





Topeka Regional Airport

AIRPORT MASTER PLAN
FINAL









AIRPORT MASTER PLAN
for
Topeka Regional Airport
Topeka, Kansas

Prepared for
The Metropolitan Topeka Airport Authority (MTAA)
By
Coffman Associates, Inc.

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FINAL
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Topeka Regional Airport

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www.coffmanassociates.com

KANSAS CITY
(816) 524-3500

237 N.W. Blue Parkway
Suite 100
Lee's Summit, MO 64063

PHOENIX
(602) 993-6999

4835 E. Cactus Road
Suite 235
Scottsdale, AZ 85254

Topeka Regional Airport

Introduction







INTRODUCTION

The Federal Aviaon Administraon (FAA) recommends that airports update their long term planning documents every seven to 10 years, or as necessary to address local changes at the airport. The last master plan update for Topeka Regional Airport was completed in 2003. The Metropolitan Topeka Airport Authority (MTAA) has received a grant from the FAA to update the airport Master Plan. The FAA grant covers 90 percent of the fixed fee project cost with MTAA providing a ten percent match.

Following federal guidelines for consultant selecon based on qualificaons, MTAA selected Coffman Associates, a naonal aviaon planning firm, to undertake the Master Plan Update. A er project scope negoa ons and an independent review of study costs, a contract was approved by MTAA in August 2015.

The study is designed to provide guidance for future development and provide updated jusfic aon for projects for which the airport may request funding parcipa on through federal and state airport improvement programs. Coffman Associates is an airport consulng firm that specializes in master planning and environmental studies. Coffman Associates has worked for numerous airports in the FAA's Central Region, including Kansas.

The Airport Master Plan Update will be prepared in accordance with FAA requirements, including Advisory Circular (AC) 150/5300-13A, Airport Design (as amended), and AC 150/5070-6C, Airport Master Plans (as amended). The scope of services, budget, and schedule was approved by MTAA, following review by the FAA.







Topeka Regional Airport is a general aviation facility, as defined by the FAA, which is intended to serve the aviation needs of the community. The Airport is included in the FAA's *National Plan of Integrated Airport Systems* (NPIAS). As such, the Airport is eligible for federal development grants. MTAA owns and operates the Airport, which is located approximately seven miles south of the central business district of Topeka, Kansas. The Airport is home to approximately 18 based civilian aircraft and 20 military aircraft. Services and facilities available include: hangar storage, tie-downs, fixed base operator (FBO) services, flight instruction, aircraft maintenance, and fueling. The Airport encompasses approximately 2,854 acres of land.

The Airport provides two intersecting runways. Runway 13-31 is 12,803 feet long and 200 feet wide and serves as the primary runway. Runway 3-21 is 7,001 feet long and 150 feet wide and serves as the crosswind runway. The primary runway is constructed of grooved concrete and the crosswind runway is constructed of grooved asphalt.

MASTER PLAN OBJECTIVES

The overall objective of the Airport Master Plan Update is to provide the sponsor with guidance for future development of the Airport, meeting the needs of existing and future users, while also being compatible with the environment. The most recent planning effort related to the Airport is the 2003 Airport Master Plan. This Airport Master Plan Update will identify and provide justification for new priorities. This plan will be closely coordinated with other existing and on-going planning studies in the area, and with aviation plans developed by the FAA and the state. Specific objectives of the study include:

- Research factors likely to affect air transportation demand in the Topeka area over the next 20 years and develop new operational and basing forecasts.
- Determine projected needs of airport users as it relates to the airside (runways, taxiways, etc.) and the landside facilities (hangar layout and mix).
- Recommend improvements that will enhance the airport's ability to satisfy future aviation needs.
- Establish a schedule of development priorities and a financial program for implementation and analyze potential funding sources, consistent with FAA planning.
- Provide specific recommendations for aviation and non-aviation related land uses on airport property and review existing or proposed land use, economic development, and zoning documents to ensure future compatibility with off-airport development.
- Develop active and productive public involvement throughout the planning process.

MASTER PLAN ELEMENTS AND PROCESS

To achieve the objectives described above, the Airport Master Plan Update is prepared in a systematic fashion pursuant to the scope of services that was coordinated with the airport sponsor and the FAA. The study has nine elements:

1.0 **Study Initiation and Organization** - Development of the scope of services, budget, and schedule. A kickoff meeting will be held with the planning advisory committee (PAC), comprised of various airport stakeholders, at the study's initiation to obtain a more comprehensive understanding of local issues.

2.0 **Inventory** - Inventory of facility and operational data, wind data, environmental data, population and economic data, airport financial data, and new aerial photography and mapping. All of the inventory data is organized as draft Chapter One.

3.0 **Forecasts** - Forecasts for based aircraft, operations, and peaking characteristics of the airport over a 20-year period. The forecasts are organized into draft Chapter Two. The forecasts are delivered to the FAA for review and approval.

4.0 **Demand Capacity/Facility Requirements** - After establishing the critical design aircraft and physical planning criteria, airport needs will be developed for airside and landside facilities. The facility requirements are organized into draft Chapter Three. The first three chapters are distributed to the PAC and the material is also presented at a meeting.

5.0 **Airport Development Alternatives** - Potential airside and landside alternatives are developed for meeting long-term needs. Each of the alternatives is subjected to engineering and environmental analysis and summarized in draft Chapter Four. Draft Chapter Four is distributed to the PAC and the material is also presented at a meeting.

6.0 **Airport Layout Plans and Land Use Compatibility** - Airport layout plans (ALPs) (the technical drawings) are developed to depict existing and proposed facilities. The drawing set is developed to meet the requirements of FAA Standard Operating Procedures 2.0 for the ALP. In addition, noise exposure contours are developed for existing and future conditions to determine the extent of critical noise exposure in the airport vicinity. An environmental overview utilizing guidelines provided in the *National Environmental Policy Act* (NEPA) is included. Land use plans are developed to identify the recommended highest and best use of airport property.

7.0 **Financial Management and Development Program** - A 20-year capital improvement program that is phased over time to various demand milestones is developed. Cost estimates for each project are developed in current (2015) dollars. A second public information workshop is held at this stage to encourage citizens to participate in the master plan process.

8.0 **Geographical Information Systems (GIS) Services –** This element involves the collection data to comply with table 2-1 of Advisory Circular 150/5300-18B, column Instrument Procedure Devel-

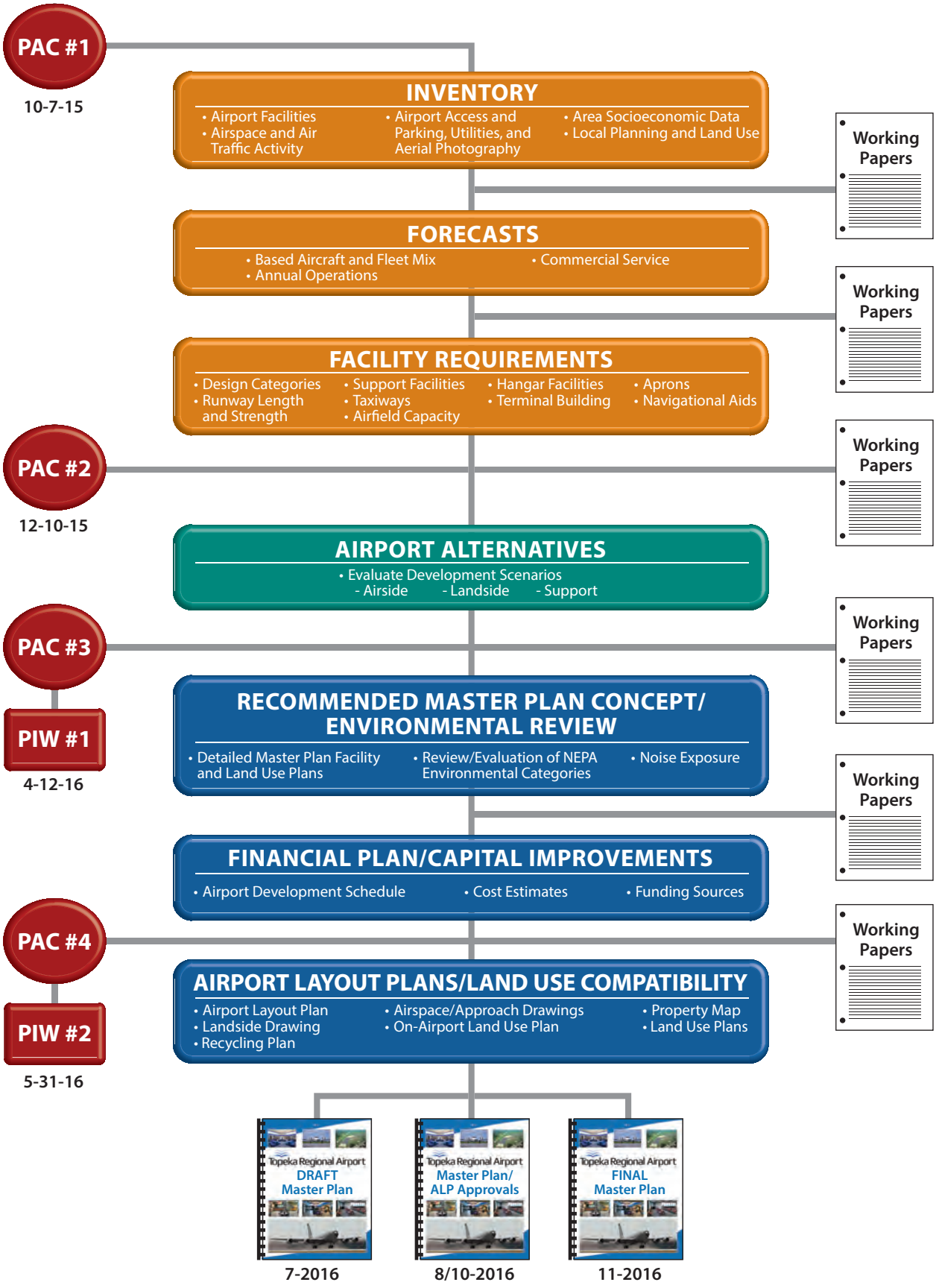
opment. The dataset is a high precision, digital model of the safety critical features of the airport as defined in 18B table 4-1. The process includes collection of high-resolution aerial photography, high precision surveys of safety critical airport data (runway ends, NAVAIDS, airport elevation, airspace, obstructions and others), and compilation of collected data into a uniform GIS dataset. A GIS dataset that meets the airport's needs and is acceptable to the FAA is the deliverable.

9.0 **Final Documentation and Public Workshop** – A draft final report is compiled that will include appropriate revisions suggested by the PAC and the public throughout the process. The draft report is utilized during the sponsor approval process. A final report includes any remaining minor updates. An executive summary is developed as well.

STUDY COORDINATION

The study process includes local participation through the formation of a PAC. The PAC consists of federal, state, and local agencies, airport tenants, and other airport stakeholders. The airport sponsor determines the final makeup of the committee. The PAC meets three times to discuss draft working papers. A kickoff meeting will be held on October 7, 2015, during the initial inventory process. All study materials are made available on-line for the duration of the study.

Two "open-house" public information workshops are held to present the preliminary findings and to solicit public comment. **Exhibit IA** presents the key study elements, meeting intervals, project schedule, and documentation for the Airport Master Plan Update.


PAC #1
10-7-15
INVENTORY
• Airport Facilities
• Airspace and Air Traffic Activity
• Airport Access and Parking, Utilities, and Aerial Photography
• Area Socioeconomic Data
• Local Planning and Land Use
Working Papers
FORECASTS
• Based Aircraft and Fleet Mix
• Annual Operations
• Commercial Service
Working Papers
FACILITY REQUIREMENTS
• Design Categories
• Runway Length and Strength
• Support Facilities
• Taxiways
• Airfield Capacity
• Hangar Facilities
• Terminal Building
• Aprons
• Navigational Aids
Working Papers
PAC #2
12-10-15
AIRPORT ALTERNATIVES
• Evaluate Development Scenarios
- Airside - Landside - Support
Working Papers
PAC #3
PIW #1
4-12-16
RECOMMENDED MASTER PLAN CONCEPT/ ENVIRONMENTAL REVIEW
• Detailed Master Plan Facility and Land Use Plans
• Review/Evaluation of NEPA Environmental Categories
• Noise Exposure
Working Papers
FINANCIAL PLAN/CAPITAL IMPROVEMENTS
• Airport Development Schedule
• Cost Estimates
• Funding Sources
Working Papers
PAC #4
PIW #2
5-31-16
AIRPORT LAYOUT PLANS/LAND USE COMPATIBILITY
• Airport Layout Plan
• Landside Drawing
• Recycling Plan
• Airspace/Approach Drawings
• On-Airport Land Use Plan
• Property Map
• Land Use Plans
Topeka Regional Airport DRAFT Master Plan
7-2016
Topeka Regional Airport Master Plan/ ALP Approvals
8/10-2016
Topeka Regional Airport FINAL Master Plan
11-2016

Topeka Regional Airport

CHAPTER ONE
Inventory







CHAPTER ONE
Inventory

The ini. al step in the preparation of the master plan update for Topeka Regional Airport (Airport) is the collection of information pertaining directly to or influencing the Airport and the area it serves. The information summarized in this chapter will be used in subsequent analyses within this study and includes:

- Background information related to the Topeka region, including descriptions of the local geography, regional climate, and surface transportation systems.
- Physical inventories and descriptions of current facilities and services offered at the Airport. The analysis will include airfield and landside infrastructure and services, as well as local and regional airspace, competing airport facilities, air traffic control, and aircraft operating procedures.
- Topeka Regional Airport's role in regional, state, and national aviation systems. Development at the Airport since the completion of the previous master plan will also be discussed.
- Socioeconomic data, including population, employment, and income activity sectors will be analyzed. These sectors typically offer an indication of future trends that could influence commercial and general aviation activity at the Airport.







- A review of existing local and regional plans and studies which will be utilized later in the process to determine their potential influence on the development and implementation of the Airport Master Plan.

- Review of existing environmental conditions and sensitivities, on or near the Airport, so as to be factored in the recommended development plan.

The information outlined in this chapter provides a foundation for all subsequent chapters. Much of the information was obtained through on-site inspections of the Airport and personal interviews with airport staff and tenants, including the Kansas National Guard units based at the Airport. Information was also obtained from outside resources, including documents prepared by the Federal Aviation Administration (FAA), Kansas Department of Transportation – Division of Aviation, City of Topeka, Shawnee County, and other pertinent regional planning and economic agencies.

REGIONAL SETTING



The City of Topeka was incorporated February 17, 1857. The State of Kansas was admitted to the Union as the 34th state in 1861 and Topeka was designated as the state capital. Topeka is located along the banks of the Kansas River and it served as an important river crossing for migrants following the Oregon Trail in the early 1800s.

In 2010, the U.S. Census indicated there were approximately 127,000 residents. The Topeka metropolitan statistical area (MSA), which includes Shawnee, Jackson, Jefferson, Osage, and Wabaunsee Counties, had a 2010 population of approximately 234,000 people. Topeka is located in northeast Kansas and is approximately 70 miles to the west of Kansas City.

AIRPORT HISTORY

Congress authorized the construction of a military airport in Topeka in December 1941. In August 1942, the Topeka Army Air Field (TAAF) was activated and became home to the 333rd Bombardment Group. By 1945, TAAF was one of three B-29 centers where newly transitioned crews took off for the Pacific to aid in the anticipated assault on the Japanese home islands. Two years after the end of the war, the TAAF was deactivated. It was reopened in 1948 as Forbes Air Force Base only to be closed again in late 1949. As the Cold War heated up, the facility was reactivated in 1951 under the Strategic Air Command to train heavy bomber crews. From 1961 to 1965, Forbes AFB was home to the 548th Strategic Missile Squadron. From the mid-1960s to the early 1970s, Forbes AFB was home to the 838th Air Division (Tactical Air Command – TAC) and the 313th Tactical Airlift Wing (TAC). The base was deactivated in October

1973 and closed in 1975. The Metropolitan Topeka Airport Authority (MTAA) was created in 1974 to oversee the transition of most of the airport facilities to the City of Topeka. Portions on the north and south sides of the airport were retained by the United States Air Force. The north end is "licensed" to the Air National Guard (ANG). On the south end, the Air Force has "permitted" to the Army which has "licensed" to the Army National Guard (ARNG). In 1978, airport operations were transferred to the MTAA.



Following transfer of the facilities, all commercial service was relocated from Philip Billard Municipal Airport to Forbes Field. In 1976, Frontier Airlines offered the first passenger jet service. A new terminal building was opened in 1985 to support continued growth in commercial service. Up until 2003, the Airport benefitted from the Essential Air Service (EAS) program that provided federal subsidies to certain communities to support commercial service. The EAS rules would not allow for continued subsidies if the cost per passenger became greater than $200 per passenger for communities within 210 miles of a large or medium hub airport (Kansas City International is a medium hub located 71 miles away). Since 2003, the availability of commercial service has been intermittent. Most recently, United Express provided two daily departures to Chicago's O'Hare International Airport between January and September 2014. There has not been regularly scheduled commercial service since United Express discontinued service.

In 2012, the MTAA Board of Directors renamed the facility to Topeka Regional Airport and Business Center, maintaining the name of the airfield as Forbes Field. The Airport is currently home of the Kansas Air National Guard's 190 Air Refueling Wing (KC-135 aircraft) and the 1st Battalion of the 108th Aviation Regiment Kansas Army National Guard (Black Hawk helicopters).

Recent Airport Development

The FAA has continued to support development and maintenance of the Airport primarily through the Airport Improvement Program. Since 1999 (time of the last master planning grant), the Airport has accepted nearly $14.7 million in grants from the FAA. Through these grants, the Airport has updated its fleet of maintenance, snow removal, and airport rescue and firefighting equipment. Several primary pavement areas have been rehabilitated, including the taxiways and terminal aprons. Currently, the Airport has begun a multi-year project to reconstruct primary Runway 13-31. Funding for this project is a cooperative effort between the Airport (and FAA) and the National Guard. The FAA is funding that portion of the runway length eligible based on civilian activity and the National Guard is funding the

additional length and the overall strengthening of the runway. **Table 1A** presents the federal grants received since the last master plan.

TABLE 1A
Federal Development Grants Since 2000
Topeka Regional Airport

Year	Project	Grant Amount	Project Amount
03/12/99	GRANT 13 - Airport Master Plan Update	$102,780	$114,200
02/18/99	GRANT 14 - FOD Sweeper Truck Acquisition	$84,849	$94,277
08/14/01	GRANT 15 - Taxiway A Rehab	$698,944	$776,604
07/01/03	GRANT 16 - Taxiway C Rehab	$766,871	$852,079
05/20/04	GRANT 17 - SCBA Equipment Acquisition	$113,931	$126,590
03/18/04	GRANT 18 - Taxiway A&D Rehab	$862,691	$958,546
05/17/05	GRANT 19 - ARFF Truck Acquisition	$677,368	$713,019
04/18/05	GRANT 20 - Additional Taxiway A&D Rehab	$41,272	$43,444
08/15/06	GRANT 21 - Design Taxiway B Rehab	$66,332	$69,823
04/05/07	GRANT 22 - Construct Taxiway B Rehab	$1,067,877	$1,124,081
05/20/08	GRANT 23 - Terminal Apron Rehab Ph1	$1,068,031	$1,124,243
08/18/08	GRANT 24 - Terminal Apron Rehab Ph2	$359,694	$378,625
02/23/09	GRANT 25 - SRE Acquisition	$388,031	$408,454
09/15/09	GRANT 26 - SRE Acquisition	$482,584	$507,983
09/13/10	GRANT 27 - HIRL On Runway 13-31	$974,148	$1,025,419
08/31/11	GRANT 28 - SRE Acquisition	$166,672	$175,444
04/20/13	GRANT 29 - Design Runway 3-21 Rehab	$106,238	$118,042
08/08/12	GRANT 30 - SRE Acquisition	$945,695	$1,050,772
03/19/14	GRANT 30 - SRE Acquisition	$97,920	$108,800
09/12/12	GRANT 31 - Runway 13-31 Survey/Emergency Repair	$112,599	$125,110
07/24/13	GRANT 32 - Construction Runway 13-31 Rehab	$4,018,560	$4,752,292
09/14/14	GRANT 33 - Design Runway 13-31 Reconstruction	$1,053,756	$1,170,885
08/13/15	GRANT 34 - Airport Master Plan Update	$397,795	$442,194
TOTAL		**$14,654,638**	**$16,260,927**

Source: Airport Records

AIRPORT ADMINISTRATION

The Topeka Regional Airport is a public use facility owned and operated by the MTAA. The MTAA is a quasi-governmental body in that it has taxing authority and is charged with operating its assets (which includes Philip Billard Municipal Airport) in accordance with various regulations.

