars
- Control Towers
- Terminal Buildings
- Visual Navigations Aids (i.e. *Beacons Towers, Segmented Circles, and Tetrahedrons*)
- Training Facilities (i.e. *Laboratories, Link Trainer Buildings, Classrooms, Firing/Target Ranges, and Parachute Buildings*)
- Administrative Buildings
- Aircraft Maintenance and Service Shops (i.e. *Shops, Washing Rack Buildings, Washing Pads, Petrol Service Facilities, Petrol Operations Facilities, and Jet Test Stands*)
- Storage Facilities (i.e. *Warehouses, Sheds, and Bunkers*)
- Domestic/Housing Facilities (i.e. *Barracks and Quarters*)

- Human Services Buildings (i.e. *Restaurants, Fire Stations, Kitchens, Hospitals, Police Stations, and Exchange/Service Stations*)
- Infrastructural Facilities (i.e. *Electrical Vaults, Utility Buildings, Drainage, Maintenance Facilities, Generator Buildings, Tanks, Pump Houses, Loading Platforms, Culverts, Water Towers, Water Treatment Plants, and Electrical Switch Stations*)
- Recreational Facilities (i.e. *Park, Restroom, Dancehall, Recreation Hall, Youth Center, Gun Club/Skeet Ranges, Golf Courses, and Golf Clubhouses*)

Military Facility

The *Military Facility* subtype includes all non-aviation resources at TxDOT AVN airports that were built for national defense purposes. Although located on airport property, these resources were erected either before or after the core airport buildings and reflect the federal government's effort to effectively utilize surplus property. Research and survey efforts determined that National Guard armories and their associated secondary buildings are the most common plan type/form that falls into this subtype category. The survey also identified a pool that was originally erected as part of a World War II era detention facility/internment camp. The following is a list of identified plan types/forms that fall within the *Military Facility* subtype.

- Armory
- Storage Facilities (i.e. *Oil Storehouse Building*)
- Shops (i.e. *Vehicle Maintenance Building*)
- Detention Facility (i.e. *Pool*)

INDUSTRY/PROCESSING/EXTRACTION

The INDUSTRY/PROCESSING/EXTRACTION property type includes resources that house activities related to the production/manufacturing of goods. Subtypes within the INDUSTRY/PROCESSING/EXTRACTION property type are *Manufacturing Facilities* and *Defense-Related* resources. The *Defense-Related* subtype includes non-federally owned buildings that are used to produce goods or conduct research for military/defense uses. Most often, private companies hold contracts with the federal government to produce such goods. In contrast, *Manufacturing Facilities* produce goods for non-military uses. The majority of the INDUSTRY/PROCESSING/EXTRACTION resources at TxDOT's AVN airports were erected in the post-World War II period, between 1945 and 1971.

Subtypes

Defense-Related

As stated above, resources in this subcategory are non-federally owned buildings that are used to produce goods for military/defense uses. *Defense-Related* industrial resources not only include primary manufacturing buildings, but also secondary buildings and structures that support overall production operations. The following is a list of identified plan types/forms that fall within the *Defense-Related* subtype.

- Hangar
- Shops (i.e. *Welding Shop, Fiberglass Shops, Recycling Buildings, and Print Shops/Photo Lab Testing Facilities*)

- Administration Buildings
- Storage Facilities (*Storage Building and Warehouse*)
- Infrastructural Facilities/Utilities (i.e. *Maintenance Buildings, Mechanical Rooms, Utility Buildings, and Pump Houses*)
- Human Services (i.e. *Cafeterias*)

Manufacturing Facility

Manufacturing Facilities house activities produce related to the production of goods for non-military uses. At TxDOT AVN facilities, these production activities are most often aviation related. These industrial resources not only include primary manufacturing buildings, but also secondary buildings and structures that support overall production operations. Plan types within this category include shops, hangars, infrastructural resources, and warehouses. The following is a list of identified plan types/forms that fall within the *Manufacturing Facility* subtype.

- Hangar
- Shops (i.e. *Hammer House, Shear Room, Tooling Department, Assembly Building, Detail Paint, Vapor Degreaser Room, Shop, Pre-Flight Service Department, Manufacturing Plant*)
- Storage Facilities (i.e. *Plastics/Plaster/Storage, Tool Storage Building, Plane Storage Building, Storage Building, Maintenance Building and Airplane Canopy*)
- Infrastructural Facilities/Utilities (i.e. *Electrical Vaults*)

TRANSPORTATION

Resources in the TRANSPORTATION property type include a wide variety of structures and buildings that house or support activities related the transportation of people and/or goods. This property type category includes all resources at TxDOT AVN airports that were **originally constructed** to serve civil aviation uses. The airports have, over time, hosted a range of functions, some related to defense, industrial production, aviation, etc. As a result, many of the airports retain an assortment of buildings and structures that were erected over an extended period of time. However, only the built resources that remain from the period in which their associated airport functioned as a civil aviation airport were categorized as TRANSPORTATION-related properties. While the earliest of the documented TRANSPORTATION resources were erected in the late 1930s, during civil aviations nascent period, the majority date from the post World War II period, between 1946 and 1971. Each documented resource within the TRANSPORTATION property type category was further subcategorized as either an *Air-Related* due to the specific type of activity that its associated airport originally hosted.

Subtypes

Air-Related

This category comprises all resources within the TxDOT AVN system that were erected at civil aviation airports. Research and survey efforts identified various structures and building types within this subtype that originally housed a variety of air-related activities, including aircraft operations, administrative support, service/maintenance, storage, human services, recreation, and infrastructural support. The following is a discussion of identified plan types/forms that fall within the *Air Related* subtype.

- Hangars
- Terminal Buildings
- Administration Buildings
- Runway Supervisory Units
- Visual Navigations Aids (i.e. *Beacon Tower, Tetrahedrons, Segmented Circles, and Windsocks*)
- Shops (i.e. *Shops, Maintenance Buildings, and Drainage Pads*)
- Infrastructural Facilities/Utilities (i.e. *Water Tower , Storage Tanks, Culverts, Air Blow-off Valves, Well Water Valves, Water Wells, Water Main Shut Off Valves, Electrical Vaults, and Drainage*)
- Commemorative Structures (i.e. *Markers and Static Displays*)

RECREATION AND CULTURE

The RECREATION AND CULTURE property type includes resources that erected for the purpose of supporting amusement, diversion, sporting, artistic, etc. endeavors and activities. Although located within the boundaries of a TxDOT AVN airport, buildings, objects, sites, and structures within this category were not built for airport personnel, rather, the resources were originally constructed for and utilized by outside patrons. Documented subtypes include *Sports Facility* and *Monument/Marker*. Identified plan types/forms that fall in this category include *Sports Facilities, Monument/Marker, and Outdoor Recreation*.