The MTAA was created by Charter Ordinance in 1974 in order to provide direct and professional operation and oversight of both airports. MTAA gains its statutory authority from Kansas Statutes Annotated (K.S.A. 27.327) which permits the creation of an airport authority for the purpose of maintaining public airports.

MTAA is governed by a five-member board of directors. Three members shall be registered voters and city residents who are appointed by the mayor with the approval of the city council. Two members shall

be Shawnee County residents residing outside the Topeka city limits and appointed by the county commission. Members shall serve three-year terms, but no more than three consecutive terms.

MTAA employs a professional staff, including a President/Executive Director responsible for day-to-day operations of the two airports and the Business Center. There are a total of 39 employees. **Exhibit 1A** shows the MTAA organizational chart as of 2015.

AIRPORT LOCATION AND ACCESS

Airports are a significant part of the national transportation infrastructure. Other modes of transportation can work in synergy with airports to promote access and economic development and they can also compete with airports for users. The following discussion presents information related to the various transportation modes available in the area.

Topeka Regional Airport is located seven miles to the south of the central business district of the City of Topeka. The facility encompasses approximately 2,463 acres and it is at an elevation of 1,078 feet above mean sea level (MSL). Primary access to the Airport is from SW Topeka Boulevard from which there are several entrances. **Exhibit 1B** shows the location of the Airport.

Highways

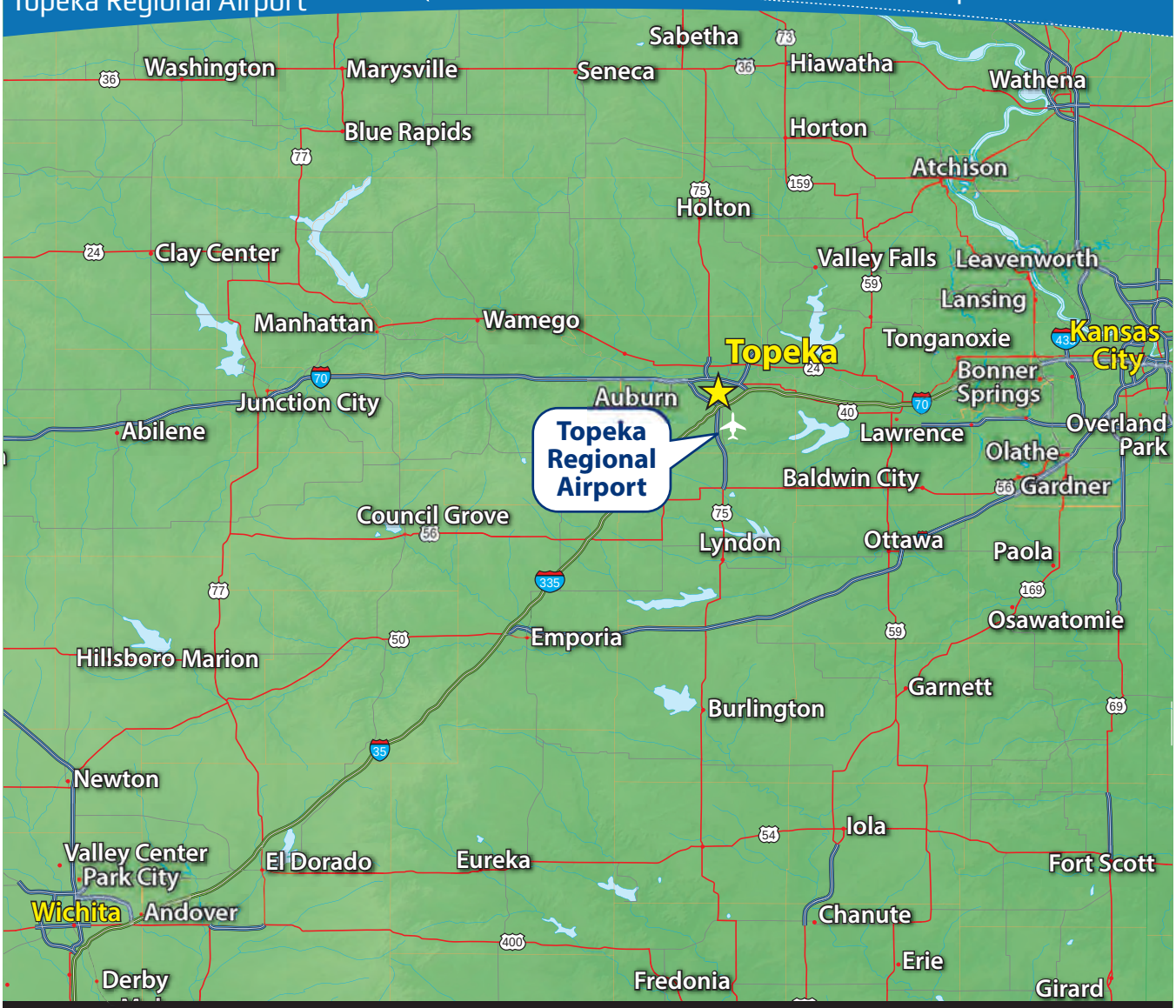
The airport is within close proximity to the surface transportation system. SW Topeka Boulevard connects to Interstate 470 approximately two miles to the north. Interstate 70 extends east/west across the country and is a major transportation route. Interstate 335 (the Kansas Turnpike), which extends from Topeka southwest to Wichita where it becomes Interstate 35 and continues south to Dallas and terminates at Laredo, Texas, is also readily accessible from the Airport.

Rail

Topeka is served by Amtrak, the national passenger rail service. The station is located at 500 SE Holliday Place in Topeka, approximately three miles from the Airport. The *Southwest Chief* makes a daily stop in Topeka.

Topeka also provides freight rail services. The Union Pacific and Burlington Northern-Santa Fe (BNSF) lines converge in downtown Topeka. The Union Pacific lines extend to the east and on the north bank of the Kansas River. The BNSF line extends on the south bank of the Kansas River to the east. Both lines extend to the west coast. BNSF has a line that extends from downtown Topeka, south to Emporia. This line is on the west side of SW Topeka Boulevard and is in close proximity to Topeka Regional Airport. At one time, a spur from this rail line entered the Topeka Business Center; however, current rail access for industrial facilities is located west of SW Topeka Boulevard, across from the Airport.


METROPOLITAN TOPEKA AIRPORT AUTHORITY (MTAA) BOARD OF DIRECTORS
ATTORNEY
PRESIDENT/AIRPORT MANAGER
OPERATIONS OPERATIONS OFFICER/ASC
ADMINISTRATION DIRECTOR OF ADMINISTRATION AND FINANCE
POLICE & FIRE DEPT CHIEF OF POLICE
MAINTENANCE DEPARTMENT
LEASING/ PROPERTY MANAGER
ELECTRICAL INSPECTION AND FIRE TRAINING OFFICER
OPERATIONS/TRAINING OFFICER (CAPTAIN)
ASSISTANT DIRECTOR OF MAINTENANCE
HR SPECIALIST/ ACCOUNTING ASSISTANT
DISPATCH
24-HOUR SHIFTS
MAINTENANCE 3
MAINTENANCE 3
MAINTENANCE 3
MAINTENANCE 3
MAINTENANCE 3
MAINTENANCE 2
MAINTENANCE 2
MAINTENANCE 1
MAINTENANCE 1
MAINTENANCE 1
1st SHIFT DISPATCHER
2nd SHIFT DISPATCHER
3rd SHIFT DISPATCHER
FLOATING DISPATCHER
PART-TIME DISPATCHER
SHIFT A SUPERVISOR (LIEUTENANT)
SHIFT B SUPERVISOR (LIEUTENANT)
SHIFT C SUPERVISOR (LIEUTENANT)
ASSISTANT SUPERVISOR (SERGEANT)
ASSISTANT SUPERVISOR (SERGEANT)
ASSISTANT SUPERVISOR (SERGEANT)
POLICE/ FIRE OFFICER 2
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POLICE/ FIRE OFFICER 1
POLICE/ FIRE OFFICER 1



LOCATION / VICINITY



Public Transit System

The Topeka Metropolitan Transit Service provides public transit services in Topeka (bus service). Two of the bus routes, the Washburn and Indiana routes, extend south to 42st Street, approximately 2.5 miles north of the Airport.

Long-distance bus service is provided by Greyhound. There is a terminal station at 600 Southeast Quincy Street, in downtown Topeka. There are several taxi cab and limousine service companies available in Topeka as well. Consideration is currently being given to a new bus route that would extend to the Airport.

REGIONAL CLIMATE

Weather conditions are important to the planning and development of an airport. Temperature is an important factor in determining runway length requirements, while wind direction and speed are used to determine optimum runway orientation. The need for navigational aids and lighting is determined by the percentage of time that visibility is impaired due to cloud coverage or other conditions.

Topeka lies in the transition between a humid continental and humid subtropical climate, with hot, somewhat humid summers and cool to cold and fairly dry winters. Over the course of a year, the monthly daily average temperature ranges from 29.7 degrees Fahrenheit (F) in January to 79.0 degrees in July. The maximum temperature reaches 90 degrees an average of 41.5 days per year and reaches 100 degrees an average of 3.5 days per year. The minimum temperature falls below zero degrees an average of four nights per year, and there are 21 days per year that stay below freezing. The average window for freezing temperatures is October 15 through April 17.

The area receives nearly 39 inches of precipitation during an average year, with the largest share being received in May and June; the April through June period averages 33 days of measurable precipitation. Generally, the spring and summer months have the most rainfall, with autumn and winter being fairly dry. During a typical year, the total amount of precipitation may be anywhere from 25 to 47 inches. Much of the rainfall is delivered by thunderstorms. These can be severe, producing frequent lightning, large hail, and sometimes tornadoes. There is an average of 100 days of measurable precipitation per year. Winter snowfall is light, as is the case in most of the state, as a result of the dry, sunny weather patterns that dominate Kansas winters, which do not allow for sufficient moisture for significant snowfall. Winter snowfall averages 21.2 inches. Measurable (≥ 0.1 inch) snowfall occurs an average of 12.9 days per year, with at least one inch of snow being received on five of those days.

Table 1B lists common climate data for Topeka, Kansas. Information pertaining to temperature and precipitation were obtained from the National Oceanic and Atmospheric Administration (NOAA), while the wind speed, percent of time in instrument and visual flight rule conditions, and sky clear data was pulled from the automated surface observation service (ASOS). Visual flight rule (VFR) conditions are those when the pilot is allowed to fly with visual reference having a minimum of three miles visibility

and at least 1,000-foot cloud ceilings. Instrument flight rule (IFR) conditions are those times where either visibility or cloud heights fall below VFR conditions.

TABLE 1B
Historic Climate Data
Topeka, Kansas

Period	Average Precipitation (in.)[1]	Normal Daily Max Temp (F) (in.)[1]	Average Snowfall (in.)[2]	Average Wind Speed (mph)[2]	Percent IFR[3]	Percent VFR[3]	Sky Clear[3]
January	0.9	39.3	5.7	9.6	20.8	79.2	54.2
February	1.27	44.5	4.5	10.2	21.1	79.0	48.2
March	2.58	56.1	3.5	11.5	15.6	84.4	51.7
April	3.76	66.4	1.0	11.8	13.1	86.9	53.9
May	5.13	75.4	0.2	10.0	10.2	89.8	57.3
June	5.77	84.1	0.0	9.5	7.4	92.6	69.3
July	4.12	90.0	0.0	8.2	6.9	93.1	76.6
August	4.79	88.8	0.0	8.0	8.3	91.7	74.2
September	4.11	80.1	0.0	8.5	13.6	86.4	63.9
October	3.11	67.2	0.3	8.9	10.8	89.2	61.4
November	2.07	54.2	1.0	9.7	10.8	89.2	65.1
December	1.34	40.9	5.0	9.6	25.3	74.7	47.5
Total	***38.95***	***65.6***	***21.2***	***9.6***	***13.66***	***86.35***	***60.28***

[1] Source: [1]National Oceanic and Atmospheric Administration (NOAA) -Climatography of the United States No. 81 (30-years of data from 1981-2010) as sourced from Topeka Regional Airport automated surface observing system (ASOS)
[2] *Source: www.city-data.com.*
[3]*Source: On-Airport ASOS via 106,762 total observations; Data Range: 2005-2014*
KEY:
In. – Inches
MPH – Miles per hour
F – Degrees Fahrenheit
IFR – Instrument Flight Rules
VFR – Visual Flight Rules

AIRPORT SYSTEM PLANNING ROLE

Airport planning exists on many levels: national, state, and local. Each level has a different emphasis and purpose. On the national level, the Topeka Regional Airport is included in the *National Plan of Integrated Airport Systems* (NPIAS). On the regional and state levels, the airport is included in the *Kansas Airport Systems Plan* (2009). The most recent local planning document is the Airport Master Plan, which was last updated in 2003.

FEDERAL AIRPORT PLANNING

The role of the federal government in the development of airports cannot be overstated. Many of the nation's existing airports were either initially constructed by the federal government or their development and maintenance was partially funded through various federal grant-in-aid programs to local communities. The system of airports existing today is due, in large part, to the existence of federal policy that promotes the development of civil aviation. As part of a continuing effort to develop a national

airport system to meet the needs of civil aviation and promote air commerce, the United States Congress has continually maintained a national plan for the development and maintenance of airports.

On the national level, the Topeka Regional Airport is included in the NPIAS as a general aviation airport. The NPIAS identifies 3,331 existing airports which are considered significant to the national air transportation system. The NPIAS is published and used by the FAA in administering the Airport Improvement Program (AIP), which is the source of federal funds for airport improvement projects across the country. The AIP program is funded exclusively by user fees and user taxes, such as those on fuel and airline tickets. The 2015-2019 NPIAS estimates that $33.5 billion worth of needed airport improvements are eligible for AIP funding across the country over the next five years. An airport must be included in the NPIAS to be eligible for federal funding assistance through the AIP.

The NPIAS supports the FAA's strategic goals for safety, system efficiency, and environmental compatibility by identifying specific airport improvements. The current issue of the NPIAS identifies approximately $34.3 million in development needs at Topeka Regional Airport for the five-year planning horizon. This figure is not a guarantee of federal funding; instead, this figure represents development needs as presented to the FAA by the airport administration in the annual airport capital improvement program. Of the $33.5 billion in airport development needs identified by the NPIAS nationally, approximately 38 percent, or $12.7 billion, is proposed for the 2,942 non-primary general aviation airports.

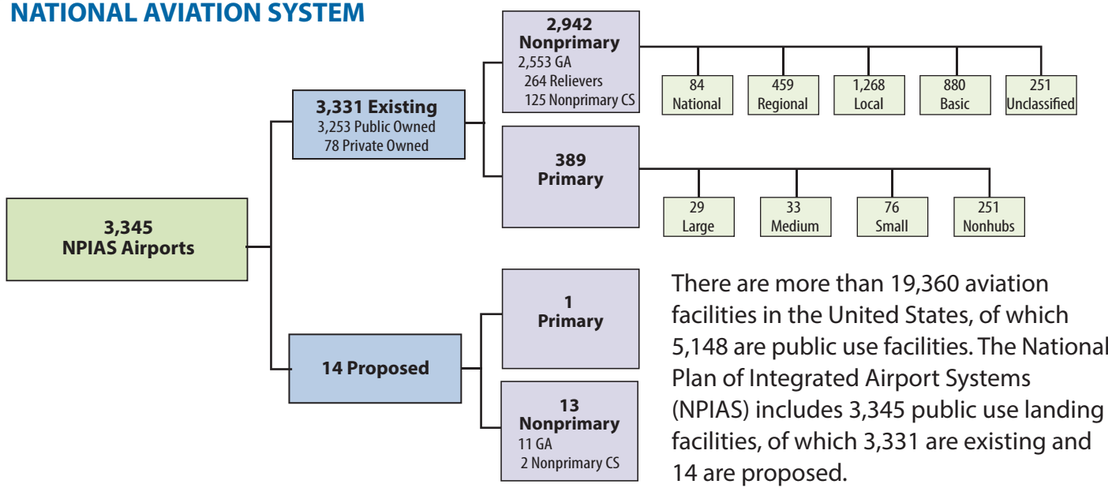
Airports that apply for and accept AIP grants must adhere to various grant assurances. These assurances include maintaining the airport facility safely and efficiently in accordance with specific conditions. The duration of the assurances depends on the type of airport, the useful life of the facility being developed, and other factors. Typically, the useful life for an airport development project is a minimum of 20 years. Thus, when an airport accepts AIP grants, they are obligated to maintain that facility in accordance with FAA standards for at least that long.

In an effort to distinguish the important and varied roles that general aviation airports serve, the FAA has completed two top-down reviews of the existing network of general aviation facilities included in the NPIAS. The results of these efforts are contained in the May 2012 report entitled, *General Aviation Airports: A National Asset,* and the March 2014 report entitled, *ASSET 2: In-Depth Review of 497 Unclassified Airports*. The purpose of the report is to further classify general aviation airports into four categories: national, regional, local, and basic airports. Of the 2,942 general aviation airports included in the study, 251 are currently unclassified due to types of activity and characteristics that did not provide for clear classification within one of the four groups. **Exhibit 1C** summarizes the composition of the National Airspace System, as well as the general aviation classifications and functions.

With this report, which has been integrated into the NPIAS, the FAA is recognizing the important contribution that general aviation airports provide to the national aviation system and economy. General aviation contributed $38.8 billion in economic output in 2009. When factoring in manufacturing and visitor expenditures, general aviation accounted for an economic contribution of $76.5 billion.

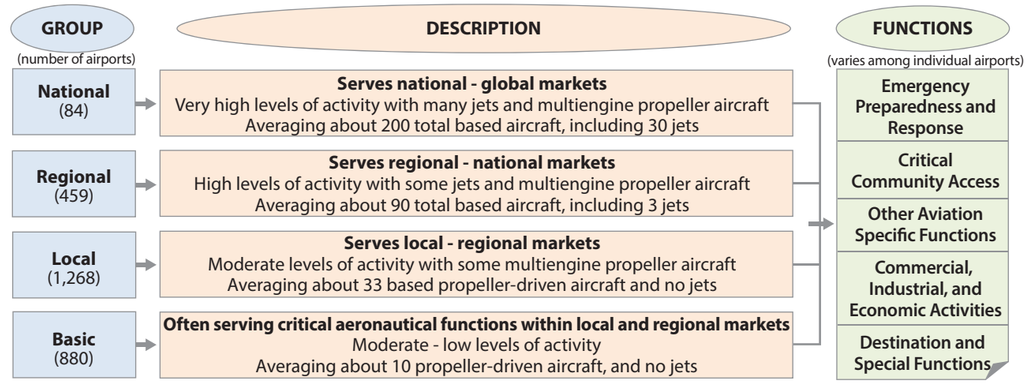
The new categories for general aviation airports are intended to help guide policymakers when making decisions regarding airports. The study recognized that categorizing all general aviation airports the

NATIONAL AVIATION SYSTEM

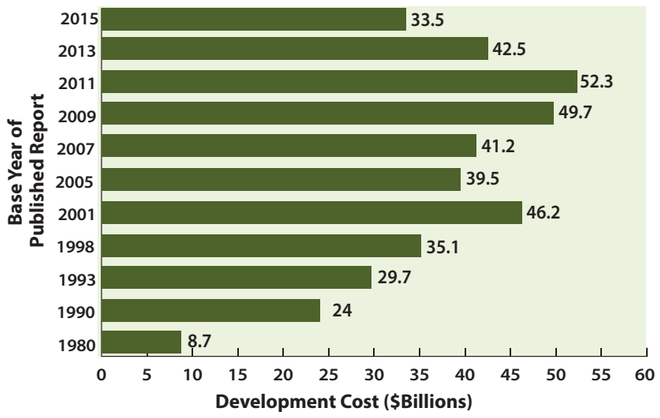


There are more than 19,360 aviation facilities in the United States, of which 5,148 are public use facilities. The National Plan of Integrated Airport Systems (NPIAS) includes 3,345 public use landing facilities, of which 3,331 are existing and 14 are proposed.

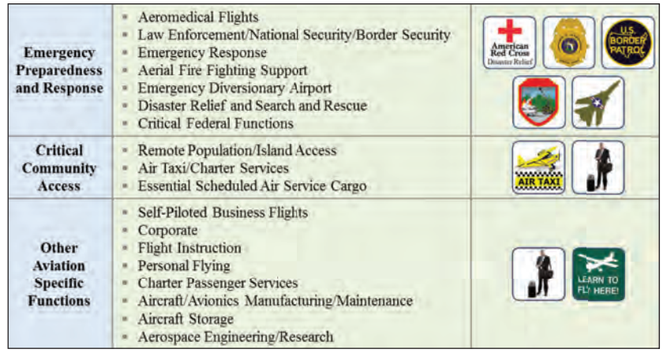
GENERAL AVIATION AIRPORTS



The FAA has further categorized non-primary airports to help guide policy makers when making decisions regarding airport development. An additional 251 airports are currently unclassified.

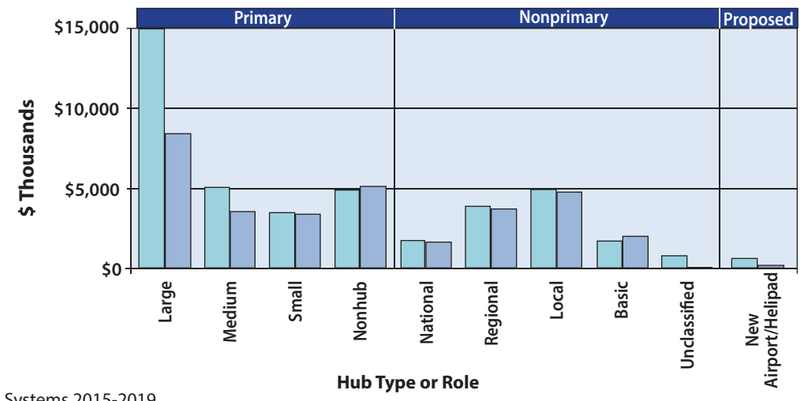


The FAA estimates that over the next five years, (2015-2019), there will be $33.5 billion of airport infrastructure projects eligible for Airport Improvement Program (AIP) funding.



General aviation airports provide important services for both local communities and the national aviation system.

The 389 primary airports account for 12% of the airports and 62% of the total development costs. The 2,939 non-primary airports account for 88% of the airports and 38% of total development costs.



Source: National Plan of Integrated Airport Systems 2015-2019

Airports in the non-primary categories account for $12.7 billion of the $33.5 billion in identified development need over the next five years.

Category	National	Regional	Local	Basic	Unclassified	Total
Safety	$76	$74	$86	$30	$0	$267
Security	$67	$63	$115	$76	$0	$321
Reconstruction	$572	$1,333	$1,578	$650	$1	$4,133
Standards	$769	$1,880	$2,740	$1,277	$2	$6,669
Environmental	$7	$11	$22	$11	$0	$52
Noise	$40	$23	$4	$0	$0	$67
Capacity	$150	$218	$180	$73	$0	$621
Terminal	$30	$44	$63	$19	$0	$155
Access	$36	$105	$88	$30	$0	$259
Other	$4	$29	$59	$37	$0	$130
New Airport	$0	$0	$0	$0	$0	$217
Total	**$1,752**	**$3,781**	**$4,935**	**$2,204**	**$3**	**$12,675**
Percentage	**5.2%**	**11.3%**	**14.7%**	**6.6%**	**0.0%**	**38%**

Source: General Aviation Airports: A National Asset (May 2012)

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same did not properly identify the important role of each airport within a community and the benefits of a large and diverse aviation system.

Topeka Regional Airport is categorized as one of the 459 "Regional" general aviation facilities. According to the NPIAS, "Regional" general aviation airports support regional economies by connecting communities to regional and national markets. These airports have high levels of activity with some jets and multiengine propeller aircraft. These airports average about 90 total based aircraft, including three jets.

These airports are located near larger population centers with many operations extending across state lines but typically within the region. According to the original asset study, regional airports account for 37 percent of total flying at general aviation airports and 42 percent of flying with flight plans. There is typically a substantial amount of charter (air taxi), jet flying, and helicopter flights at regional airports. Nearly all of the regional airports support air ambulance services (as does Topeka Regional Airport). Approximately 11 percent have limited scheduled commercial service.

The NPIAS also includes an anticipated airport designation for the five-year timeframe. Topeka Regional Airport is currently projected to transition to a primary commercial service airport by 2020. Primary commercial service airports report a minimum of 10,000 annual enplanements. At the time the 2015-2019 NPIAS was drafted, United Airlines was still providing regional service to Chicago and more than 8,000 enplanements were reported. Since that time, scheduled commercial service has been discontinued.

REGIONAL SYSTEM PLANNING

In more urban locales with multiple airports, regional planning agencies may elect to develop a regional aviation system plan. The Metropolitan Topeka Planning Organization does not develop a separate aviation plan but it does include an aviation element in its federally required long range transportation plan. The *2040 Long Range Transportation Plan Update,* adopted in 2012, includes an in-depth discussion of the facilities and services available at both Topeka Regional Airport and Philip Billard Municipal Airport.

STATE AIRPORT PLANNING

The primary aviation planning document for the State of Kansas is the *Kansas Airport System Plan* (2009 KASP). The plan provides the Kansas Department of Transportation's (KDOT) – Aviation Division staff with a tool to assess the needs of the state's airports; help justify funding for airport improvements; and provide information to airport sponsors and others concerning the value, use, and needs of the state's public use airports.

The 2009 KASP identified five roles for Kansas airports which are defined as follows:

Commercial Service Airports: These airports accommodate scheduled major/national or regional/commuter commercial air service.

Regional Airports: Airports that accommodate regional economic activities, connect the state and national economies, and serve all types of general aviation aircraft.

Business Airports: Airports that accommodate local business activities and general aviation users.

Community Airports: These airports serve a supplemental role in local economies, primarily serving smaller business, recreational, and personal flying.

Basic Airports: Airports that serve a limited role in the local economy, primarily serving recreational and personal flying.

Topeka Regional Airport is classified as a Commercial Service Airport in the 2009 KASP. The minimum facility and service requirements are listed in **Table 1C.** Also shown are the minimum criteria for Regional Airports, which could be considered the classification today since there is not currently scheduled commercial service. The airport layout and available services meet the minimum recommendations in the 2009 KASP for all criteria.

TABLE 1C
Minimum Facility and Service Criteria
KASP Airport Classifications

	Minimum Objective For:	
Airport Criteria	**Commercial Service Airport**	**Regional Airport**
Runway Length	5,500 feet	5,000 feet
Runway Width	100 feet	100 feet
Taxiway	Full Parallel	Full Parallel
Surface	Paved/All Weather Surface	Paved/All Weather Surface
Pavement Condition Index	70 or Greater	70 or Greater
Approach Capability	Precision	Near-Precision
Visual Aids	Beacon, Lighted Wind Sock, REILs, GVGI	Beacon, Lighted Wind Sock, REILs, GVGI
Lighting	MIRL/MITL	MIRL/MITL
Approach Lighting System	ALS	ALS Desired
Weather Aids	AWOS/ASOS/ATCT	AWOS/ASOS/ATCT
Planning Document	Security Plan, Snow Removal Plan	Security Plan, Snow Removal Plan
Services	Full Service FBO, Restrooms, Link to Ground Transportation, AvGas and Jet A Fuel	Limited Service FBO, Restrooms, Link to Ground Transportation, AvGas and Jet A Fuel
Facilities	Terminal with Pilot's Lounge Hangars: 100% of based Aircraft Apron: 100 feet x 100 feet Auto Parking	Terminal with Pilot's Lounge Hangars: 100% of based Aircraft Apron: 100 feet x 100 feet Auto Parking

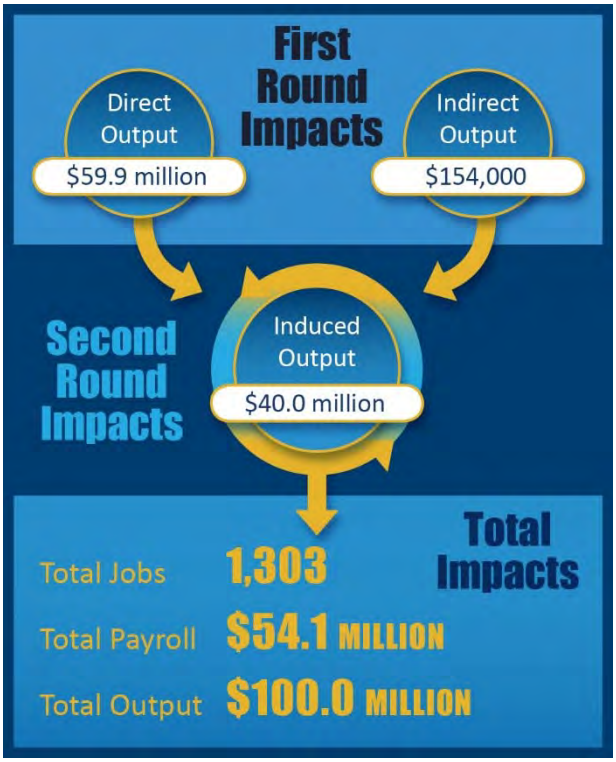
REIL: Runway End Identification Lights
GVGI: Ground-based Visual Glide Slope Indicator
ALS: Approach Lighting System
AWOS: Automated Weather Observing System
ASOS: Automated Surface Observing System
ATCT: Airport Traffic Control Tower
FBO: Fixed Base Operator
Source: 2009 Kansas Airport System Plan (KASP)

LOCAL AIRPORT PLANNING

The airport master plan is the primary local planning document. The master plan is intended to provide a 20-year vision for airport development based on aviation demand forecasts. The most recent update to the airport planning document is the 2003 Airport Master Plan. Over time, the forecast element of an airport master plan typically becomes less reliable due to changes in aviation activity and/or the economy. As a result, the FAA recommends that airports update their master plans every five to ten years, or as necessary to address any significant changes. Therefore, this is an appropriate time to update the airport master plan and revisit the development assumptions from the previous planning study.

ECONOMIC IMPACT

In August 2010, the Kansas Department of Transportation – Division of Aviation published the commissioned report, *Kansas Aviation Economic Impact Study*. The report identifies 140 public use airports in the state, of which eight provide commercial service and the remaining 132 are general aviation airports. In 2009, the base year for the study, the system of 140 airports supported approximately 47,651 jobs, generated $2.3 billion in annual payroll, and produced $10.4 billion in economic activity.



Topeka Regional Airport is included in the study as a regional general aviation airport. It is estimated that the Airport accounted for 1,303 jobs, $54.1 million in total payroll, and $100 million in total economic output. In addition, the 190th Air Refueling Wing estimated that their community wide economic impact in fiscal year 2015 was in excess of $119 million.

Foreign Trade Zone

Shawnee County, along with Douglas, Miami, Johnson, Wyandotte, and Leavenworth counties comprise the Alternative Site Framework (ASF) for the Greater Kansas City Foreign Trade Zone (FTZ). Businesses that locate in any of these counties are eligible to apply to the County for the benefits that the FTZ offers.

The FTZ is designated to promote international trade and offer companies and importers a way to gain a financial edge in the global marketplace. The benefits of operating a business in an FTZ are primarily the reduction or elimination of duties or excise taxes on goods imported into the U.S. At a minimum, a U.S. importer could store a shipment in the FTZ and gradually import only what is needed, and thereby improve the company's cash flow by spreading the import duty over a longer period of time.

AIRPORT PROPERTY

Topeka Regional Airport encompasses approximately 2,463 acres. The Airport owns avigation easements encompassing 876 acres immediately adjacent to the Airport. In addition, the Airport owns 234 acres of easement rights for property that is more distant from the Airport. This includes a tract at the location of the Riply outer-marker which is approximately five miles to the southeast of the Runway 13-31 extended centerline.

The Kansas Air National Guard (north end of the Airport) owns approximately 152 acres adjacent to Taxiway A. The Kansas Army National Guard (south end of the Airport) leases from the Air National Guard approximately 30 acres adjacent to Taxiway E.

In 2015, the FAA requested that the Airport update their Exhibit A Property Map. The Property Map for an Airport is important for securing FAA development grants, but it is also necessary in order to meet grant assurances associated with FAA development grants. **Exhibit 1D** shows the current Exhibit A Property Map.

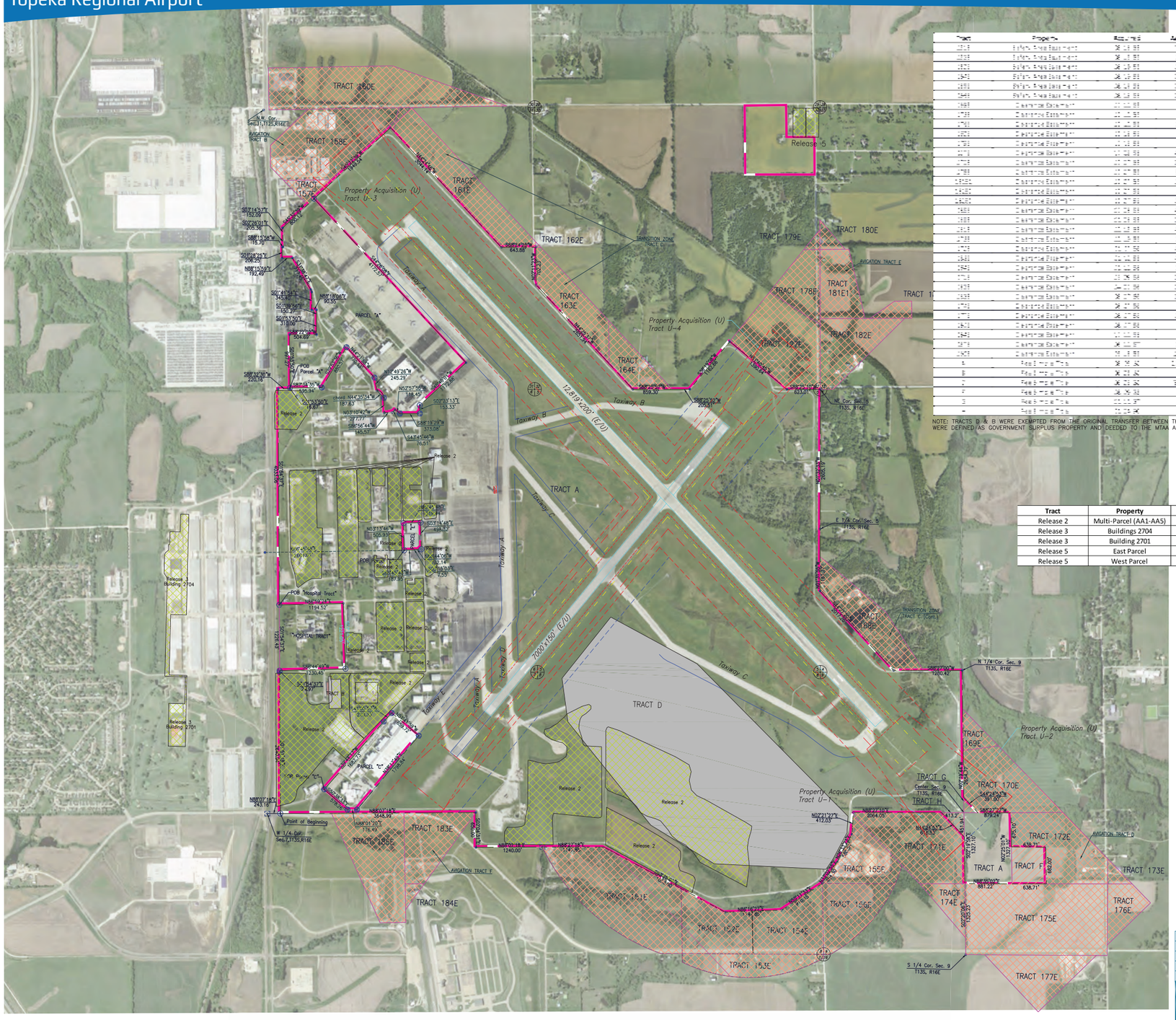
AREA LAND USE

Land uses in the vicinity of the Airport can have an impact on Airport operations and growth potential. The following section identifies baseline information relating to both existing and future land uses in the vicinity of Topeka Regional Airport. By understanding the land use issues surrounding the Airport, more appropriate recommendations can be made for the future of the Airport.

Exhibit 1E presents the current land uses in the vicinity of the airport. To the east is primarily agricultural lands with intermixed farm houses. To the north is agricultural lands and commercial lands adjacent SW Topeka Boulevard. To the west is industrial lands abutting SW Topeka Boulevard. There are two large neighborhoods to the west followed by agricultural lands. To the south is commercial property and agricultural property.

In 2012, the Metropolitan Topeka Planning Organization adopted the Long Range Transportation Plan. As shown on **Exhibit 1F**, the plan includes both current and future land use plans. The future land use plan categorized land uses in the Airport. Land to the west is primarily residential, to the south and east is primarily industrial. The land surrounding the Kansas River to the north and east is planned to remain open space. The airport is planned to remain a quazi-governmental land use as it continues to operate as an airport.

In January of 2016, the Shawnee County Commissioners released a Request for Proposal for a planning consultant to develop a Shawnee County Comprehensive Plan (Comp Plan). The Comp Plan is to cover unincorporated Shawnee County which abuts Airport property. The Comp Plan may also include new building codes. Any information that emerges from the Comp Plan study will be examined for potential impact to the future development concept for this Master Plan. If the Comp Plan is not complete by the



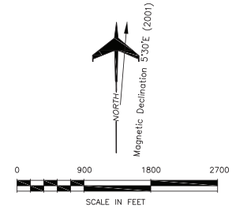
Property Owned

Tract	Property	Acreage	Release Type	Release Date	Instrument	Book	Page	Grantor	Grantee
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

NOTE: TRACTS B & B WERE EXEMPTED FROM THE ORIGINAL TRANSFER BETWEEN THE U.S. GOVERNMENT AND THE CITY OF TOPEKA. THEY WERE DEFINED AS GOVERNMENT SURPLUS PROPERTY AND DEEDED TO THE MTAA AS RECORDED ON 6-25-80, BOOK 2099, PG. 987

Property Released

Tract	Property	Acreage	Release Type	Release Date	Instrument	Tax Parcel ID#	Grantor	Grantee
Release 2	Multi-Parcel (AA1-AA5)	444.00	Land Use Release	04/23/01	FAA Release Letter	N/A	FAA	MTAA
Release 3	Buildings 2704	19.54	Property Release	05/29/87	Deed of Release	1911200001003010	FAA	MTAA
Release 3	Building 2701	6.39	Property Release	05/29/87	Deed of Release	1910100001007030	FAA	MTAA
Release 5	East Parcel	3.00	Property Release	12/19/80	Deed of Release	1393200001001000	FAA	MTAA
Release 5	West Parcel	3.00	Property Release	12/20/80	Deed of Release	1393200001002000	FAA	MTAA



LEGEND	
○	IRON BAR FOUND
⬚	IRON BAR IN CONCRETE MONUMENT FOUND
◁	IRON BAR WITH CITY CAP FOUND
●	5/8" ø IRON BAR SET
◯	ENCASED IN CONCRETE
	AIRPORT PROPERTY BOUNDRY (E)
	AIRPORT PROPERTY BOUNDRY (U)
	TRACT BOUNDRY
	PROPERTY PURCHASED WITH FEDERAL FUNDS
	EASEMENTS
	FAA RELEASES
	DEEDED TO MTAA BY FEDERAL GOVT.