Subtypes

Sports Facility

Resources in this category are recreational/sports fields that typically include buildings or other associated equipment. Resources in this category can include:

- Recreational Fields (i.e. *Baseball Fields, Football Fields, and Golf Courses*)
- Recreational Buildings (i.e. *Clubhouses, Storage Buildings, Concession Stands, and Restrooms*)

Monument/Marker

This category includes object that were erected to commemorate a special person, place or event. Resources in this category can include:

- Historic Markers (i.e. *OSHM Markers*)

Outdoor Recreation

This subtype includes any publicly or privately-owned non-sports related outdoor recreational sites.

- Park (i.e. *RV Parks*)

AGRICULTURE/SUBSISTENCE

The AGRICULTURAL/SUBSISTENCE property type includes a wide variety of buildings and structures that were designed to house or support agricultural activities. These activities can include ranching, farming, animal husbandry, etc. Agricultural resources at TxDOT AVN facilities were not erected during an airport's original building campaign, rather they were most likely originally held in private ownership and later purchased or acquired by an airport. These buildings include resources that mainly function in a supportive role rather than one that is directly related to an airport's primary mission. Identified associated subtypes within this property type are *Storage Buildings* and *Animal Shelters*.

Subtypes

Storage Building

Storage buildings within the AGRICULTURAL/SUBSISTENCE property type are those resources that are used to shelter/warehouse agricultural products, materials, or equipment. The most typical agricultural storage building plan type/form found at TxDOT AVN airports are prefabricated frame barns that were erected in the 1930s through the 1970s and included:

- Barns (hay storage, machine/equipment storage)

Animal Shelter

Animal shelters within the AGRICULTURAL/SUBSISTENCE property type are used to shelter/warehouse animals. The most typical animal shelter building plan type/form found at TxDOT AVN airports are barns.

- Barns

DOMESTIC

Resources in the DOMESTIC property type include all buildings and structures that provide shelter for human habitation. Buildings in this category were not typically erected as part of the original building campaign at an airport, rather they were erected separately from the establishment of the airport by private individuals. The survey effort identified only one Subtype within this category, *Single Dwelling*.

Subtypes

Single Dwelling

Single dwellings include homes that were erected to house one family or individual. The buildings can exhibit a range of plan types, forms, and materials based upon the time period in which they were erected and also can include not only primary dwellings but also auxiliary secondary buildings such as sheds, garage, etc. The survey effort identified two rectangular-plan single dwellings at TxDOT AVN general aviation facilities.

FUNERARY

In general, properties in the FUNERARY property type category include cemeteries, crypts, mounds, and sites that are associated with human interment. Typically, these burials are indicated by masonry, metal, or wood markers. The survey effort identified and documented one subtype within this category, *Cemetery*.

Subtype

Cemetery

The cemetery identified during the survey effort was established in the 19th century, prior to the construction of its associated airport. The resource is a grassy site that lacks headstones or grave markers.

EDUCATION

The EDUCATION property type includes resources that house activities related to academic instruction, training, or study. Education resources include a range of subtypes and plan types/forms and are therefore related more by their common function than by a set of unified architectural characteristics. The resources in this category were typically erected by research facilities on property that was leased from the airports. Documented subtypes in this category include *Research Facility* and *College*.

Subtypes

Research Facility

This subtype includes a range of resources that educational institutions utilize to conduct research activities. However, the only *Research Facility* within the TxDOT AVN identified thus far was a grape orchard that was established ca. 1960 in a field that was leased by Texas A&M. The site is currently an abandoned grassy field.

College

College facilities include any institution that provides post-secondary education. As is the case with research facilities, resources in this category span a wide range of plan types and forms and are therefore related more by their common function than by a set of unified architectural characteristics. *College* facilities within the TxDOT AVN system host activities related to classroom instruction, storage, and research.

- Greenhouse
- Classrooms
- Storage Building

EVALUATION METHODOLOGY

The following discussion provides a means for the NRHP evaluation of resources at TxDOT AVN's general aviation airports and builds upon information outlined in the Historic Context and Property Type sections of this report. The information provided in this methodology is based upon the National Park Service's publication entitled *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation*, which defines the standard criteria "by which every property that is nominated to the National Register is judged" (NPS 1991). In general, in order for a property to be eligible for listing in the NRHP, it must represent a significant aspect of history, architecture, archaeology, engineering, or culture of an area, and also possess the characteristics or integrity that make it a good representative of properties associated with that aspect of the past" (NPS 1991, 7). In other words, although every historic-age property exists within a context and has historic associations, in order to be eligible for listing in the NRHP the resource must demonstrate a **significant** association under one or more of the listed NRHP Criteria within its historic context. The resource must also be recognizable to its period of significance and retain the level of integrity necessary to convey that significance. Although properties may be preliminarily assessed while in the field, the final evaluation should be undertaken at the completion of field and research efforts and should follow a logical set of steps. These steps include:

- Categorize the property as district, site, building, structure, or object;
- Determine the prehistoric or historic context(s) that the property represents;
- Determine whether the property is significant under the National Register Criteria;
- Determine if the property represents a type usually excluded from the National Register; and
- Determine whether the property retains integrity

The below methodology provides that steps one should follow when assessing and evaluating the significance of resources with the TxDOT AVN general aviation system.

STEP 1: CATEGORIZE THE PROPERTY

The first step in the evaluation/assessment process is to categorize the type of property/resource that is targeted for study. Specifically, an NRHP-eligible resource may be a building, structure, object, site, or district. A building is defined as any man-made resource that was built to house human habitation or activity. Within the TxDOT general aviation system, buildings comprise the largest number of resources and examples include hangars, parachute buildings, and classrooms. Structures, on the other hand, are man-made, utilitarian resources that were not built to house human habitation/shelter. Property Types within the TxDOT general aviation that fall in this category are typically used for Infrastructural/Utilities (water tower, electrical substation, etc.) purposes. Objects are defined as portable resources that are either small-scale or artistic/commemorative in nature, such as historical markers. Sites are defined as locations of events, ruined buildings or structures, or areas that possess cultural, historic, or archaeological value, for example a cemetery. A district is a grouping of resources that are united "historically or aesthetically by plan or physical development" (NPS 1991, 5).