NOTES:

1. LEGAL DESCRIPTIONS OF ALL PROPERTY AND EASEMENTS ARE AVALABLE AT MTAA OFFICES.
2. TRACT "A" ACREAGE REPRESENTS TOTAL AREA INCLUDED IN "PLAT OF SURVEY" DATED JULY 28, 1981, WHICH EXCLUDES PARCEL "A", PARCEL "C", PARCEL "E" AND "HOSPITAL TRACT".
3. TRACTS "F", "G" AND "H" WERE PURCHASED WITH PROJECT NO. 3-20-0113-04 ON THE DATE SHOWN.
4. THE MTAA HAS BEEN RELEASED FROM ITS OBLIGATION TO MAINTAIN AS AIRPORT PROPERTY BUILDINGS NO.s 2701 AND 2704 AND TWO PARCELS CONTAINING A TOTAL OF 23 AND 48 ACRES WEST OF HIGHWAY 75 IN SEC.'s 1 AND 12, T.13S., R.15E. REFERENCE TO LETTER DATED MAY 29, 1987 FROM AIRPORTS DIVISION, FAA.

No.	REVISIONS	DATE	BY	APPD
△				
△				
△	Exhibit A	7/1/14		
△	Fuel Farm Potential Sites (u)	12/19/08		

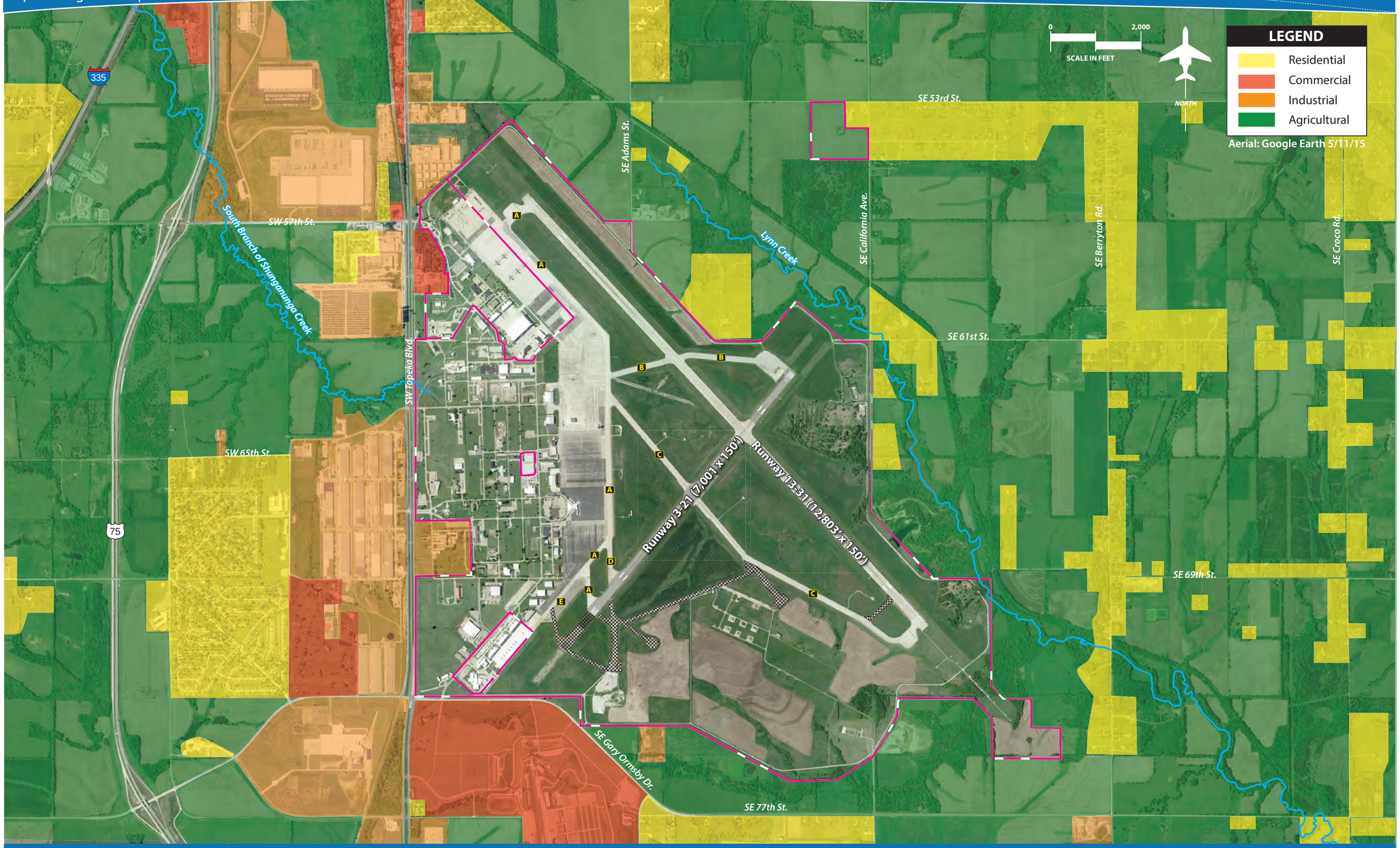
THE PREPARATION OF THESE DOCUMENTS WAS FINANCED IN PART THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, AS AMENDED. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THESE DOCUMENTS BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT OF THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH THE APPROPRIATE PUBLIC LAWS.

Topeka Regional Airport
Forbes Field
EXHIBIT A
Airport Property Inventory Maps
DRAFT
Topeka, Kansas

PLANNED BY:	Mike Dmyterko
DETAILED BY:	Chris Donnelly
APPROVED BY:	Mike Dmyterko
July 2014	SHEET 1 OF 1

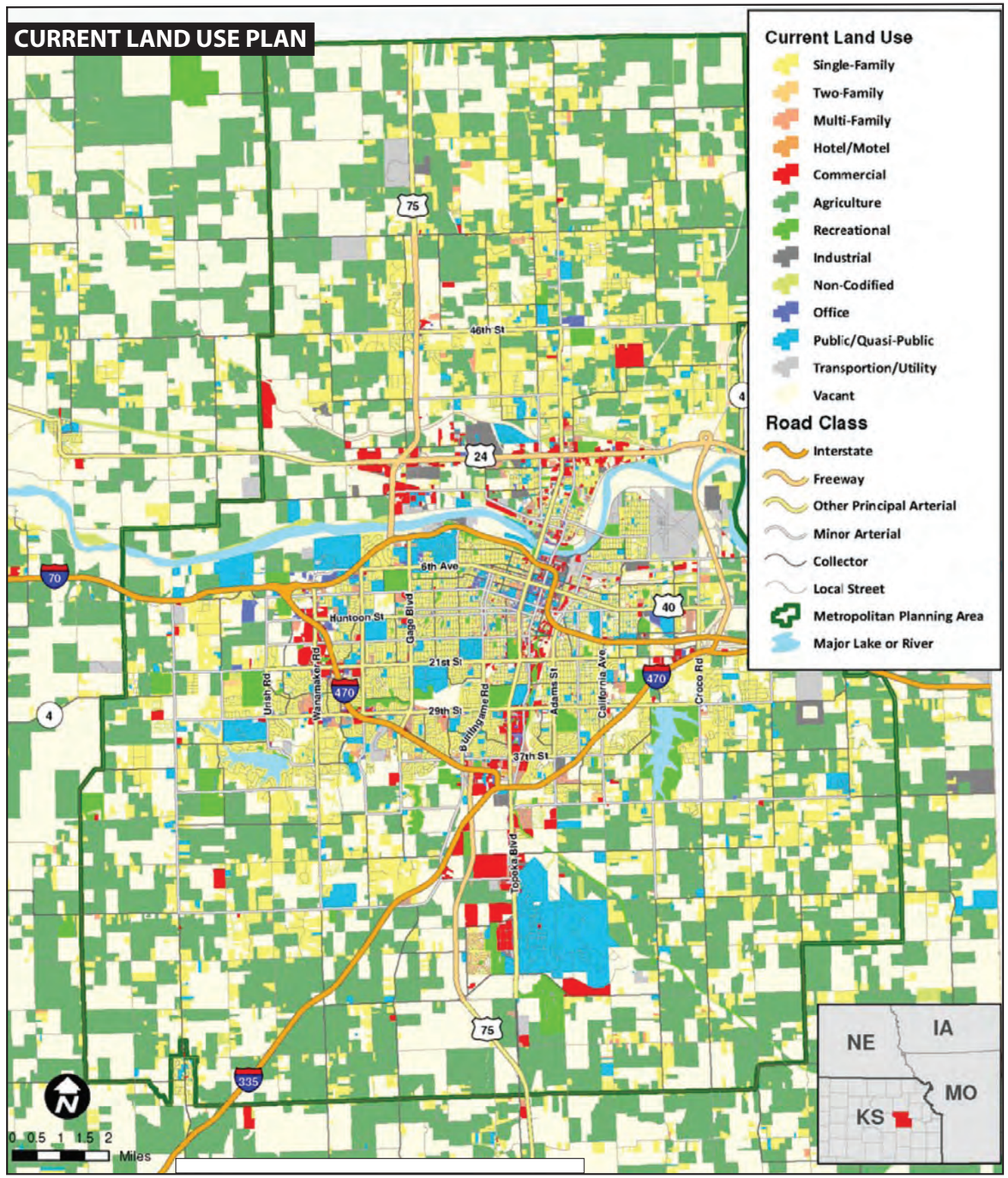
Coffman Associates
Airport Consultants
www.coffmanassociates.com

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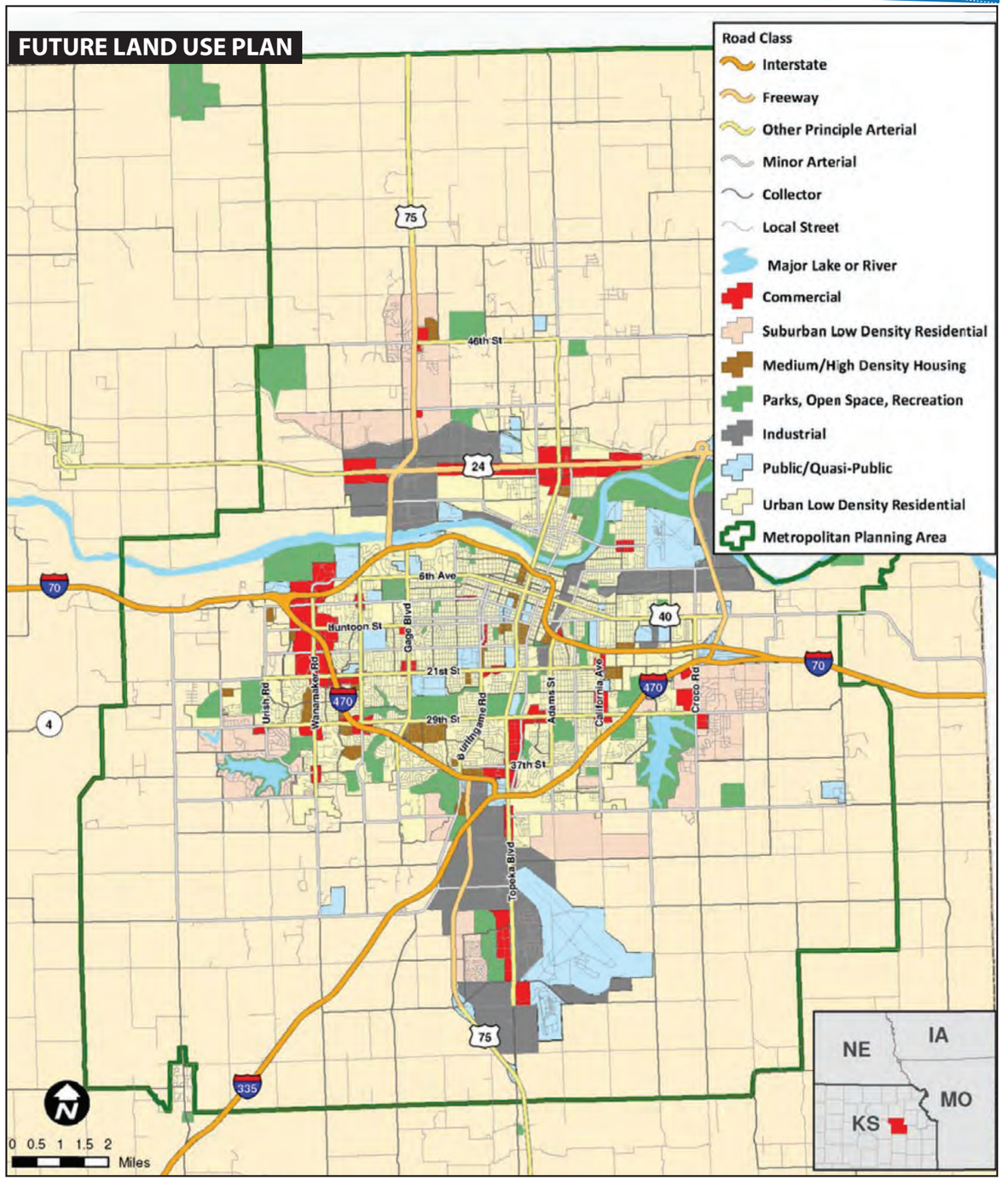

0
2,000
SCALE IN FEET
NORTH
LEGEND
Residential
Commercial
Industrial
Agricultural
Aerial: Google Earth 5/11/15
335
75
SW 57th St.
SW 65th St.
South Branch of Shunganunga Creek
SW Topeka Blvd.
SE Adams St.
SE 53rd St.
Lynn Creek
SE California Ave.
SE Berryton Rd.
SE Croco Rd.
SE 61st St.
SE 69th St.
SE 77th St.
SE Gary Ormsby Dr.
Runway 3-21 (7,001' x 150')
Runway 13-31 (12,803' x 150')
A
B
C
D
E

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CURRENT LAND USE PLAN



FUTURE LAND USE PLAN



Source: 2040 Metropolitan Topeka Long Range Transportation Plan

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time the Airport Master Plan is complete, MTAA should continue to monitor the progress of the Shawnee County Comprehensive Plan.

HEIGHT AND HAZARD ZONING

The City of Topeka and Shawnee County have provided height and hazard zoning for the protection of Topeka Regional Airport. Topeka Municipal Code, Chapter 18.205, *Forbes Field and Philip Billard Airports Hazard Zoning,* codifies these regulations. The code establishes various zones as defined by the instrument capability of each runway. The zones established are the approach zones (visual, nonprecision, and precision), transition zones, horizontal zones, and conical zones, as applicable to each runway as defined in Code of Federal Regulations (CFR) Part 77, *Objects Affecting Navigable Airspace*.

According to the code, the height limitations require that no structure or tree shall be erected, altered, allowed to grow, or be maintained in any zone to a height in excess of the height limit established for each zone. **Exhibit 1G** presents the various zones as associated with Topeka Regional Airport. The following is a description of each zone:

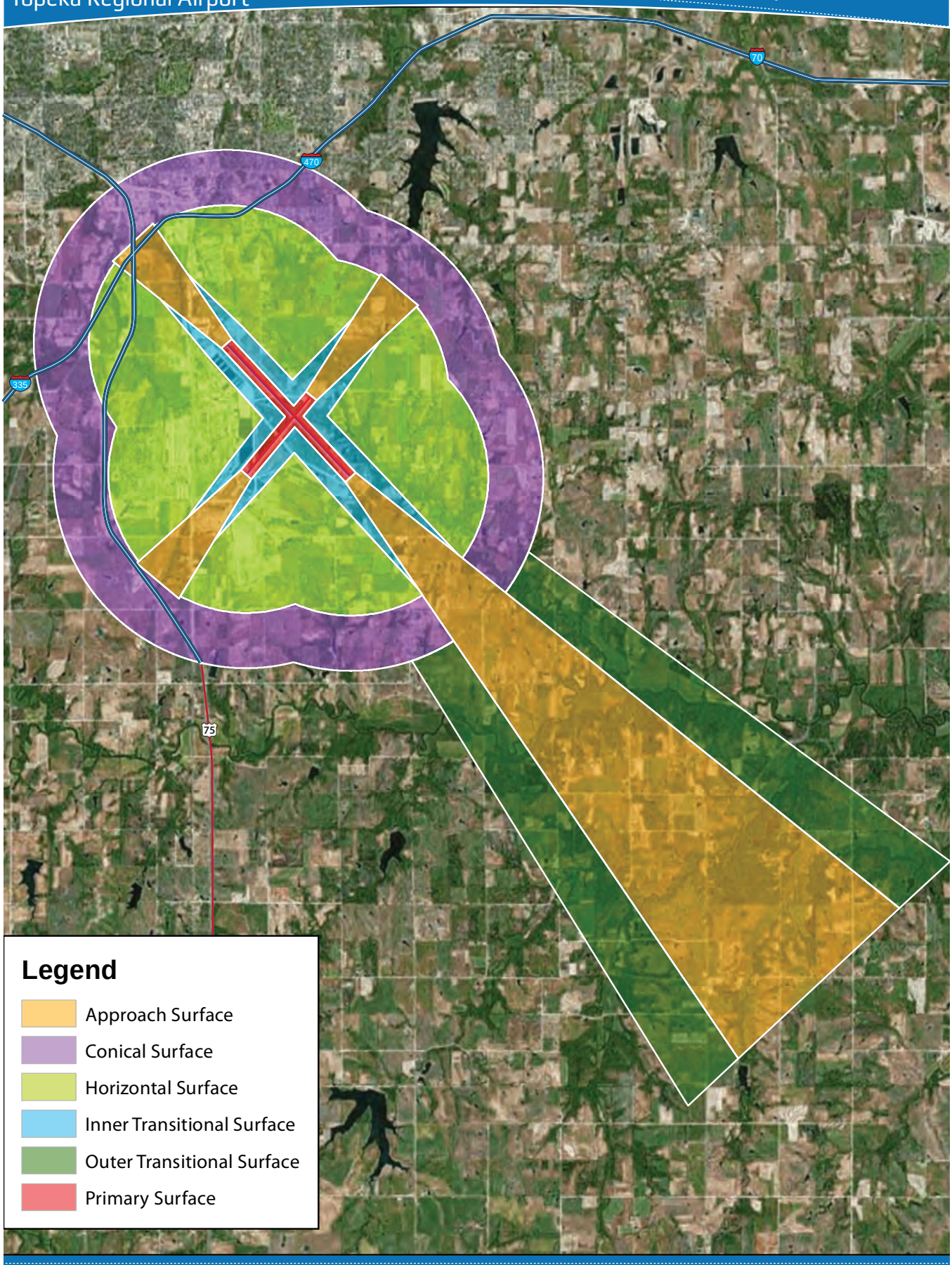
Runway 31 Precision Instrument Approach Zone: The inner edge of the precision instrument runway approach zone coincides with the width of the primary surface and is 1,000 feet wide. The approach zone expands outward uniformly to a width of 16,000 feet at a horizontal distance of 50,000 feet from the primary surface, its centerline being the continuation of the centerline of the runway.

This approach zone slopes upward 50 feet horizontally for each foot vertically (50:1) beginning at the end of and at the same elevation as the primary surface and extending to a horizontal distance of 10,000 feet along the extended runway centerline; then slopes upward 40 feet horizontally for each foot vertically (40:1) to an additional horizontal distance of 40,000 feet along the extended runway centerline.

Runways 13, 3, and 21 Nonprecision Instrument Approach Zone: The inner edge of this approach zone coincides with the width of the primary surface and is 1,000 feet wide. The approach zone expands outward uniformly to a width of 4,000 feet at a horizontal distance of 10,000 feet from the primary surface, its centerline being the continuation of the centerline of the runway.

This approach zone slopes upward 34 feet horizontally for each foot vertically (34:1) beginning at the end of and at the same elevation as the primary surface and extending to a horizontal distance of 10,000 feet along the extended runway centerline.

Transitional Zones: Transitional zones are established as the area beneath the transitional surfaces. These surfaces extend outward and upward at a 90-degree angle to the runway centerline and the runway centerline extends at a slope of seven feet horizontally for each foot vertically from the sides of the primary and approach surfaces to where they intersect with the horizontal and conical surfaces. Transitional zones for those portions of the precision approach zones which project through and beyond the limits of the conical surface extend a distance of 5,000 feet measured horizontally from the edge of the approach and at 90-degree angles to the extended runway centerline.


70
470
335
75
Legend
Approach Surface
Conical Surface
Horizontal Surface
Inner Transitional Surface
Outer Transitional Surface
Primary Surface

Horizontal Zone: The horizontal zone is established by swinging arcs of specified radii from the center of each end of the primary surface to each runway. The radius of each arc is 5,000 feet for all runways designated as utility or visual and 10,000 feet for all other runways. The radius of the arc specified for each end of a runway will have the same arithmetical value. That value will be the highest determined for either end of the runway. When a 5,000-foot arc is encompassed by tangents connecting two adjacent 10,000-foot areas, the 5,000-foot arc shall be disregarded on the construction of the perimeter of the horizontal surface, and connecting the adjacent arcs by drawing lines tangent to those arcs. The horizontal zone does not include the approach and transitional zones. The horizontal surface is established at 150 feet above the airport elevation.

Conical Zone: The conical zone is established as the area that commences at the periphery of the horizontal zone and extends outward there from a horizontal distance of 4,000 feet. The conical zone does not include the precision instrument approach zones and the transitional zones.

The height and hazard zoning surrounding Topeka Regional Airport provides for protection of the Airport against obstructions that could be a hazard to air navigation. The zoning regulation is structured to be adaptable so that if any of the instrument approaches were to change at the Airport, the restrictions would still apply. These regulations should be maintained through the existence of the Airport.

PART 139 CERTIFICATION

An airport must have an Airport Operating Certificate (AOC) if it is serving scheduled air carrier aircraft with more than nine seats or serving unscheduled air carrier aircraft with more than 30 passenger seats. 14 CFR Part 139 (Part 139) describes the requirements for obtaining and maintaining an AOC. This includes meeting various Federal Aviation Regulations (FARs) now codified under the CFR.

Airports are classified in the following categories based on the type of air carrier operations served:

- **Class I Airport** – an airport certificated to serve scheduled operations of large air carrier aircraft that can also serve unscheduled passenger operations of large air carrier aircraft and/or scheduled operations of small air carrier aircraft.

- **Class II Airport** – an airport certificated to serve scheduled operations of small air carrier aircraft and the unscheduled passenger operations of large air carrier aircraft. A Class II airport cannot serve scheduled large air carrier aircraft.

- **Class III Airport** – an airport certificated to serve scheduled operations of small air carrier aircraft. A Class III airport cannot serve scheduled or unscheduled large air carrier aircraft.

- **Class IV Airport** – an airport certificated to serve unscheduled passenger operations of large air carrier aircraft. A Class IV airport cannot serve scheduled air carrier aircraft regulated under CFR Part 121.

Topeka Regional Airport is currently classified as a Class IV CFR Part 139 commercial service airport.

Topeka Regional Airport is currently classified as a Class IV CFR Part 139 commercial service airport. Part 139 regulations (which implemented provisions of the *Airport and Airway Development Act of 1970*, as amended on November 27, 1971) set standards for: the marking and lighting of areas used for operations; firefighting and rescue equipment and services; the handling and storing of hazardous materials; the identification of obstructions; and safety inspection and reporting procedures. It also requires airport operators to have an FAA-approved Airport Certification Manual (ACM).

The ACM defines the procedures to be followed in the routine operation of the airport and for response to emergency situations. The ACM is a working document that is updated annually as necessary. It reflects the current condition and operation of the airport and establishes the responsibility, authority, and procedures as required. There are required sections for the ACM covering administrative and procedural detail. Topeka Regional Airport has a current, approved ACM. The ACM includes the following information:

- General Information
- Inspection Authority
- Deviation to Part 139 Requirements
- ACM Maintenance/Revisions
- Personnel Information
- Paved/Unpaved Areas
- Safety Areas
- Marking, Signs, and Lighting
- Snow and Ice Control Plan
- ARFF Index, Equipment, Agents, and Operational Requirements
- Hazardous Materials
- Traffic and Wind Indicators
- Airport Emergency Plan
- Self-inspection Program
- Pedestrians and Ground Vehicles
- Obstructions
- Protection of NAVAIDS
- Public Protection
- Wildlife Hazard Management Plan
- Airport Condition Reporting
- Identifying, Marking, and Lighting Construction and Unserviceable Areas
- Airport Signage Plan

HISTORICAL AERONAUTICAL ACTIVITY

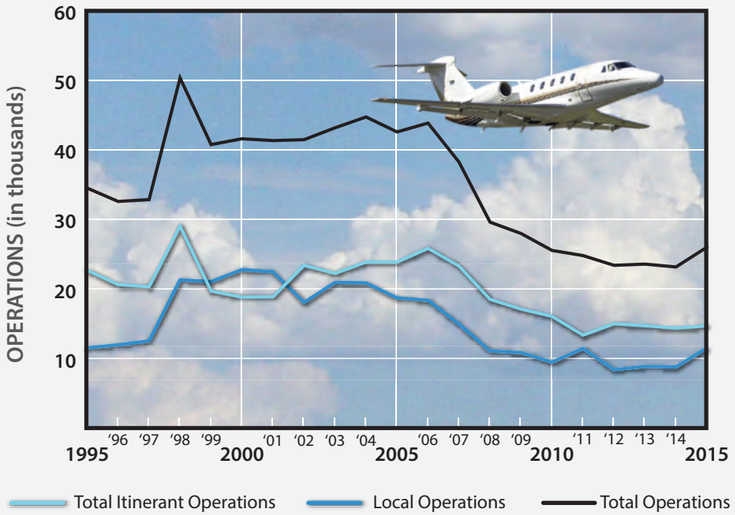
A key aspect of the master planning process is the documentation of historical activity levels for various aviation demand indicators. For Topeka Regional Airport, these include based aircraft, based aircraft fleet mix, annual operations (takeoffs and landings), and peak operations levels. In addition, the Airport has in the recent past accommodated scheduled commercial passenger service. While this service is not currently available, it is still important to document historical levels as shown on **Exhibit 1H**. In the chapter to follow, forecasts of each of the aviation demand indicators will be developed, submitted to the FAA for review and approval, and will serve as the basis for future facility needs.

YEAR	IFR ITINERANT OPERATIONS					VFR ITINERANT OPERATIONS					Total ITINERANT OPERATIONS					LOCAL OPERATIONS			TOTAL	BASED AIRCRAFT[1]
	AC	AT	GA	MIL	Total	AC	AT	GA	MIL	Total	AC	AT	GA	MIL	Total	GA	MIL	Total		
1995	58	2,436	5,280	2,612	10,386	142	883	8,904	2,371	12,300	200	3,319	14,184	4,983	22,686	4,832	7,004	11,836	34,522	70
1996	113	1,050	5,288	2,774	9,225	169	559	8,300	2,385	11,413	282	1,609	13,588	5,159	20,638	5,816	6,140	11,956	32,594	65
1997	31	889	5,585	2,830	9,335	130	297	8,289	2,268	10,984	161	1,186	13,874	5,098	20,319	5,274	7,261	12,535	32,854	74
1998	17	3,047	6,028	3,256	12,348	84	466	11,986	4,157	16,693	101	3,513	18,014	7,413	29,041	8,983	12,328	21,311	50,352	74
1999	30	2,569	4,809	2,711	10,119	100	417	7,978	1,090	9,585	130	2,986	12,787	3,801	19,704	7,075	13,992	21,067	40,771	77
2000	27	2,412	4,560	2,955	9,954	117	366	7,392	996	8,871	144	2,778	11,952	3,951	18,825	8,161	14,622	22,783	41,608	77
2001	110	2,548	3,715	3,871	10,244	42	140	7,137	1,308	8,627	152	2,688	10,852	5,179	18,871	5,672	16,800	22,472	41,343	71
2002	126	2,412	3,267	5,009	10,814	0	325	8,211	4,052	12,588	126	2,737	11,478	9,061	23,402	4,690	13,385	18,075	41,477	62
2003	152	1,143	2,983	4,462	8,740	31	310	8,804	4,354	13,499	183	1,453	11,787	8,816	22,239	6,829	14,117	20,946	43,185	59
2004	80	516	3,149	6,095	9,840	101	305	7,718	5,900	14,024	181	821	10,867	11,995	23,864	5,288	15,588	20,876	44,740	66
2005	156	926	2,580	5,668	9,330	0	227	8,659	5,659	14,545	156	1,153	11,239	11,327	23,875	3,533	15,185	18,718	42,593	61
2006	362	986	2,501	5,460	9,309	0	288	10,436	5,449	16,173	362	1,274	12,937	10,909	25,482	3,980	14,400	18,380	43,862	61
2007	383	503	2,551	5,055	8,492	2	165	9,879	4,757	14,803	385	668	12,430	9,812	23,295	2,602	12,351	14,953	38,248	57
2008	221	614	2,449	5,284	8,568	2	134	5,997	3,814	9,947	223	748	8,446	9,098	18,515	2,042	9,060	11,102	29,617	57
2009	197	366	1,930	7,231	9,724	0	117	3,954	3,325	7,396	197	483	5,884	10,556	17,120	1,251	9,610	10,861	27,981	57
2010	225	382	1,943	6,659	9,209	0	94	3,895	2,869	6,858	225	476	5,838	9,528	16,067	897	8,584	9,481	25,548	39
2011	196	353	1,788	6,319	8,656	0	91	2,855	1,767	4,713	196	444	4,643	8,086	13,369	1,251	10,187	11,438	24,807	39
2012	191	351	1,884	7,511	9,937	0	64	2,764	2,240	5,068	191	415	4,648	9,751	15,005	690	7,709	8,399	23,404	40
2013	253	256	1,824	6,188	8,521	0	70	2,844	3,280	6,194	253	326	4,668	9,468	14,715	1,052	7,812	8,864	23,579	30
2014	212	999	2,028	5,608	8,847	0	105	2,527	2,901	5,533	212	1,104	4,555	8,509	14,380	1,042	7,751	8,793	23,173	30
2015	188	289	2,573	5,179	8,229	12	173	3,176	3,007	6,368	200	462	5,749	8,186	14,597	971	10,421	11,392	25,989	42

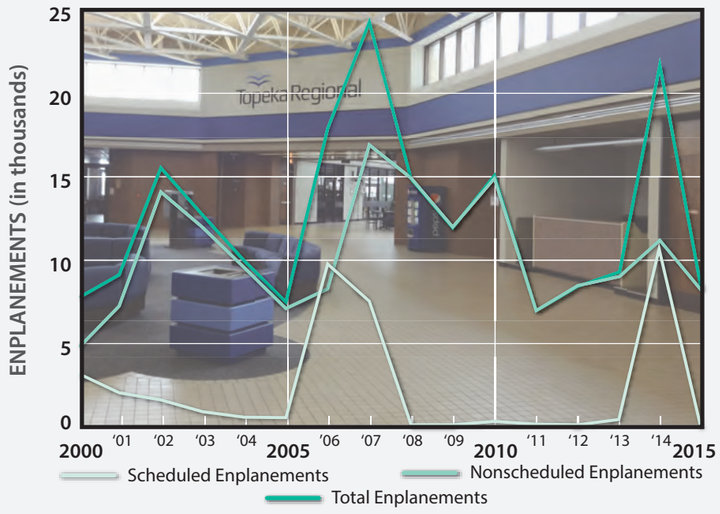
[1] FAA Terminal Area Forecast except for 2015 which is actual.
Source: The Operations Network (OPSNET), official FAA operations count from the on-airport tower (no overflights)

KEY
AC - Air Carrier (commercially operated aircraft having seating capacity more than 60 seats or a maximum payload capacity of 18,000 pounds)
AT - Air Taxi (commercially operated aircraft having 60 or fewer passenger seats or less than 18,000 pounds maximum payload capacity)
GA - General Aviation
MIL - Military

ANNUAL OPERATIONS

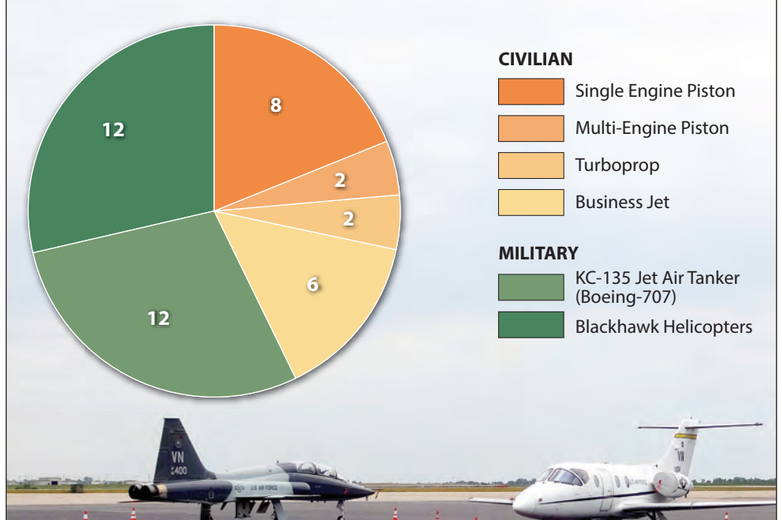


ANNUAL ENPLANEMENTS



Source: FAA Air Carrier Activity Information System (ACAIS) Database. 2015 estimate.

BASED AIRCRAFT FLEET MIX 2015



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BASED AIRCRAFT

Identifying the current number of based aircraft is important to master plan analysis, yet it can be challenging because of the transient nature of aircraft storage. The Airport maintains a physical based aircraft count. Currently, there are 18 based civilian aircraft comprised of eight single engine pistons, two multi-engine pistons, two turboprops, and six business jets. The largest business jet is a Challenger CL-600. There is also a BAC 111, short-range 119-seat airliner that is owned by the American Flight Museum. This aircraft is operational and occupies apron space but is rarely flown.

In addition to the civilian aircraft, there are military aircraft based at the Airport. The 190th Air Refueling Wing of the Kansas Air National Guard has 12 KC-135 air tanker aircraft. The 108th Army Aviation Regiment of the Kansas National Guard has 12 based Black Hawk helicopters. **Table 1D** shows the based aircraft fleet mix.

TABLE 1D
2015 Existing Based Aircraft
Topeka Regional Airport

CIVILIAN	
Aircraft Type	**Number**
Single Engine Piston	8
Multi-Engine Piston	2
Turboprop	2
Business Jet	6
Helicopters	0
Subtotal	*18*
MILITARY	
Aircraft Type	**Number**
KC-135 Jet Air Tanker (Boeing-707)	12
Black Hawk Helicopters	12
Subtotal	*24*
TOTAL	**42**

Source: Airport records; Interview with military representatives

AIRCRAFT OPERATIONS

Aircraft operations, being a take-off or landing, are classified as either local or itinerant. Local operations consist mostly of aircraft training operations conducted within the airport traffic pattern, such as touch-and-go and stop-and-go operations. Itinerant operations are arriving or departing aircraft which have an origin or destination away from an airport.

Aircraft operations are further sub-classified into four general categories: air carrier, air taxi, general aviation, and military. Air carrier operations are defined as those conducted commercially by aircraft having a seating capacity of 60 or more and/or a maximum payload capacity of 18,000 pounds. Air taxi operations can include small commercial service aircraft operations, as well as general aviation aircraft used for the "on-demand" commercial transport of persons and property in accordance with 14 Code of Federal Regulations (CFR) Part 135 and Subchapter K of 14 CFR Part 91.

Exhibit 1H presents the annual aircraft operations as counted by the air traffic control tower (ATCT) at the Airport since 1995. The exhibit includes two categories of itinerant operations: IFR and VFR operations. IFR operations are those conducted during instrument weather conditions or during VFR but under a completed instrument flight plan. Commercial service operations will fall under both the air carrier and air taxi categories. General aviation operations include a wide array of aircraft use ranging from personal to business and corporate uses. Over the last 20 years, approximately 58 percent of operations have been itinerant in nature with the remaining 42 percent being local.

With the two Kansas National Guard units based at the Airport, there is a significant level of military activity. Since 1995, approximately 76 percent of local operations have been conducted by military aircraft. Since 2008, local military operations have accounted for an average of 90 percent of local operations. Overall, military operations (itinerant and local) have averaged 60 percent of total operations since 1995, which has been relatively steady on a yearly basis.

PASSENGER ENPLANEMENTS

Commercial service airports provide local and regional access to the national and international aviation systems. As such, these airports are vital to interstate commerce, as well as a key component to local and regional economic infrastructure. These facilities support and can even drive growth in all socioeconomic categories.

An enplanement includes any revenue passengers that board an aircraft for a fare at an airport. This statistic is important in that it is utilized by the FAA to determine the annual level of entitlement funding dedicated to an airport under the Airport Improvement Program (AIP). An airport must reach 10,000 annual enplanements to be eligible for a minimum one million dollars in annual entitlement funds. Historical enplanement data is provided on **Exhibit 1H** and **Table 1E**. Airline passenger enplanements will typically be influenced by many factors, including number of airlines serving the airport, frequency of daily departures, types of aircraft used, and diversity of number of non-stop destinations.

Topeka Regional Airport has long struggled to compete for regularly scheduled passenger service. The primary obstacle has been the close proximity of Kansas City International Airport, which is approximately 70 interstate miles to the east. Kansas City International Airport has many advantages, including numerous direct

TABLE 1E
Historical Passenger Enplanements
Topeka Regional Airport

Year	Scheduled	Nonscheduled	Total
2014	10,540	11,190	21,730
2013	318	9,021	9,339
2012	0	8,476	8,476
2011	37	6,978	7,015
2010	202	14,913	15,115
2009	0	11,985	11,985
2008	0	14,922	14,922
2007	7,406	16,910	24,316
2006	9,639	8,285	17,924
2005	429	7,101	7,530
2004	455	9,554	10,009
2003	785	11,970	12,755
2002	1,490	14,090	15,580
2001	1,920	7,247	9,167
2000	3,020	4,848	7,868
1999	3,504	7,653	11,157
1998	3,884	3,909	7,793
1997	10,321	No Data	10,321
1996	13,455	No Data	13,455
1995	13,453	No Data	13,453
1994	15,913	No Data	15,913
1993	21,628	No Data	21,628
1992	22,785	No Data	22,785
1991	18,131	No Data	18,131
1990	24,317	No Data	24,317
1989	26,825	No Data	26,825
1988	36,812	No Data	36,812
1987	51,247	No Data	51,247
1986	54,082	No Data	54,082
1985	31,502	No Data	31,502
1984	61,388	No Data	61,388

Source: FAA Air Carrier Activity Information System (ACAIS) Database

destinations, reliable flight schedule with relatively few cancelled flights, available vehicle parking, and location.

Topeka Regional Airport has benefited from a relatively steady level of nonscheduled passenger enplanements. These enplanements have primarily been from troop deployments from Fort Riley Kansas, which is the current home to the First Army Infantry Division. When troops are deployed from Fort Riley, they will be bussed to Topeka Regional Airport where they will board a large commercial type aircraft destined for the theater of operation or an intermediate stop, such as a U.S. base around the world.