For example, the survey documented two hangars – one at Fort Worth Meacham International Airport and one at Big Spring McMahon Wrinkle Airport– and a terminal at Marshall-Harrison

County Airport. All three resources were identified as buildings based upon their use and overall form. The terminal building at Marshall, which was erected in 1953, was further identified as a Transportation/Air Facility property type/subtype. The hangar at Big Spring hangar, which was erected in 1942 at a former Army airfield, was identified as a Defense/Air Facility, while the hangar at Meacham, erected in 1933, was built for commercial passenger airliner American Airways and was therefore further categorized as a Transportation/Air Facility property type/subtype.

STEP 2: DETERMINE THE PREHISTORIC OR HISTORIC CONTEXT(S)

Step 2 includes an identification a property's associated theme(s), geographical limits, and chronological period to provide a perspective from which to evaluate the property's historical significance. Please note that historical themes/context are found at a local (town, city, regional, etc.), state, or national level. In the case of the current study, due to its state-specific theme – i.e. Texas Aviation – most contexts represent a state level. Based upon a sampling of TxDOT AVN general aviation airports and research efforts, this report identified a number of historic themes or contexts under which the significance of resources at TxDOT AVN general aviation facilities can be evaluated. As stated in this report's historic context, these historic themes/contexts can include:

- The birth of military and general aviation in Texas, 1910-1917
- World War I and its impact on aviation in Texas, 1917-1918
- The rise of civilian aviation in Texas, including the emergence of airmail, flight training, business travel, and commercial passenger service during the Interwar Period, 1919-1940
- The Interwar military buildup in the US and its impact upon the development of aviation in Texas, 1919-1940
- Depression Era New Deal work relief programs and their impact on the development of aviation facilities in Texas, 1933-1943
- World War II and its impact on aviation in Texas, 1941-1945
- Postwar industrial development at Texas general aviation facilities, 1945-1970
- The Postwar development within Texas general aviation facilities, 1945-1970
- Cold War military development in Texas and its impact on general aviation facilities, 1945-1991

In order to identify all associated contexts, it is necessary to first ascertain a property's function over time and the function of its associated airport. For example, an identified hangar that was built during World War II at a former Army airfield could be assessed under a Cold War context if it was subsequently repurposed to house a Cold War Era military activity. The resource should therefore be evaluated under its original World War II context and its later Cold War context.

STEP 3: APPLY NRHP CRITERIA FOR EVALUATION

Once a property has been categorized and its appropriate historic context(s) has been identified, the next step is to determine if the resource has significance within that historic context. When evaluated within its historic context, a property must be found to be significant within one or four

of the below-listed NRHP Criteria for Evaluation. These criteria are formally defined in the *Code of Federal Regulations (CFR), Title 36, Part 60* and include:

- **Criterion A:** Event – This criterion includes properties that are associated with events that have made a significant contribution to broad patterns of our history
- **Criterion B:** Person – This criterion includes properties that are associated with the lives of persons significant in our past
- **Criterion C:** Design/Construction – This criterion includes properties that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction
- **Criterion D:** Information Potential – This criterion includes properties that have yielded, or may be likely to yield, information important in prehistory or history.

If a property is determined to be significant under one or more of the above-listed criteria, its level of significance – local, state, or national – and area of significance should be ascertained. The level and areas of significance of a resource is typically based upon historic context and function. If found to be significant, resources at TxDOT AVN general aviation airports would most likely fall under one of the four following areas:

- Architecture
- Industry
- Military
- Transportation

At airports, often the most prominent resources are those buildings related to air operations such as hangars, terminal buildings, and air traffic control towers. At TxDOT AVN's airports, however, many of the identified resources in this category do not display a significant role within their associated historic context(s), represent serial plans/forms and display no particular architectural or engineering merit, and/or have suffered from alterations. Nevertheless, the survey did note a small number of noteworthy resources that represent significant historic themes and architectural design/construction. For example, the 1933 American Airways hangar at Fort Worth Meacham International Airport was recommended as eligible for listing in the NRHP under Criteria A and C at a state level in the area of Transportation and Architecture. The resource was not only determined to be a good representative of associated context – the rise of civilian aviation in Texas, including the emergence of airmail, flight training, business travel, and commercial passenger service during the Interwar Period, 1919-1940 – but it also remained as an excellent example of the Art Deco style. The building displayed an unusual level of workmanship applied to a utilitarian property type that typically relies upon standardized plans and display little decorative elaboration. The terminal building at Marshall-Harrison County Airport was recommended eligible under Criterion C at a local level in the area of Architecture. The resource, which was architect designed and displayed masonry exterior cladding, remained as an excellent

local example of postwar Modern architecture. The two remaining identified significant resources are hangars at Big Spring McMahon Wrinkle Airport and Port Isabel – Cameron County Municipal Airport. The resources were both recommended eligible under Criterion C at a local level in the area of Architecture. Although both are based upon a standard plan, they both display unique “Lamella” roofing systems and masonry construction with concrete buttressing.

Conversely other resources at TxDOT AVN general aviation airports can generally be assessed as ineligible because as a class they represent a ubiquitous property type that lacks significance within the overall theme of the development of general aviation in Texas. These resources include:

- Postwar-era prefabricated portable metal buildings
- T-hangars
- Visual navigation aids such as beacon towers, tetrahedrons, segmented circles, and windsocks
- Infrastructural Facilities/Utilities such as water towers , storage tanks, and electrical vaults
- Recreational fields and buildings

STEP 4: DETERMINE IF THE PROPERTY REPRESENTS A TYPE USUALLY EXCLUDED FROM THE NATIONAL REGISTER

There are certain properties that are not typically considered eligible for listing in the NRHP. These resources include religious properties, moved properties, birthplaces, graves, cemeteries, reconstructed properties, commemorative properties, or properties less than 50 years old. However, properties in these categories can be eligible if they meet special conditions called Criterion Considerations as well as one of the four Criteria for Eligibility and possess the necessary level of integrity. See *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation* for detailed discussion of the Criterion Considerations

STEP 5: DETERMINE WHETHER THE PROPERTY RETAINS INTEGRITY

Integrity is defined as a property’s ability to convey its significance and should be assessed after a property’s significance has been fully established. The following aspects combine to define integrity. In order to be eligible for the NRHP, a must be identified as historically and/or architecturally significant and must possess several if not most of these aspects.

- **Location** – The place were the property was originally constructed or where an historic event occurred
- **Design** – The combination of elements that create the form, plan, space, structure, and style of a property
- **Setting** – The physical environment of a historic property
- **Materials** – The physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property

- **Workmanship** – The physical evidence of the crafts of a particular culture or people during any given period in history or prehistory
- **Feeling** – The property's expression of the aesthetic or historic sense of a particular period of time
- **Association** – The direct link between an important historic event or person and a historic property

Once a property has been determined to be significant, it is necessary to identify its character-defining features and then determine the extent to which these features must be present in order for the resource to adequately express its significance. Once the character-defining features are identified, the resources should be compared with similar properties. Finally, based on the significance and identified essential character-defining features, the aspects of integrity that are particularly vital to the property should be identified. If a property retains the aspects of integrity deemed vital to its significance, then it should be recommended as eligible for listing. For example, a building that is determined to be NRHP eligible due to its unique workmanship, such as the two identified significant hangars at Big Spring McMahon Wrinkle Airport and Port Isabel – Cameron County Municipal Airport, should retain their integrity of Design, Materials, and Workmanship to a good degree.

In addition to assessing the significance of individual properties the current study looked for any potential historic districts within the targeted general aviation airports. Specifically, the survey looked for any cohesive collection of resources that remained as a good representative of one or more of the significant themes outlined in the historic context. However, due to changing functions of the airports over time and the addition of non-historic infill to accommodate these new functions, no significant groupings of resources were identified.

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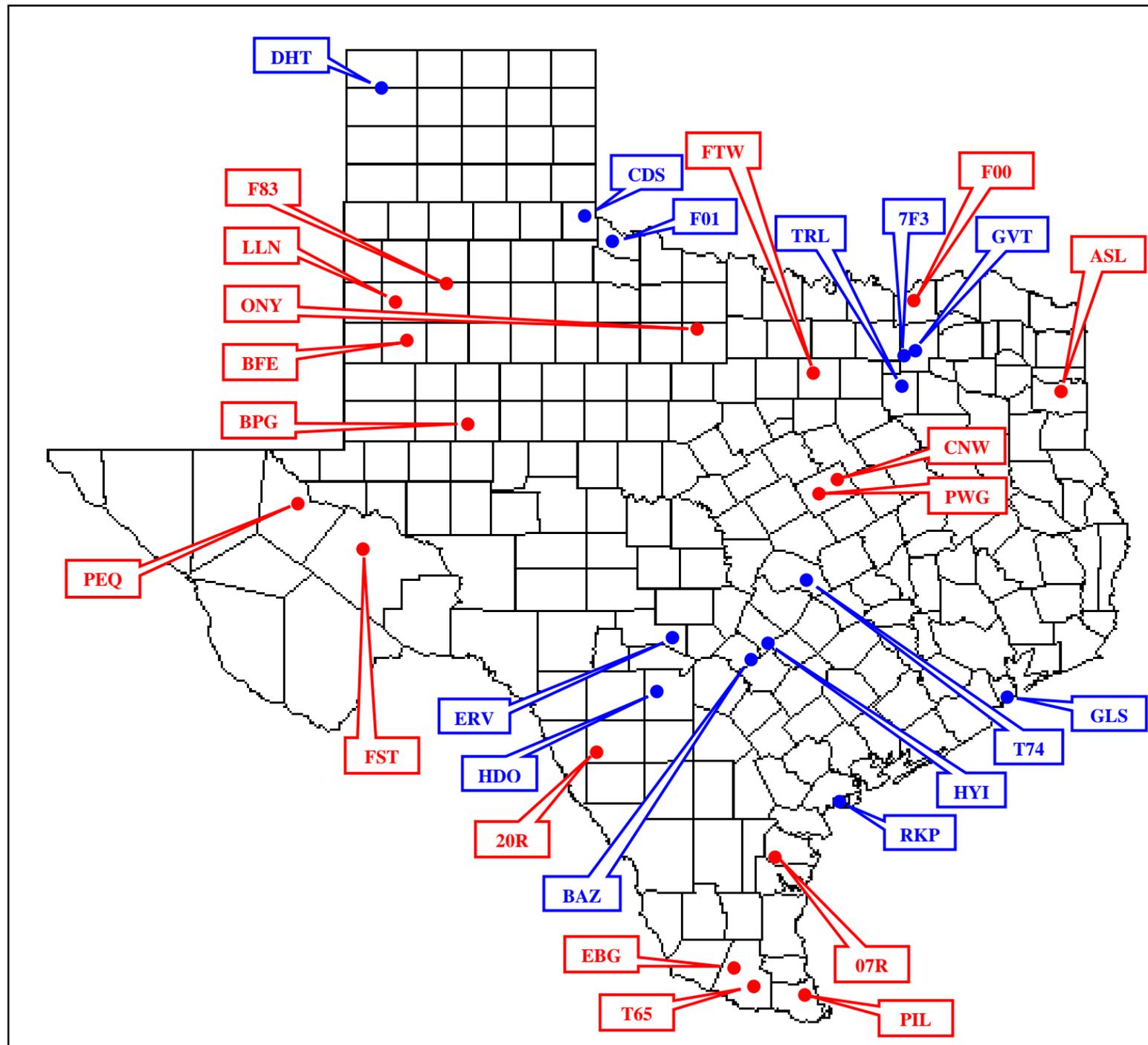
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APPENDIX A

Map and Table of Surveyed Texas General Aviation Airports



AIRPORT NAME	COUNTY	CODE
Abernathy Municipal	Hale	F83
Big Spring McMahon Wrinkle	Howard	BPG
Bishop Municipal	Nueces	07R
Bonham, Jones Field	Fannin	F00
Brownfield, Terry County	Terry	BFE
Caddo Mills Municipal	Hunt	7F3
Childress Municipal	Childress	CDS
Crystal City Municipal	Zavala	20R
Dalhart Municipal	Hartley	DHT
Edinburg International	Hidalgo	EBG
Fort Worth – Meacham International	Tarrant	FTW
Fort Stockton – Pecos County	Pecos	FST
Houston - Lone Star Executive	Harris	CXO
Galveston, Scholes International	Galveston	GLS
Greenville, Majors Field	Hunt	GVT
Hondo Municipal	Medina	HDO
Kerrville Municipal – Louis Schreiner Field	Kerr	ERV
La Porte Municipal	Harris	T41
Levelland Municipal	Hockley	LLN
Marshall, Harrison County	Harrison	ASL
New Braunfels Municipal	Comal	BAZ
Olney Municipal	Young	ONY
Palacios Municipal	Matagorda	PSX
Pecos Municipal	Reeves	PEQ
Port Isabel – Cameron county	Cameron	PIL
Quanah Municipal	Hardeman	F01
Rockport, Aransas County	Aransas	RKP
San Marcos Municipal	Hays	HYI
Taylor Municipal	Williamson	T74
Terrell Municipal	Kaufman	TRL
Waco – McGregor Municipal	McLennan	PWG
Waco – TSTC	McLennan	CNW
Weslaco – Mid Valley	Hidalgo	T65

Appendix A. Locations of 33 Texas airports surveyed in Phases One (blue) and Two (red). Map adapted from Cartography website of the University of Indiana.