AIRFIELD FACILITIES

Airfield facilities are those which facilitate aircraft movements between the air and ground. Generally, these facilities include runways, taxiways, airport lighting and markings, and navigational aids. **Exhibit 1J** summarizes and depicts airfield facility information atop an aerial photograph for visual reference.

RUNWAYS

Topeka Regional Airport is served by two runways which intersect. Runway 13-31 is the Airport's primary runway, and Runway 3-21 is the crosswind runway.

Primary Runway 13-31

Runway 13-31 is 12,803 feet long by 200 feet wide, oriented in a northwest-southeast manner. The pavement is constructed of concrete with a grooved surface treatment and is reported as being in fair condition by official FAA publications. Runway 13-31 has precision markings providing threshold bars, runway end designations, touchdown zone, aiming point, centerline, and edge markings.

Runway 13-31 is 12,803 feet long.
Runway 3-21 is 7,001 feet long.

Runway 13-31 has a pavement strength of 75,000 pounds single wheel loading (S), which refers to the design of certain aircraft landing gear that has a single wheel on each main landing gear strut. The runway pavement has also been strength-rated at 200,000 pounds dual wheel (D), 280,000 pounds for dual tandem wheel (DT), and 760,000 pounds double dual tandem wheel (DDT).

The FAA has recently moved to implementing the International Civil Aviation Organization (ICAO) pavement classification number (PCN) for identifying strength of airport pavements. The PCN is a five-part code described as follows:

1) PCN Numerical Value: Indicates the load-carrying capacity of the pavement expressed as a whole number. The value is calculated based on several engineering factors such as aircraft geometry and pavement usage.
2) Pavement Type: Expressed as either R for rigid pavement (most typically concrete) or F for flexible pavement (most typically asphalt).
3) Subgrade Strength: Expressed as A (High), B (Medium), C (Low), D (Ultra Low). A subgrade of A would be considered very strong, like concrete-stabilized clay and a subgrade of D would be very weak like un-compacted soil.
4) Maximum Tire Pressure: Expressed as W (Unlimited/No Pressure Limit), X (High/254 psi), Y (Medium/181 psi), or Z (Low/72 psi), this indicates the maximum tire pressure the pavement can support. Concrete surfaces are usually rated W.
5) Process of Determination: Expressed as either T (technical evaluation) or U (physical evaluation) this indicates how the pavement was tested.

The PCN for Runway 13-31 is expressed as 79RDWT. This means that the underlying pavements value indicating load-carrying capacity is 79 (unitless), is rigid (concrete), is ultra-low subgrade strength, has no tire pressure restrictions, and was calculated through a technical evaluation. Once the runway is reconstructed the PCN is planned to be 95RCWT.

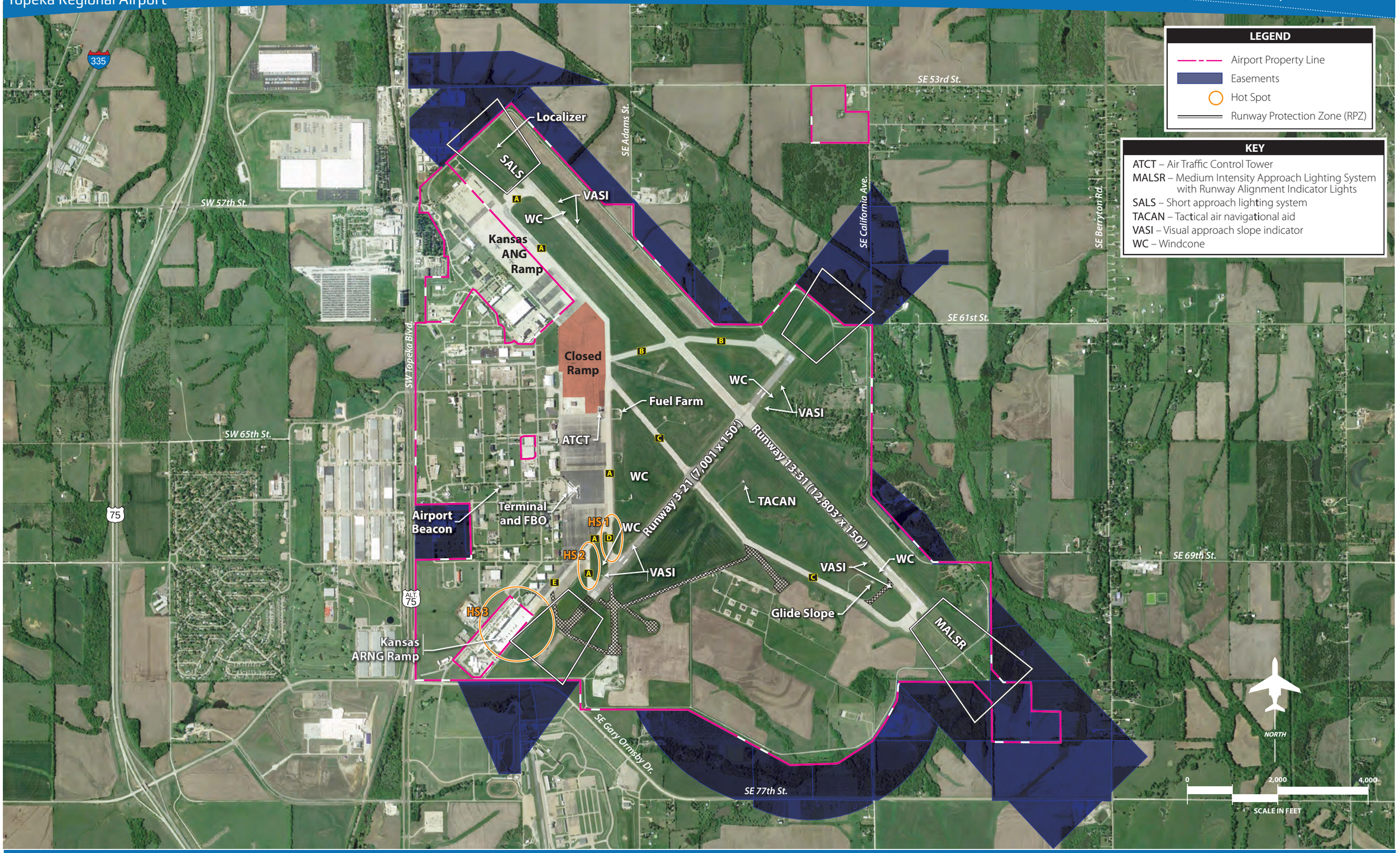
The PCN for Runway 3-21 is expressed as 46RCXT. This means that the underlying pavements value indicating load-carrying capacity is 46 (unitless), is rigid (concrete), is low strength subgrade, has high tire pressure restrictions, and was calculated through a technical evaluation.

The runway is equipped with a 100-foot long blast pad on each end. The gradient of the runway is 0.3 percent with the high point being at the Runway 13 threshold. The elevation at the Runway 13 threshold is 1,062 feet and at the Runway 31 threshold it is 1,035 feet. Runway 13-31 intersects the crosswind runway approximately 5,800 feet from the Runway 31 landing threshold.

Runway 13-31 is planned to be completely reconstructed in the coming years due to its condition. The reconstruction is being undertaken as a cost-sharing arrangement between the Airport (primarily through FAA AIP grant funding) and the National Guard. The FAA is covering the eligible civilian portion and the military is covering the remaining length and they are strengthening the entire length. The project is planned to be completed by the end of 2018. The runway will be narrowed to 150 feet in width as part of the project.

Crosswind Runway 3-21

Oriented in a northeast-southwest manner, crosswind Runway 3-21 is 7,001 feet long and 150 feet wide. The runway is constructed of asphalt pavement with a grooved surface treatment and is reported in FAA publications to be in excellent condition having been recently rehabilitated. Runway 3-21 has non-precision markings, which include threshold bars, runway end designations, touchdown zone, and centerline markings. The published pavement strength is 100,000 pounds S, 210,000 pounds D, 360,000


LEGEND
Airport Property Line
Easements
Hot Spot
Runway Protection Zone (RPZ)
KEY
ATCT – Air Traffic Control Tower
MALSR – Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights
SALS – Short approach lighting system
TACAN – Tactical air navigational aid
VASI – Visual approach slope indicator
WC – Windcone
335
SW 57th St.
SW Topeka Blvd.
SE Adams St.
SE 53rd St.
SE California Ave.
SE Berryton Rd.
SE 61st St.
SE 69th St.
SW 65th St.
75
ALT 75
SE Gary Ormsby Dr.
SE 77th St.
Localizer
SALS
VASI
WC
Kansas ANG Ramp
Closed Ramp
Fuel Farm
ATCT
WC
VASI
Runway 3-21 (7,001 x 150')
Runway 13-31 (12,803 x 150')
TACAN
Airport Beacon
Terminal and FBO
HS 1
HS 2
HS 3
WC
VASI
VASI
WC
Glide Slope
MALSR
Kansas ARNG Ramp
NORTH
0
2,000
4,000
SCALE IN FEET

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pounds DT, and 720,000 pounds DDT. Runway 3-21 intersects the primary runway approximately 1,700 feet from the Runway 21 landing threshold.

TAXIWAYS

There are four primary taxiways, each of which is 75 feet wide, serving ground movement of aircraft. Taxiway A extends from the Runway 13 threshold south to the Runway 3 threshold. Taxiway A, at the Runway 3 threshold, enters the runway at an acute angle. This is an FAA identified "hot spot," which means the area can lead to pilot confusion and potentially a runway incursion. Taxiway A is situated adjacent to the large apron areas, including the terminal area and the Air National Guard aprons. Taxiway A is in fair condition and will need a significant level of rehabilitation or reconstruction in the near future.

Taxiway B extends from an intersection with Taxiway A near the ATCT to the Runway 21 threshold. It crosses Runway 13-31 approximately 4,800 feet from the Runway 13 threshold. Taxiway B crosses Runway 13-31 at an angle. Taxiway B is in good condition having been overlaid in 2006.

Taxiway C extends from the terminal area in proximity to the ATCT to the Runway 31 threshold. It crosses Runway 3-21 at a point approximately 3,450 feet from the Runway 3 threshold. Taxiway C is in fair condition and will need a significant level of rehabilitation or reconstruction in the near future.

Taxiway D is a short stub taxiway extending from an intersection with Taxiway A to Runway 3-21 at a point approximately 800 feet from the Runway 3 threshold. Taxiway D enters the runway at an angle and the location is considered an FAA "hot spot." FAA "hot spots" are locations on the airfield where the pavement geometry may lead to pilot confusion and potentially a runway incursion. Previous planning has included the possibility of removing this taxiway from the airfield system.

Taxiway E extends from an intersection with Taxiway A to the Army National Guard facilities at the south end of the Airport.

Pavement Markings

Runway 13-31 has precision markings which identify the runway designation, edges, centerline, threshold, touchdown zone, and aiming point. Runway 3-21 has non-precision markings that include threshold bars, runway designation, centerline, and aiming points.

Taxiway and taxilane centerline markings are provided to assist pilots in maintaining proper clearance from pavement edges and objects near the taxiway/taxilane edges. Taxiway markings at the Airport include the following:

- Centerline;
- Continuous type edge markings along paved shoulders;
- Aircraft holding position markings;
- Enhanced centerline markings leading to runway hold lines; and,
- Dashed type edge markings along the taxiways which are contiguous to the terminal ramp.

The distance from the hold position markings to the runway centerline vary at the Airport. All hold line markings leading to Runway 13-31 are 300 feet from the runway centerline. The hold lines on Taxiway A at the Runway 3 threshold are 380 feet from the runway centerline. On Taxiway D, the hold lines are 300 feet from the runway centerline. The hold lines on Taxiway C are 250 feet from the Runway 3-21 centerline. And the hold lines on Taxiway B prior to the Runway 21 threshold is 275 feet from the runway centerline.

Aircraft movement areas on various ramps are identified with centerline markings. Aircraft tie-down positions are identified on various ramp surfaces.

AIRFIELD "HOT SPOTS"

The FAA defines an "airport surface hot spot" as a location on an aerodrome movement area with a history or potential risk of collision or runway incursion, and where heightened attention by pilots/ drivers is necessary. A "hot spot" is a runway safety related problem area on an airport that presents increased risk during surface operations. Typically, it is a complex or confusing taxiway/taxiway or taxiway/runway intersection. The area of increased risk has either a history of, or potential for, runway incursions or surface incidents, due to a variety of causes, such as, but not limited to: airport layout, traffic flow, airport marking, signage and lighting, situational awareness, and training. "Hot spots" are depicted on airport diagrams as open circles or polygons designated as "HS 1," "HS 2," etc.

There are three "hot spots" at Topeka Regional Airport (see **Exhibit 1J**) which are described by the FAA as follows:

- HS 1: Southbound traffic on Taxiway A must remain alert so as to not miss the right turn on Taxiway A when taxiing to Runway 3. Taxiway D continues to an intersection with Runway 3. Taxiway A turns to the southwest.

- HS 2: Use caution because Taxiway A becomes Taxiway E just past access to the approach end of Runway 3. Taxiway A turns left, Taxiway E continues southwest bound to the Kansas Army National Guard ramp. (A special directional pavement marking has been installed to alert pilots of the turn to the Runway 3 threshold.)

- HS 3: Taxiway E is not visible from the ATCT. Taxiway E also accesses the Kansas Army National Guard ramp.

AIRFIELD LIGHTING SYSTEMS

Airfield lighting systems extend an airport's usefulness into periods of darkness and/or poor visibility. A variety of lighting systems are installed at the Airport for this purpose. These lighting systems, categorized by function, are summarized as follows.

Identification Lighting: The location of the Airport at night is universally identified by a rotating beacon. The rotating beacon projects two beams of light, one white and one green, 180 degrees apart. The rotating beacon is located to the west of the passenger terminal building, within the Airport Business Center, atop the water tower.

Runway and Taxiway Lighting/Signage: Runway and taxiway edge lighting utilize light fixtures placed near the edge of the pavement to define the lateral limits of the pavement. This lighting is essential for safe operations during night and/or times of low visibility in order to maintain safe and efficient access to and from the runways and aircraft parking areas. Taxiway A has edge lighting on the east side only because the apron is contiguous on the west side.

Runway 13-31 is equipped with high intensity runway lights (HIRL). Runway 3-21 is served by medium intensity runway lights (MIRL). All runway edge light lenses are split white-yellow to mark the caution zone on the last 2,000 feet of each runway end. All taxiways are equipped with medium intensity taxiway edge lighting (MITL).

The Airport also has a runway/taxiway signage system. The presence of runway/taxiway signage is an essential component of a surface movement guidance control system necessary for the safe and efficient operation of the airport. The signage system installed at the Airport includes runway and taxiway designations, holding positions, instrument landing system (ILS) critical areas, routing/directional, runway end and exits, and runway distance remaining. All airfield signs are lit and were replaced with LED lighting in 2012. **Exhibit 1K** depicts the existing airfield signage system for PWM on an aerial base map.

Approach Lighting Systems (ALS): The approach to Runway 13 is equipped with a short approach lighting system (SALS). These approach lights are spaced every 100 feet and extend approximately 1,500 feet from the runway threshold. The ALS provides an extended runway centerline to alert pilots of their lateral position in relation to the runway orientation.

Runway 31 is equipped with a medium intensity approach lighting system (MALS) which offers a lighted, visual grid for pilots to identify the runway end while on final approach. The MALS is supplemented with runway alignment indicator lights (RAIL). The combined MALS and RAIL is referred to as a MALSR. The RAIL portion of the MALSR is a linear progression of strobe lights which provides pilots with a rapid, visual cue of the runway centerline. The lights start 200 feet from the runway end and extend for a total distance of 2,900 feet from the runway.



Visual Glide Slope Approach Aids: All four runway ends are equipped with four-box visual approach slope indicator (VASI-4) system. The VASIs consist of a set of staggered light boxes set to the left side of the approach to the runway. The boxes shine either a red or white light that the pilot is able to interpret to determine if they are on the correct glide path to the runway. The approach slope to all four runway ends is set to the standard 3 degrees.

Runway End Identifier Lights (REIL): Runways 13, 3, and 21 are equipped with REILs which are located adjacent to each side of the runway threshold. These flashing, strobe lights provide rapid identification of the runway threshold for a distance of up to 20 miles.

After-Hours Lighting: When the ATCT is closed, pilots can activate airfield lights utilizing the pilot controlled lighting (PCL) system. The PCL will activate the edge lights for both runways, the MALSR on Runway 31, and the VASIs for Runway 3-21 via a series of clicks with their microphone transponder on the common traffic advisory channel (CTAF) frequency 120.8 MHz.

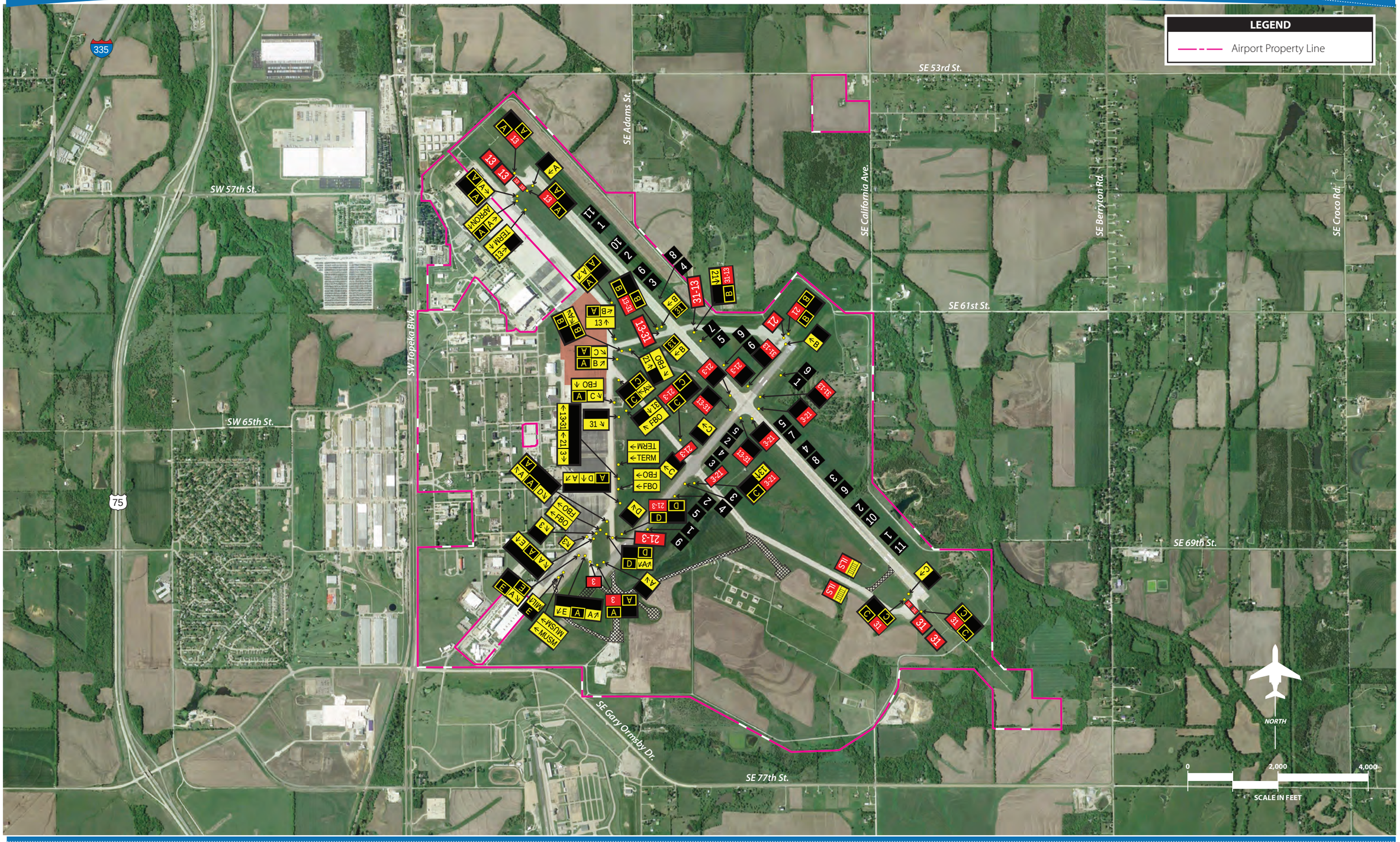
The Airport owns and maintains the SALS approach light on Runway 13. The FAA owns all other navigational aids, including the MALSR, VASIs, and REILS.