APPENDIX B

Functional Identification Guide

HANGARS

Hangars can be categorized as defense, transportation or industry property types, depending on their original function. Their primary role is to create interior space for airplanes, but some larger hangars can have lean-tos attached for administrative, maintenance, storage or human services facilities. They may have wood, reinforced concrete, or steel frames and have a wide range of roof shapes. They can be walled and roofed with a variety of materials, including sheet metal, asbestos tile, wood and masonry. Large hangars most often have horizontal-sliding doors flanked on both sides by storage pockets. Less frequently seen are hangars with tilt-up/pivot doors. Windows, when present, are typically metal-sash industrial units. Fixed glazing is often found in the sliding doors, while other fenestration is operable. Smaller T-hangars are generally sheathed in sheet metal, have no windows and are divided into spaces for individual airplanes, as opposed to the single open expanse of a larger hangar.



A transportation/air-related 1922 Art Deco hangar at Fort Worth – Meacham (FTW).



Defense/air facility 1942 hangar at Big Spring Municipal Airport (BGP) with concrete frame.



A defense/ air facility circa 1945 hangar with lean-tos at Waco TSTC (CNW).



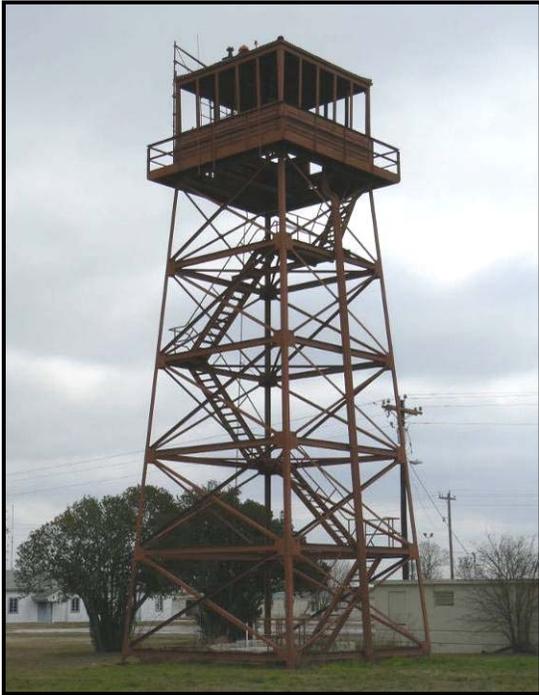
An industry/manufacturing circa 1960 sheet metal-hanger at Kerrville Municipal Airport (ERV).



A transportation/air-related circa 1965 sheet metal T-hanger at Rockport-Aransas County (RKP).

CONTROL TOWERS

Control towers house the equipment that airport personnel use to monitor and direct airplane traffic within and near an airfield. In plan, control towers are typically rectangular and rise several stories in height in order to provide clear views of aircraft on the ground and in the air. Control towers can be steel-frame, standard mobilization type structures or more permanent masonry construction. Exterior walls, if present, are clad with metal panels or concrete. A staircase that is located within the base of the structure leads to the uppermost story, which contains the building's control room. The control room is typically octagonal, rectangular, or circular, with a window wall and observation deck to allow for 360-degree views. Control towers are either freestanding or, often times, are attached to base operations/terminal buildings. They can be defense or transportation property types.



Defense/air facility circa 1940 steel control tower at San Marcos Municipal Airport (HYI).



Defense/air facility 1957 steel frame and sheet metal control tower at Big Spring (BPG).



Transportation/air-related 1968 control tower at Fort Worth-Meacham (FTW).

TERMINAL BUILDINGS

Terminal buildings are generally of the transportation type, having been built for civilian air travel purposes, but can be of the defense/air facility type as well. These buildings provide a waiting space for airport passengers. Some terminal buildings also house administrative functions and/or aircraft operations. Terminal buildings may have integrated towers, and these tend to be irregular in plan, and generally consist of a central one- or two-story mass with a multiple-story tower. Freestanding terminals are generally rectangular-plan resources but vary in size. Exterior walls are clad with a range of materials and are constructed from wood-, steel-, or concrete-frame. Some also utilize load-bearing masonry. Roofs are most often low slope and windows are typically steel-framed, and primary entrances are either metal or aluminum-frame doors. Typical alterations to terminal buildings include the replacement of original exterior doors and window units. A smaller number have had their original exterior cladding replaced. Some also have additions.



Defense/air-facility circa 1940 terminal building at Waco-McGregor (PWG).



Transportation/air-related 1950 terminal building at Galveston (GLS).



Transportation/air-related 1953 terminal with integrated control tower at Harrison County Airport in Marshall (ASL).



Transportation/air-related 1967 terminal building at Fort-Worth-Meacham (FTW), replaced original defense/air facility terminal with integrated control tower.

VISUAL NAVIGATION AIDS

These structures include tetrahedrons, segmented circles and beacon towers, and can be classified as defense, transportation or industry property types, depending on when and by whom they were erected. These visual navigational aids were commonly located on the airport flight line. A tetrahedron, which indicates wind direction, is typically a metal frame tetrahedron that is clad with sheet metal and mounted to a metal base atop a concrete footing. Segmented circles indicate both wind direction and speed and include a canvas or nylon windsock affixed to a metal pole and surrounded by circle of concrete segments, easily visible from the air. Beacons towers, which are used to guide planes to the runway, are typically composed of a single metal pole that is topped with a rotating light beacon. These structures are of similar design across airports, many are no longer in use and are not usually historically significant.



Defense/air-related 1942 tetrahedron at Hondo Municipal Airport (HDO), no longer in use.



Circa 1970 transportation/air-related beacon tower at Crystal City (20R).



Transportation/air-related circa 1970 segmented circle at San Marcos Municipal Airport (HYI).

TRAINING FACILITIES

Training facilities can be classrooms, laboratories, firing/target ranges, etc. and may be associated with the military or an educational institution. These sites often house specialized training equipment. A classroom building can include lecture halls or rooms that are used for instructional training. Many of the defense-type buildings were constructed during the World War II era and were based upon standardized plans, so training facilities in this category are generally similar in appearance and typically, one-story, rectangular-plan structures that utilize wood-frame construction. Roofs are flat or gabled and exterior walls are clad typically with asbestos shingles, brick veneer, or ribbed steel panels. Later education-type facilities come in a variety of forms and materials. Firing/target ranges include an open field with shooting targets and some include open-air shelters that consist of a metal roof atop metal poles and/or small wood-frame or concrete block, flat- or gabled-roofed buildings.



Defense/air facility 1942-1943 Link Trainer building at Palacios (PSX).



Educational/college circa 1965 classroom building at Waco TSTC (CNW).



Defense/air facility circa 1960 pistol range with shelter at Big Spring (BPG).

ADMINISTRATIVE BUILDINGS

Administrative buildings are those resources that were originally erected to house offices and administrative functions that support the day-to-day operation of military-type or transportation-type airfield facilities. Due to the general nature these functions, the buildings in this category can vary greatly in appearance and scale. However, these resources tend to be single- or multi-story, rectangular-plan buildings that utilize either wood-frame or masonry construction. Roofs are flat, hipped, or gabled and exterior walls are clad with ribbed steel, stucco, brick, asbestos shingles, or concrete block. Exterior doorways are most often aluminum-frame paired storefront doors and windows are typically fixed metal-sash units. Most often these buildings are located off the flight line near the entrance of the facility. As they are used for administrative tasks or office space, they are often divided into individual rooms on the interior.



Defense/air facility circa 1945 administration building at San Marcos Municipal Airport (HYI).



Defense/air facility 1960 office building at Big Spring (BPG) in International style.



Industry/defense related 1960 administration building at Greenville Municipal Airport (GVT).



Defense/air facility circa 1965 administration building at Palacios (PSX), occasionally serving as a terminal building.

MAINTENANCE AND SERVICE SHOPS

This category includes buildings and structures that are used to maintain and service aircraft. These resources can be categorized as defense, transportation or industry property types, depending on their original function. They are utilitarian buildings that are typically rectangular in plan and can be constructed with a wood or metal frame or concrete masonry units. The buildings' interior spaces typically include large open spaces that house specialized production equipment. Windows, if present, are typically fixed metal-frame units. While some of these resources have the hangar form, if they are specified as shops by their function, they should be categorized as such.



Transportation/air-related 1956 maintenance shop at Fort Worth-Meacham (FTW).



Defense/air facility 1961 approach and moor organizational shop at Big Spring (BPG).



Industry/defense-related 1965 fiberglass shop at Greenville Municipal Airport (GVT).

STORAGE FACILITIES

Warehouses, sheds and bunkers are some common storage facilities found at municipal airports. They fall under a variety of property types, including defense, transportation, industry, education and agriculture and are auxiliary utilitarian buildings that were erected to store/house equipment or materials. This resource's primary interior space is typically a large open room. They are typically a single story building with limited, if any, fenestration, but doors range from a single man-door or hinged, overhead, or horizontal-sliding doors to provide larger openings. Wood, metal and concrete framing are used in conjunction with wood and metal sheathing, or the whole building can be constructed of poured concrete.



Circa 1930 agricultural property type moved to Quannah Municipal Airport (F01) for use as storage building.



Defense property type World War II munitions storage bunkers near Port Isabel-Cameron County Airport (PIL).



Defense/air-related circa 1945 warehouse at Scholes Field, Galveston (GLS).

ARMORIES

Armories at TxDOT AVN airports are Army National Guard buildings that house administrative, training, storage, and maintenance activities in support of the guard's mission. They are based upon standardized plans and are steel- or concrete-frame buildings with concrete slab foundations. The buildings are either irregular or rectangular in plan and are typically composed of a central two-story mass that is flanked by lower one-story wings. Roofs are flat or shallow gabled and exterior walls are most often clad with a brick veneer. Windows are aluminum-sash fixed units and doors are either paired or single aluminum-frame storefront entries. Auxiliary buildings serve secondary storage functions. These resources are typically small, one-story utilitarian resources and often times are similar in use of materials and construction to their associated armory. Since they were not built or used for aviation related activities, armories are not to be categorized as military/air facilities, even though they occupy airport property.



Mid-1950s defense/military facility armory at Marshall (ASL).



Defense/military facility circa 1965 National Guard Armory at La Porte (T41).

DOMESTIC/HOUSING FACILITIES

Generally built by the military to house service people and their families, these resources may be single dwellings, enlisted personnel barracks and officers' quarters. A few non-defense housing facilities were found to have either pre-dated an airport's existence, or were moved to the grounds from elsewhere for non-domestic use. One-story barracks in this category were originally built to house enlisted men and are based upon a standard Series 700 mobilization plan developed by the Army during World War II. These rectangular, wood-frame buildings are front-gabled with pier-and-beam foundations. Exterior walls are may be clad with wood, synthetic, or ribbed steel siding. The building's primary entrance is a single hinged door that is centrally-located on the front façade and windows are either aluminum- or wood-sash units. As originally constructed, the building's interior space would have originally had a single open, un-partitioned room with a line of lockers running down the center. This category also includes two-story enlisted men's barracks that are also based upon a standard mobilization plan. This dormitory-like building type utilizes wood-frame construction and rests atop a continuous concrete perimeter beam with interior piers. The building's shallow side-gabled roof has slightly-overhanging, boxed eaves. Other housing includes detached, single-story, single-family and multiple-family homes that were most likely funded by the Capehart-Wherry program of the 1950s and 1960s. The single-family dwellings are wood-frame, ranch-plan homes with side-gabled roofs and concrete slab foundations. Exterior walls are clad with synthetic siding and windows are non-historic, aluminum-frame units.



Domestic property type pre-dating the airport at Kerrville (ERV), now used for administration.