WEATHER AND COMMUNICATION AIDS

Wind Indicators: Topeka Regional Airport is equipped with five lighted windcones. The windcones provide information to pilots regarding wind conditions, such as direction and intensity, and are rated for 30-knot winds. Four of the windcones are strategically located in proximity to the runway ends and a fifth is located in proximity to the commercial terminal ramp.



Runway Visual Range (RVR): RVR is the distance over which a pilot of an aircraft on the centerline of the runway can see the runway surface markings delineating the runway or identifying its centerline. RVR is expressed in feet and is used as one of the main criteria for minima on instrument approaches. The maximum RVR reading is 6,000 feet, above which the reading becomes insignificant and does not need to be reported. RVR sensor equipment has been installed on the south side of Runway 31 at the touchdown zone marking.


LEGEND
Airport Property Line
335
75
SW 57th St.
SW 65th St.
SW Topeka Blvd.
SE Adams St.
SE California Ave.
SE 53rd St.
SE 61st St.
SE 69th St.
SE Berryton Rd.
SE Croco Rd.
SE Gary Ormsby Dr.
SE 77th St.
NORTH
0
2,000
4,000
SCALE IN FEET

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Automated Surface Observing System (ASOS): Topeka Regional Airport is served by an ASOS which automatically records weather conditions, such as temperature, dew point, wind speed, altimeter setting, visibility, sky condition, and precipitation. The ASOS updates observations each minute, 24 hours a day, and this information is transmitted to pilots in the vicinity via an FAA very high frequency (VHF) ground-to-air radio transmitter or via a local telephone number (785-862-8258).

Automated Terminal Information Service (ATIS): ATIS broadcasts are updated hourly and provide arriving and departing pilots the current surface weather conditions, communication frequencies, and other important airport-specific information. The ATIS frequency at Topeka Regional Airport is 128.25 MHz.

Common Traffic Advisory Frequency (CTAF): The Topeka Regional Airport CTAF radio frequency is 120.8 MHz. CTAF is used by pilots in the vicinity of the airport to communicate with each other about approaches to or departures from the airport when the ATCT is closed, as well as for PCL. In addition, a UNICOM frequency is also available (122.95 MHz), where a pilot can obtain information pertaining to the Airport.

AREA AIRSPACE AND AIR TRAFFIC CONTROL

The *Federal Aviation Administration Act of 1958* established the FAA as the responsible agency for the control and use of navigable airspace within the United States. The FAA has established the National Airspace System (NAS) to protect persons and property on the ground and to establish a safe and efficient airspace environment for civil, commercial, and military aviation. The NAS covers the common network of U.S. airspace, including: air navigation facilities; airports and landing areas; aeronautical charts; associated rules, regulations, and procedures; technical information; and personnel and material. The system also includes components shared jointly with the military.

AIRSPACE STRUCTURE

Airspace within the United States is broadly classified as either “controlled” or “uncontrolled.” The difference between controlled and uncontrolled airspace relates primarily to requirements for pilot qualifications, ground-to-air communications, navigation and air traffic services, and weather conditions. Six classes of airspace have been designated in the United States, as shown on **Exhibit 1L**. Airspace designated as Class A, B, C, D, or E is considered controlled airspace. Aircraft operating within controlled airspace are subject to varying requirements for positive air traffic control.

Class A Airspace: Class A airspace includes all airspace from 18,000 feet mean sea level (MSL) to flight level (FL) 600 (60,000 feet MSL). This airspace is designated in FAR Part 71.193 for positive control of aircraft. The Positive Control Area (PCA) allows flights governed only under IFR operations. The aircraft must have special radio and navigation equipment, and the pilot must obtain clearance from an ATC facility to enter Class A airspace. In addition, the pilot must possess an instrument rating.

Class B Airspace: Class B airspace has been designated around some of the country's busiest commercial service airports, such as the Kansas City International Airport. Class B airspace is designed to regulate the flow of uncontrolled traffic, above, around, and below the arrival and departure airspace required for high-performance, passenger-carrying aircraft at busy commercial service airports. This airspace is the most restrictive controlled airspace encountered by pilots operating under VFR.

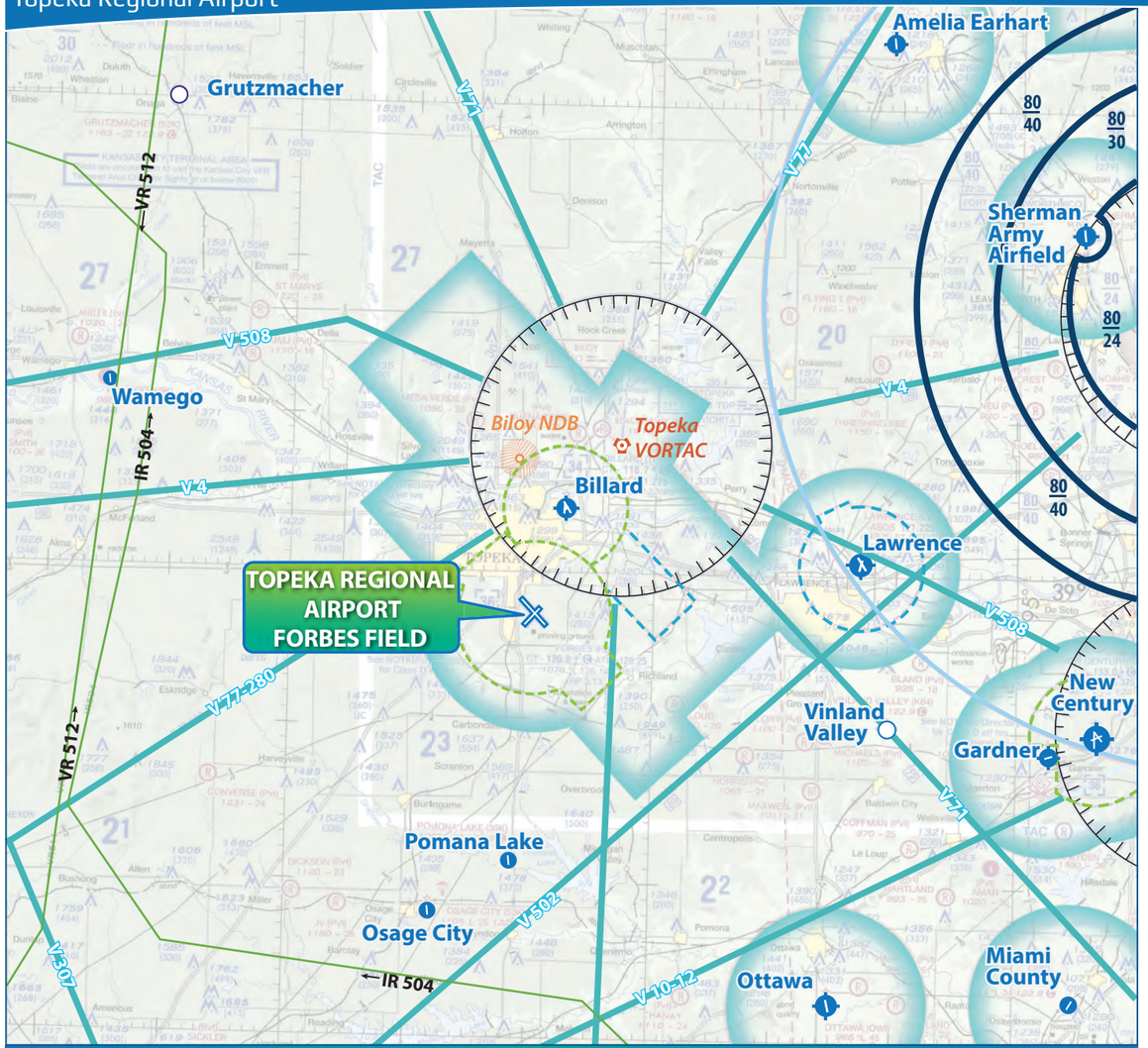
In order to fly within Class B airspace, an aircraft must be equipped with special radio and navigation equipment and must obtain clearance from air traffic control. Moreover, a pilot must have at least a private pilot's certificate or be a student pilot who has met the requirements of F.A.R. Part 61.95, which requires special ground and flight training for Class B airspace. Helicopters do not need special navigation equipment or a transponder if they operate at or below 1,000 feet and have made prior arrangements in the form of a Letter of Agreement with the FAA controlling agency. Aircraft are also required to have and utilize a Mode C transponder within a 30-nautical mile (NM) range of the center of Class B airspace. A Mode C transponder allows the ATCT to track the altitude of the aircraft.

Class C Airspace: The FAA has established Class C airspace at 120 airports around the country as a means of regulating air traffic in these areas. Class C airspace is designed to regulate the flow of uncontrolled traffic above, around, and below the arrival and departure airspace required for high-performance, passenger-carrying aircraft at some commercial service airports. In order to fly inside Class C airspace, the aircraft must have a two-way radio, an encoding transponder, and have established communication with the ATC. Aircraft may fly below the floor of the Class C airspace, or above the Class C airspace ceiling without establishing communication with ATC. The closest Class C airspace surrounds Wichita Dwight D. Eisenhower National Airport.

Class D Airspace: Class D airspace is controlled airspace surrounding airports with an ATCT, such as at Topeka Regional Airport. The Class D airspace typically constitutes a cylinder with a designated horizontal radius from the airport, extending from the surface up to a designated vertical limit, above the airport elevation. If an airport has an instrument approach or departure, the Class D airspace sometimes extends along the approach or departure path. During periods when the airport's ATCT is closed, Class D airspace typically reverts to Class E airspace.

FAA Order JO 7400.9X, *Airspace Designations and Reporting Points*, describes the Class D airspace surrounding Topeka Regional Airport. In summary, the Class D airspace extends upward from the surface to and including 3,600 feet MSL within a 4.9-mile radius of the Airport, and within 2.2 miles to each side of the 317 degree bearing (RIPLY LOM), extending from the 4.9-mile radius to 5.3 miles northwest of the Airport and within 1.8 miles to each side of the Airport ILS Localizer southeast course, extending from the 4.9-mile radius to 0.9 miles southeast of the RIPLY LOM.

Class E Airspace: Class E airspace consists of controlled airspace designed to contain IFR operations near an airport, and while aircraft are transitioning between the airport and en route environments. Unless otherwise specified, Class E airspace terminates at the base of the overlying airspace. Only aircraft operating under IFR are required to be in contact with air traffic control when operating in Class E airspace. While aircraft conducting visual flights in Class E airspace are not required to be in radio communications



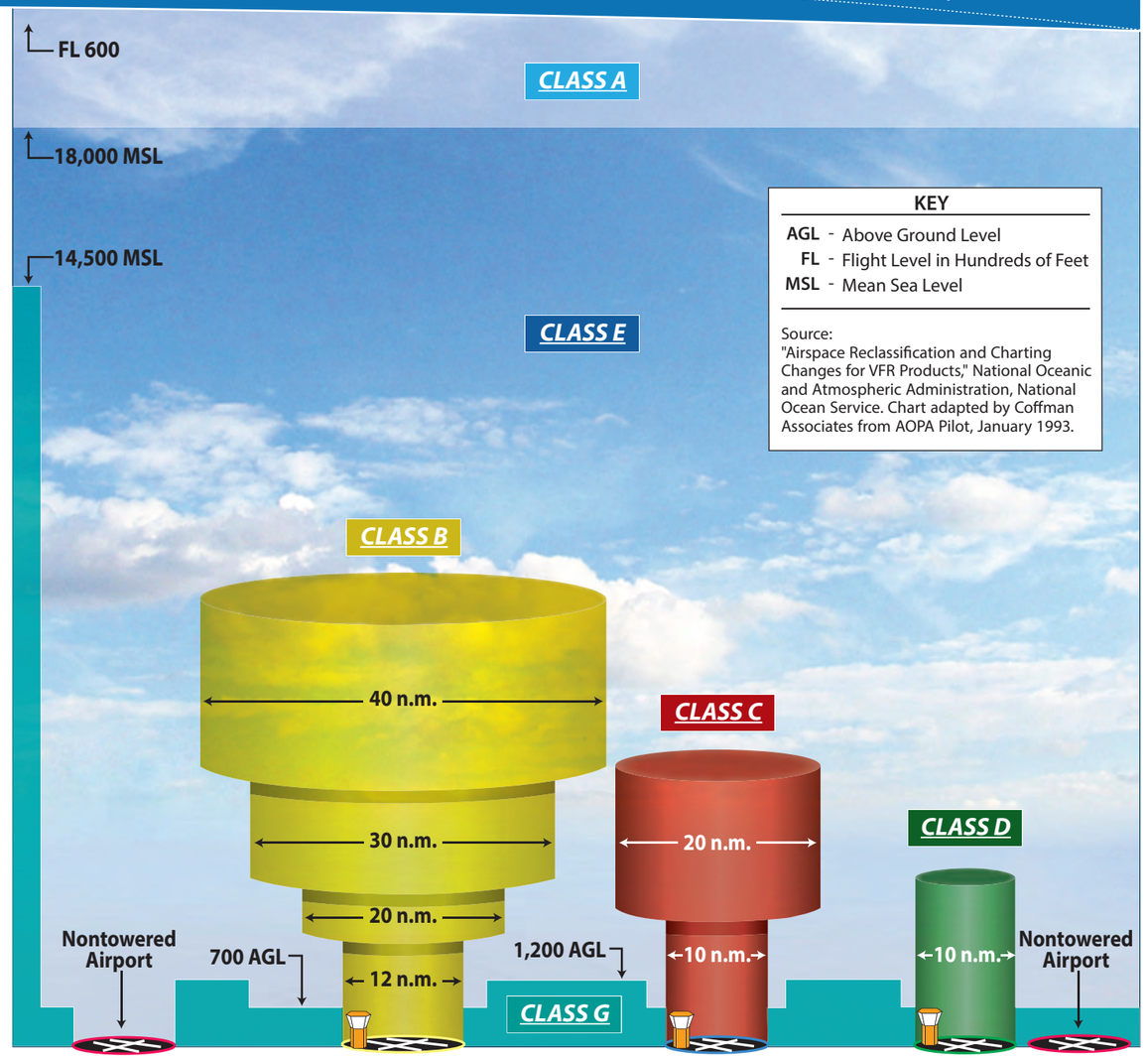
LEGEND

- Airport with other than hard-surfaced runways
- Airport with hard-surfaced runways 1,500' to 8,069' in length
- Airports with hard-surfaced runways greater than 8,069' or some multiple runways less than 8,069'
- VORTAC
- Non-Directional Radiobeacon (NDB)
- VOR Compass Rose
- Military Training Routes
- Victor Airways
- Class B Airspace
- Class D Airspace
- Mode C
- Class E (sfc) Airspace
- Class E Airspace with floor 700' above surface

Source:
Kansas City North Sectional Chart, US Department of Commerce, National Oceanic and Atmospheric Administration - November 12, 2015

NORTH
NOT TO SCALE

Note: Not to be used for navigation



DEFINITION OF AIRSPACE CLASSIFICATIONS

CLASS A Generally airspace above 18,000 feet MSL up to and including FL 600.

CLASS B Generally multi-layered airspace from the surface up to 10,000 feet MSL surrounding the nation's busiest airports.

CLASS C Generally airspace from the surface to 4,000 feet AGL surrounding towered airports with service by radar approach control.

CLASS D Generally airspace from the surface to 2,500 feet AGL surrounding towered airports.

CLASS E Generally controlled airspace that is not Class A, Class B, Class C, or Class D.

CLASS G Generally uncontrolled airspace that is not Class A, Class B, Class C, Class D, or Class E.

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with air traffic control facilities, visual flight can only be conducted if minimum visibility and cloud ceilings exist. When the ATCT is closed, Topeka Regional Airport reverts to Class E airspace.

Class G Airspace: Airspace not designated as Class A, B, C, D, or E is considered uncontrolled, or Class G, airspace. Air traffic control does not have the authority or responsibility to exercise control over air traffic within this airspace. Class G airspace lies between the surface and the overlaying Class E airspace (700 to 1,200 feet above ground level [AGL]).

Exhibit 1L shows the airspace structure surrounding Topeka Regional Airport.

SPECIAL USE AIRSPACE

Special use airspace is defined as airspace where activities must be confined because of their nature or where limitations are imposed on aircraft not taking part in those activities. The designation of special use airspace identifies for other users the areas where military activity occurs, provides for segregation of that activity from other fliers, and allows charting to keep airspace users informed. These areas are depicted on **Exhibit 1L**.

Military Operating Areas (MOAs): This special use airspace is established outside positive control areas to separate/segregate certain nonhazardous military activities from IFR traffic and to identify for VFR traffic where these activities are conducted. MOAs are established to contain certain military activities, such as air combat maneuvers, air intercepts, acrobatics, etc. The Riley MOA is the closest to Topeka and is approximately 50 miles to the west.

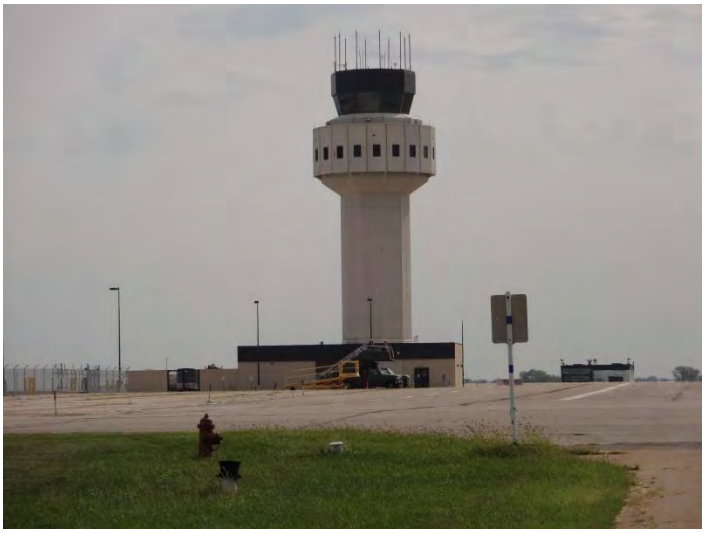
Military Training Routes: Military training routes (MTRs) are designated airspace that has been generally established for use by high performance military aircraft to train below 10,000 feet AGL and in excess of 250 knots. There are VR (visual) and IR (instrument) designated MTRs. MTRs with no segment above 1,500 feet AGL will be designated with the VR or IR, followed by a four-digit number (e.g., VR1257). MTRs with one or more segments above 1,500 feet AGL are identified by the route designation followed by a three-digit number (e.g., VR540). The arrows on the route show the direction of travel. The MTRs are not in close proximity to the Airport. VR511 and VR 512 are approximately 30 miles to the west, and IR504 is approximately 30 miles to the south.

Victor Airways: For aircraft arriving or departing the area using very high frequency omni-directional range (VOR) facilities, a system of Federal Airways, referred to as Victor Airways, has been established. Victor Airways are corridors of airspace eight miles wide that extend upward from 1,200 feet AGL to 18,000 feet MSL and extend between VOR navigational facilities. There are numerous Victor Airways leading to and from the Topeka VORTAC facility located approximately 15 miles northeast of the Airport.

Restricted Airspace: No person may operate an aircraft within a restricted area between the designated altitudes and during the time of designation without advanced permission of the using and controlling agency. The closest Restricted Airspace is R-3602A and B which are approximately 60 miles to the east.