Defense/air-related 1942 barracks at Hondo Municipal Airport (HDO)



Defense/air-related circa 1955 barracks at Big Spring Municipal Airport (BPG)



Defense/air-related 1960 bachelor officers' quarters at Hondo Municipal Airport (HDO)

HUMAN SERVICES BUILDING

These facilities include restaurants, kitchens, hospitals, police and fire stations and exchange/service stations. Resources in this grouping are public buildings that can fulfill support roles within defense, transportation and industrial property type facilities by providing health and human services. These buildings most commonly utilize masonry, wood-frame, or steel-frame construction, and have concrete slab-on-grade or pier-and-beam foundations. Roofs are gabled, gambrel, hipped, or shed and exterior walls display a range of different materials including stucco, concrete block, synthetic siding, and brick. Windows are typically non-historic, fixed aluminum-frame units and exterior entrances are generally aluminum-frame store front entries with either single or paired hinged doors.



Defense/air-facility 1942 former military hospital at Fort Stockton (FST).



Defense/air facility circa 1965 concrete-block air police station and confinement facility at Waco TSTC (CNW).



Transportation/air-related 1970 café at Dalhart Municipal Airport (DAL).

INFRASTRUCTURE

This functional category includes a group of infrastructural buildings and structures that provide underlying support to the day-to-day operations at the airports, whether it is for military, transportation or industrial use. The buildings in this category are utilitarian in nature, lacking particular exterior decorative detailing or elaboration. These resources are typically one-story, rectangular-plan buildings that are constructed of masonry or metal and rest atop concrete slab foundations. Roofs are most often flat and exterior walls are concrete (poured or block) or sheet metal. These utility buildings house specialized equipment and are not meant for human habitation and therefore most often lack windows. The structures in this grouping include water towers, tanks, culverts, drainage, bulk overhead water loader, and telephone control junction boxes. Culverts are typically concrete or metal pipe culverts or concrete box culverts with concrete head- and wing-walls. Additional components within the drainage systems at airports include concrete and metal drains and grates, valves. Water towers and water tanks are circular structures that are used to store water. Tanks are most often constructed of riveted steel panels and rest directly on a concrete footing on grade while the majority of water towers are composed of a water tank that is elevated on a steel base or tower. A smaller number of are water towers are monolithic cylindrical concrete tanks on concrete footings that sit directly at grade.



Defense/air-related circa 1940 poured concrete water tower at Greenville Municipal Airport (GVT).



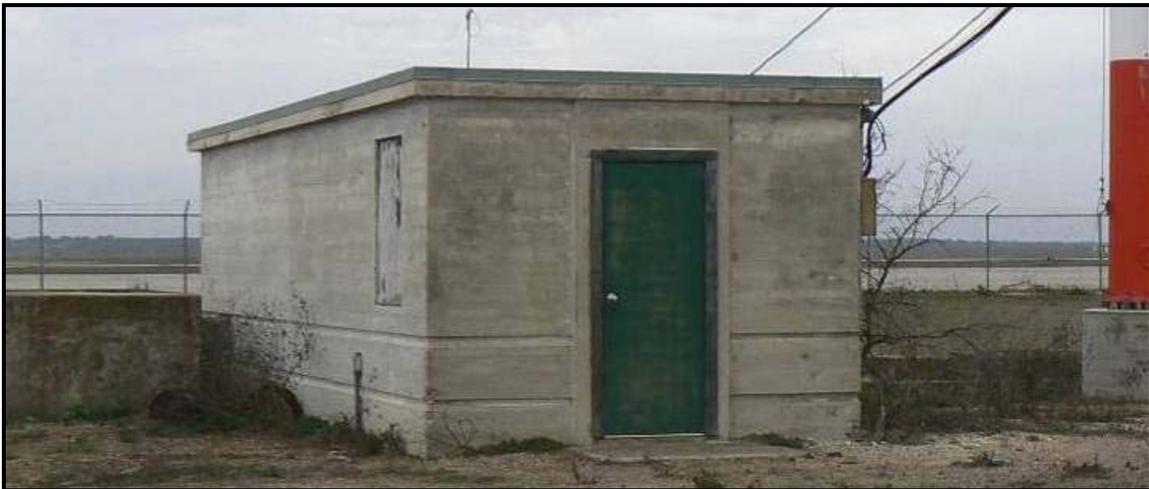
Transportation/road-related circa 1945 drainage system component at Weslaco-Midvalley Airport (T65).



Defense/air-facility circa 1945 holding tank at Waco-TSTC (CNW), part of a water treatment plant.



Industry/defense related 1953 mechanical room at Greenville (GVT).



Defense/air facility circa 1960 poured concrete electrical vault at Hondo Municipal Airport (HDO).

RECREATION FACILITIES

Airport property can be home to a variety of recreational facilities. They may have been built by the military for the entertainment of the troops, making them defense property types or created after the property was released from the federal government to utilize the land. The dancehall and recreation hall resources within this category typically date from the World War II era and are likely based upon a standardized plan. Most often they are wood-frame, one-story building featuring asbestos shingle or non-historic ribbed metal exterior wall cladding and wood-sash, single-hung window units. Golf courses, parks, sports fields and skeet ranges are recreational fields that are themselves resources, but may include support buildings such as restrooms and clubhouses. They are generally modest utilitarian buildings constructed from masonry or wood with concrete block, hollow clay tile, asbestos shingle, or wood siding and have gabled, hipped, or shed roofs. Non-historic, aluminum-frame fixed units have replaced the buildings' original windows. Many firing ranges also provide open-air shelters that consist of a metal roof atop metal poles or small wood-frame or masonry, flat- or gabled-roof buildings.



Defense/air-related 1942 dancehall at Hondo Municipal Airport (HDO, with one wing demolished).



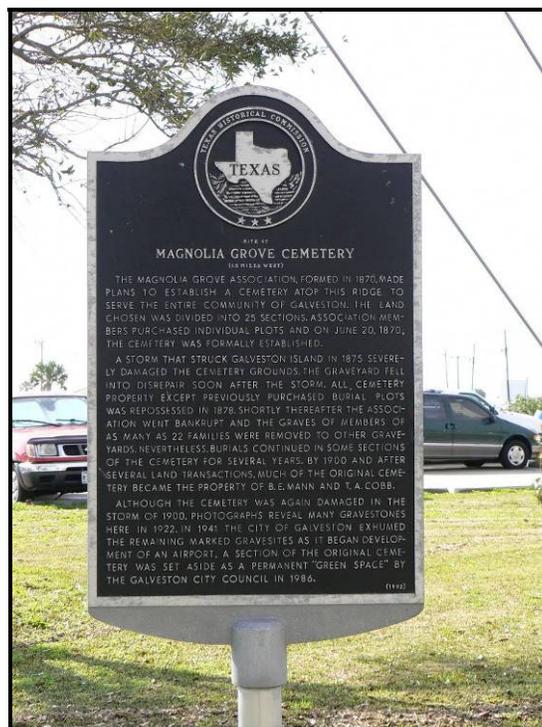
Recreation property type circa 1960 football field at Caddo Mills Municipal Airport (7F3).



Defense/air facility 1969 gun club/skeet range concrete pathways at Big Spring (BPG).

COMMEMORATIVE

Official State Historical Markers, National Register of Historic Places plaques, other commemorative designations and static airplane displays may be found on airport property and should be documented.



OSHM at Scholes Field, Galveston (GLS), commemorating Magnolia Grove Cemetery.



Transportation/air-related circa 1965 airplane on display at the Lone Star flight Museum at Scholes Field, Galveston (GLS).

OTHER

A variety of unusual resources have been identified and documented on municipal airport properties, including the former site of a cemetery, a military detention facility swimming pool, and historic landscapes. Again, these should be classified by property type according to the date they were constructed and by whom.



Former site of 1870 Magnolia Grove Cemetery (a funerary property type) at Scholes Field at Galveston (GLS).



Defense/military facility 1942 internment camp swimming pool at Crystal City (20R).



Defense/air-facility landscaped palm allée from circa 1950 at Palacios (PSX)

APPENDIX C
Sample Survey Form

APPENDIX D

Relevant Federal and State Enabling Legislation

RELEVANT FEDERAL AND STATE ENABLING LEGISLATION

Beginning in 1911, the federal government, realizing the growing importance of the airplane for both civilian and military uses, initiated efforts to oversee aviation activities. Over time, this legislation has played a significant role in the development of aviation in the United States. These laws impact all aspects aviation, including licensing, safety enforcement, funding, airport layout, etc. The following is a brief outline of major legislation, both federal and state, that has impacted the development of aviation in Texas and is based upon information found in Lopez Garcia Group's *Texas General Aviation Context* (DeFreece et al. 2006, 27-34). An expanded discussion of this information can be found in the Lopez Garcia report.

Federal Agencies and Legislation

- 1911 – U.S. War Department allocated \$125,000.00 for the development of aviation
- 1915 – National Advisory Committee for Aeronautics (NACA) was created as the first federal governmental body to oversee aviation.
- 1916 – Congress passes the National Defense Act, which allocated \$13, 281,660.00 for the development of aviation in the US.
- 1917 – The Aircraft Production Board was created with the primary purpose of organizing aircraft production during World War I.
- 1919 – The Airways Section of the Army Air Service was established and charged with overseeing the development of civilian airfields.
- 1925 – Congress passes the Air Mail Act, which allowed commercial carriers to receive contracts from the government to carry mail.
- 1926 – Congress passes the Air Commerce Act to give the federal government the power to regulate civilian aviation. The act also created the Aeronautics Branch of the Department of Commerce.
- 1926 – Congress passed the Air Corps Act, which proposed to increase the nation's armed forces by 1931.
- 1933 – The Federal Emergency Relief Act (FERA) and the Civil Works Administration (CWA) created to provide federal funding to municipal airports for the improvement of inadequate facilities.
- 1934 –The Aeronautics Branch of the Department of Commerce was renamed the Bureau of Air Commerce and charged with establishing emergency landing fields across the US. The bureau was also given the authority to oversee all air traffic control (ATC).
- 1935 – The Work Projects Administration (WPA) was established. The agency provided federal funding and manpower for airport improvements, both civilian and military.
- 1938 – Civil Aeronautic Act transferred all federal civil aviation responsibilities from the Department of Commerce and the Post Office to the newly created Civil Aeronautics Authority (CAA).
- 1940 – Civil Aeronautics Authority was split into two agencies; the Civil Aeronautics Administration (CAA) and the Civil Aeronautics Board (CAB). The CAA was responsible for the air traffic control, licensing, safety, and airway development while the CAB was responsible for safety rulemaking, accident investigations, and economic regulation of the airlines.

- 1940 – Congress established the Development of Landing Areas for National Defense (DLAND) program, administered by the WPA, which determined of the nation’s existing airports would receive federal funding for improvement.
- 1944 – The National Airport Plan was submitted to Congress. The plan recommended that \$1,250,000.00 be allocated for the construction of new airports and the improvement of existing aviation facilities. The CAA was also charged with overseeing the implementation of the plan and the allocation of federal funds for the improvement and construction of aviation facilities.
- 1946 – The Federal Airport Act was passed and provided aid for municipal airports through the Federal Aid for Airports Program (FAAP). The FAAP, which was overseen by the CAA, expired in 1969.
- 1958 – The Federal Aviation Act was passed and created the Federal Aviation Agency, which supplanted the CAA. The FAA was charged with overseeing safety through the development and maintenance of a common civil-military system of air navigation. The management of ATC also fell under the agency.
- 1966 – Congress created the Department of Transportation (DOT). The Federal Aviation Agency was placed under the umbrella of the DOT and renamed the Federal Aviation Administration (FAA). The FAA was charged with aviation security and noise regulation.
- 1970 – The Airport and Airway Development Act (ADAP) supplanted the FAAP and provided federal aid to municipal airports.
- 1978 – Congress passed the Airline Deregulation Act, which allowed commercial airlines rather than the government to set rates and flight schedules, service to a number of smaller population

State Agencies and Legislation

- 1945 – The Texas Aeronautics Commission was established under the Texas Aeronautics Act to encourage and assist in the development of aeronautics in Texas.
- 1961 – The Texas Aeronautics Commission responsibilities were given the additional responsibility to oversee the acquisition of land for aeronautical purposes and to certify air carriers in Texas.
- 1965 – The Texas Aeronautics Act was amended and charged the Texas Aeronautics Commission with the responsibility to provide grants available for local governments to for airport development and capital projects.
- 1989 – The Texas Aeronautics Commission was replaced by the Texas Department of Aviation, the new department had greater federal authority and appropriated for non-reliever general aviation airports.
- 1991 – The Texas Department of Aviation was placed under TxDOT’s umbrella and renamed the Aviation Division (AVN).