This restricted airspace is from the surface to 29,000 feet MSL. The controlling agency is FAA Kansas City Air Route Traffic Control Center and the using agency is Fort Riley.

AIRSPACE CONTROL



The airport traffic control tower (ATCT) is one of the most visible structures at the Airport. It is located on the central ramp area, north of the commercial terminal ramp. Air traffic controllers staff the ATCT from 5:45 a.m. to 10:00 p.m. daily. Tower controllers provide services to aircraft operating on the Airport and generally within a five-mile radius of the Airport. When the tower is closed, the airspace is turned over to the Kansas City Air Route Traffic Control Center (ARTCC).

The ATCT is operated as part of the FAA contract tower program in which the controllers are employed by a private company that is certified by the FAA. The ATCT staff provides approach, departure, and ground control at the Airport. The tower was constructed in 2003 and it is 137 feet tall. Tower staff has full visual range of the entire airfield except for portions of the Army National Guard ramp in the southwest corner of the Airport.

NAVIGATIONAL AIDS

Navigational aids are electronic devices that transmit radio frequencies, which pilots of properly equipped aircraft can translate into point-to-point guidance and position information. The types of electronic navigational aids available for aircraft flying to or from Topeka Regional Airport include a very high frequency omni-directional range (VOR) facility, the global positioning system (GPS), and a non-directional beacon (NDB).

The VOR, in general, provides azimuth readings to pilots of properly equipped aircraft transmitting a radio signal at every degree to provide 360 individual navigational courses. Frequently, distance measuring equipment (DME) is combined with a VOR facility (VOR-DME) to provide distance as well as direction information to the pilot. Military tactical air navigation aids (TACANs) and civil VORs are commonly combined to form a VORTAC. The VORTAC provides distance and direction information to both civil and military pilots. The Topeka VORTAC is located approximately 12 miles to the northeast. There is a TACAN on the infield of the Airport; however, it is reserved for use by the military.



GPS is an additional navigational aid for pilots. GPS was initially developed by the United States Department of Defense for military navigation around the world. GPS differs from a VOR, in that pilots are not required to navigate using a specific facility. GPS uses satellites placed in orbit around the earth to transmit electronic radio signals, which pilots of properly equipped aircraft use to determine altitude, speed, and other navigational information. With GPS, pilots can directly navigate to any airport in the country and are not required to navigate to a specific ground-based navigation facility.

Many airports are equipped with an Instrument Landing System (ILS). The ILS serving Runway 31 is comprised of localizer and glideslope equipment. The localizer provides an instrument approach course for horizontal alignment with runway centerline and transmits on an eight element antenna array. The glideslopes provide vertical guidance for landing aircraft and transmit on a three element capture effect antenna. Additionally, the Runway 31 MALSR is a high intensity approach lighting system providing visual alignment information on the extended course centerline.

INSTRUMENT APPROACH PROCEDURES

Instrument approach procedures are a series of predetermined maneuvers established by the FAA, using electronic navigational aids that assist pilots in locating and landing at an airport, especially during instrument flight conditions. There are currently 12 published instrument approach procedures, including one ILS instrument approach to Runway 31. Precision instrument approaches provide vertical descent information and course guidance information to the pilot. Non-precision approaches only provide course guidance to the pilot; however, the relatively new GPS localizer performance with vertical guidance (LPV) approaches are currently categorized by the FAA as a non-precision approach even though it provides vertical guidance.

The capability of an instrument approach procedure is defined by the visibility and cloud ceiling minimums associated with the approach. Visibility minimums define the horizontal distance the pilot must be able to see in order to complete the approach. Cloud ceilings define the lowest level a cloud layer (defined in feet above the ground) can be situated for the pilot to complete the approach. If the observed visibility or cloud ceilings are below the minimums prescribed for the approach, the pilot cannot complete the instrument approach. **Exhibit 1M** summarizes FAA approved and published instrument approach procedures, including associated weather minimums for Topeka Regional Airport.

The most sophisticated instrument approach procedure available at the Airport is associated with the ILS to Runway 31. The ILS instrument approach provides visibility minimums as low as ½-mile (2,400 feet RVR) and cloud ceilings of 200 feet AGL (referred to as a Category I approach).

The capability of an instrument approach procedure is defined by the visibility and cloud ceiling minimums associated with the approach.

Instrument approaches based on the global positioning system (GPS) have become very common across the country. GPS is inexpensive, as it does not require a significant investment in ground-based systems by the airport or FAA. All four runway ends at Topeka Regional Airport are served by GPS approaches with associated minima presented on **Exhibit 1M**. GPS LPV approaches provide both horizontal and vertical guidance information to pilots. Advancements in GPS technology have allowed instrument approach procedures to provide minimums nearly as low as more traditional ILS systems. Currently, the GPS approaches to all runways include an LPV component.

LOCAL CONDITIONS

Various pilot information services identify potential obstructions in the vicinity of the Airport which pilots should be aware. On the approach to Runway 13, there are 35-foot tall trees located approximately 1,750 feet from the runway end and 300 feet to the left of centerline. A minimum 44:1 slope is necessary to clear the trees. On the approach to Runway 31, there are 59-foot tall trees located approximately 2,900 feet from the runway end and 500 feet to the left of centerline. A 45:1 approach slope is recommended to clear the trees. On the approach to Runway 21, there are trees that are 36 feet tall located approximately 1,850 feet from the runway end and 200 feet to the right of centerline. A 45:1 approach slope is recommended to clear these trees.

The Airport publishes several alerts for pilots which include the possibility of migratory birds in the vicinity of the Airport especially from March to May and from September to November. The Airport also requests that pilots avoid overflight of the Montara residential neighborhood for noise abatement. This neighborhood is located approximately two miles west of Runway 13. Finally, pilots should be aware of the two National Guard units based at the Airport. Pilots should not inadvertently enter the restricted areas associated with these units.

RUNWAY USE AND TRAFFIC PATTERNS

The Airport elevation is 1,079 feet above mean sea level. Runways 31 and 21 have standard left-hand traffic patterns. Runways 13 and 3 have non-standard right-hand traffic patterns. Light/slow aircraft have a traffic pattern altitude of 1,000 feet AGL and heavy/fast aircraft have a traffic pattern altitude of 1,500 feet AGL.

CIVILIAN USE INSTRUMENT APPROACHES

	WEATHER MINIMUMS BY AIRCRAFT TYPE				
	Category A	Category B	Category C	Category D	Category E
ILS or LOC Runway 31					
Straight-In ILS	200'/½-mile				
Straight-In LOC	423'/½-mile		423'/¾-mile	423'/1-mile	
Circling	442'/1-mile	502'/1-mile	502'/1½-mile	562'/2-mile	642'/2¼-mile
RNAV (GPS) Runway 31					
LPV DA	261'/½-mile				NA
LNAV/VNAV DA	320'/½-mile			320'/¾-mile	NA
LNAV MDA	543'/1-mile		463'/¾-mile	463'/1-mile	NA
Circling	442'/1-mile	502'/1-mile	502'/1½-mile	562'/2-mile	NA
RNAV (GPS) Runway 13					
LPV DA	250'/¾-mile				NA
LNAV/VNAV DA	440'/1½-mile				NA
LNAV MDA	475'/¾-mile		475'/1¼-mile	475'/1½-mile	NA
Circling	462'/1½-mile	502'/1½-mile		562'/2-mile	NA
NDB Runway 13					
Straight-In	615'/¾-mile		615'/1½-mile		NA
Circling	602'/1-mile		602'/1¾-mile	602'/2-mile	NA
Zaglu Fix Minimums					
Straight-In	515'/¾-mile		515'/1¼-mile		NA
Circling	502'/1-mile		502'/1½-mile	562'/2-mile	NA
RNAV (GPS) Runway 3					
LPV DA	250'/¾-mile				NA
LNAV/VNAV DA	283'/⅞-mile				NA
LNAV MDA	382'/1-mile		382'/1⅛-mile		NA
Circling	442'/1-mile	502'/1-mile	502'/1½-mile	622'/2-mile	NA
VOR/DME Runway 3					
Straight-In	422'/1-mile		422'/1¼-mile		NA
Circling	441'/1-mile	501'/1-mile	501'/1½-mile	561'/2-mile	NA
RNAV (GPS) Runway 21					
LPV DA	264'/1-mile				NA
LNAV/VNAV DA	250'/¾-mile				NA
LNAV MDA	393'/1-mile		393'/1⅛-mile		NA
Circling	442'/1-mile	502'/1-mile	502'/1½-mile	622'/2-mile	NA
VOR/DME Runway 21					
Straight-In	393'/1-mile			393'/1¼-mile	NA
Circling	441'/1-mile	501'/1-mile	501'/1½-mile	561'/2-mile	NA

NOT FOR CIVILIAN USE INSTRUMENT APPROACHES

	WEATHER MINIMUMS BY AIRCRAFT TYPE				
	Category A	Category B	Category C	Category D	Category E
TACAN Runway 31					
Straight-In	423'/½-mile		423'/¾-mile		423'/1-mile
Circling	442'/1-mile	502'/1-mile	502'/1½-mile	562'/2-mile	642'/2¼-mile
Philip Billard Muni Altimeter Setting Minimums					
Straight-In	483'/½-mile		483'/¾-mile	483'/1-mile	483'/1¼-mile
Circling	502'/1-mile	562'/1-mile	562'/1½-mile	622'/2-mile	702'/2½-mile
HI-TACAN Runway 31					
Straight-In	NA	NA	423'/¾-mile	423'/1-mile	
Circling	NA	NA	501'/1½-mile	561'/2-mile	641'/2¼-mile
TACAN Runway 13					
Straight-In	435'/¾-mile		435'/1-mile	435'/1¼-mile	
Circling	442'/1-mile	502'/1-mile	502'/1½-mile	562'/2-mile	642'/2¼-mile
Philip Billard Muni Altimeter Setting Minimums					
Straight-In	495'/¾-mile		495'/1-mile	495'/1¼-mile	495'/1½-mile
Circling	502'/1-mile	562'/1-mile	562'/1½-mile	622'/2-mile	702'/2½-mile
HI-TACAN Runway 13					
Straight-In	NA	NA	435'/1¼-mile	435'/1½-mile	
Circling	NA	NA	501'/1½-mile	561'/2-mile	641'/2¼-mile
TACAN Runway 3					
Straight-In	422'/1-mile		422'/1¼-mile		NA
Circling	441'/1-mile	501'/1-mile	501'/1½-mile	561'/2-mile	NA
TACAN Runway 21					
Straight-In	393'/1-mile			393'/1¼-mile	NA
Circling	441'/1-mile	501'/1-mile	501'/1½-mile	561'/2-mile	NA

Aircraft categories are based on the approach speed of aircraft, which is determined as 1.3 times the stall speed in landing configuration as follows:

Category A: 0-90 knots (e.g., Cessna 172)
Category B: 91-120 knots (e.g., Beechcraft KingAir)
Category C: 121-140 knots (e.g., Canadair Challenger, Boeing 737)
Category D: 141-166 knots (e.g., Gulfstream IV, Boeing MD-88)
Category E: Greater than 166 knots (e.g Certain large military or cargo aircraft)

Abbreviations:
GPS - Global Positioning System
LPV - A technical variant of GPS (Localizer Performance with Vertical Guidance)
LNAV/RNAV/VNAV - A technical variant of GPS (Lateral, Area, Veretical Navigation)
TACAN - Tactical Air Navigation
DA - Decision Altitude (Used for non-precision approaches)
ILS - Instrument Landing System
LOC - Localizer
MDA - Minimum Decision Altitude
VOR - Very-high-Frequency Omni-directional Range Facility
DME- Distance Measuring Equipment
Note: (xxx'/ x-mile) = Cloud ceiling height/Visibility minimum



Source: U.S. Terminal Procedures - Northcentral Region (Effective October 15, 2015)

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Identification of the general runway use percentages by aircraft type aids in various environmental analysis and in determining aircraft movement efficiency. **Table 1F** presents the runway use percentage as estimated by ATCT personnel.

TABLE 1F
Runway Use Percent
Topeka Regional Airport

Aircraft Type	Runway 13-31	Runway 3-21
Business Jets	80%	20%
Turboprop	85%	15%
Piston	50%	50%
Helicopter	50%	50%
Military	80%	20%
Touch and Go	80%	20%

Source: Interview with ATCT personnel.

REGIONAL AIRPORTS/AIRPORT SERVICE AREA

A review of public-use airports within the vicinity of Topeka Regional Airport has been made to identify and distinguish the type of air service provided in the region. Information pertaining to each airport was obtained from FAA records with a summary provided on **Exhibit 1N**.

The exhibit shows detail for the five closest public use airports. Clearly none of these airports provides a similar runway length but four of them provide a similar level of service for the general aviation community. Several of the regional airports have businesses that provide extensive maintenance and repair services, which are limited at Topeka Regional Airport. Several also provide precision instrument approaches capability (i.e., CAT-I ILS) similar to what is available at Topeka Regional Airport.

The service area for an airport is primarily defined by its proximity to other airports providing a similar level of service. The general aviation service area for Topeka Regional Airport will be limited by the proximity of Philip Billard Municipal Airport and Lawrence Municipal Airport. The general aviation service area may extend more to the west than the east; however, the potential for aircraft ownership is less as the population is lower to the west. For general aviation services, the airport service area is limited to Shawnee County and the surrounding counties, including Jackson, Jefferson, Osage, and Wabaunsee.

As a certificated FAR Part 139 (commercial service) airport, Topeka Regional Airport may also define a commercial service area. This service area is limited by the proximity of Kansas City International Airport located 70 miles to the east and Manhattan Regional Airport located approximately 60 miles to the west.

LANDSIDE FACILITIES

Landside facilities support the aircraft and pilot/passenger transition between air and ground. Typical landside facilities include the passenger terminal complex, on-airport buildings and hangars, general aviation facilities, and support facilities (i.e., fuel storage, vehicle parking, roadway access, snow removal equipment, and aircraft rescue and firefighting). An overview of the landside facilities and building inventory are depicted on **Exhibit 1P**.

AVIATION BUSINESSES

Million Air is the fixed base operator (FBO) at the Airport. They provide essential services to the general aviation community including fueling, aircraft storage, and line services. A significant portion of their business is providing services for Fort Riley deployments and arrivals that take place at the Airport. Million Air leases several hangars, terminal building space, and a smaller general aviation line service building immediately south of the terminal building.

There are several other aviation businesses utilizing and leasing space at the Airport. Aviation businesses based at the Airport are listed in **Table 1G**. In addition, the Topeka Regional Business Center, most of which is on Airport property, has more than 70 non-aviation businesses providing lease income to the Airport.

TABLE 1G
Airport Aviation Businesses
Topeka Regional Airport

Building Number	Business Name	Business Function
612	American Flight Museum	Museum
602, 604	Combat Air Museum	Museum
628	Departure/Arrival Control Group (DACG)	Military Troop Processing
620	FAA	Airway Facility Office
178, 600, 601, 609, 610, 613, 619, 627, 697	Freeman Holdings, LLC	Million Air FBO
626	Gary Properties LLC	Hangar/Office Leasing
636, 680 ,681 ,681, 684, 688	Kansas Army National Guard	Military
696	Midwest Air Traffic Control	Control Tower
667	Shawnee County Sheriff	Firing Range
621, Helipad #1	Topeka Air Ambulance	Helicopter Ambulance
669	Topeka Police Department	Firing Range
619	US Army Corps of Engineers	Federal Engineering
619	US Navy Defense Distribution Center	Military
626	Vaerus Aviation, Inc.	Charter Flight Operations
662, 663, 664, 665, 666, 750, 760, 770, 775 (numerous others not listed)	Kansas Air National Guard	Military

Source: Airport records (Exhibit 1P)

AIRCRAFT HANGARS

While the Airport owns many buildings, hangars, and other structures, it is important to identify those hangars that may be used for storage/parking of active aircraft. By having a reasonable estimate of the baseline hangar capacity, a determination of future hangar needs can be made based upon forecast hangar demand. It is estimated that there is approximately 165,000 square feet of hangar space at the Airport that could be utilized for storage/parking of active aircraft.

PHILIP BILLARD MUNICIPAL AIRPORT (TOP) - 7 nm N of FOE

Airport Classification: Publicly Owned/Public Use
NPIAS ..... Non-Primary GA
FAA GA Asset Study ..... Regional
KASP ..... Regional
Elevation ..... 881' MSL
Weather Reporting ..... ASOS
ATCT ..... Yes (7:00am - 7:00pm)
Annual Operations 58,000
Based Aircraft 60



RUNWAYS	13-31	18-36	4-22
Length	5,099	4,331	3,001
Width	100	75	100
Pavement Strength			
SWL	50,000	60,000	29,000
DWL	72,000	80,000	NA
DTWL	110,000	96,000	NA
Lighting	HIRL	MIRL	MIRL
Marking	Precision	Non-precision	Basic
Visual Approach Aids	MALSR (13); VASI-4L (31);REIL (31)	VASI-4L (18); VASI-4R (36); REIL (18)	NA
Instrument Approaches	ILS (13); GPS; LOC BC (31)	GPS	GPS; VOR (22)

Services Provided - Fuel, Maintenance and Repair, Hangar Storage, Tiedowns, Charter, Flight Training, Aircraft Rental and Sales

LAWRENCE MUNICIPAL AIRPORT (LWC) - 21 nm E of FOE

Airport Classification: Publicly Owned/Public Use
NPIAS ..... Non-Primary GA
FAA GA Asset Study ..... Regional
KASP ..... Regional
Elevation ..... 833' MSL
Weather Reporting ..... ASOS
ATCT ..... NA
Annual Operations 33,000
Based Aircraft 55



RUNWAYS	15-33	1-19
Length	5,700	3,901
Width	100	75
Pavement Strength		
SWL	40,000	12,500
DWL	60,000	15,600
Lighting	MIRL	MIRL
Marking	Precision	Non-precision
Visual Approach Aids	MALSR (33); PAPI-4L	PAPI-2L; REIL
Instrument Approaches	ILS (33); GPS; LOC (33)	NA

Services Provided -Fuel, Maintenance and Repair, Hangar Storage, Tiedowns, Charter, Flight Training, Aircraft Rental and Sales

OTTAWA MUNICIPAL AIRPORT (OWI) - 31 nm SE of FOE

Airport Classification: Publicly Owned/Public Use
NPIAS ..... Non-Primary GA
FAA GA Asset Study ..... Local
KASP ..... Business
Elevation ..... 966' MSL
Weather Reporting ..... NA
ATCT ..... NA
Annual Operations 4,000
Based Aircraft 42



RUNWAYS	17-35	13-31 (Turf)
Length	4,500	1,785
Width	75	95
Pavement Strength		
SWL	30,000	NA
DWL	30,000	NA
Lighting	MIRL	MIRL
Marking	Non-precision	Non-precision
Visual Approach Aids	PAPI-2L, REIL	NA
Instrument Approaches	GPS	NA

Services Provided - Fuel, Hangar Storage, Tiedowns, Flight Training

NEW CENTURY AIRCENTER (IXD) - 37 nm E of FOE

Airport Classification: Publicly Owned/Public Use
NPIAS ..... Non-Primary Reliever
FAA GA Asset Study ..... Regional
KASP ..... Regional
Elevation ..... 1,087' MSL
Weather Reporting ..... ASOS
ATCT ..... Yes (6:00 am - 10:00 pm)
Annual Operations 46,000
Based Aircraft 93

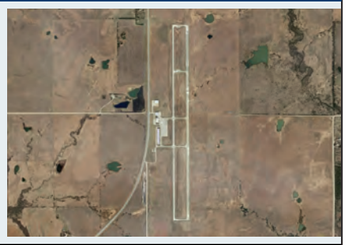


RUNWAYS	18-36	4-22
Length	7,339	5,132
Width	150	100
Pavement Strength		
SWL	75,000	47,000
DWL	175,000	55,000
DTWL	350,000	NA
Lighting	HIRL	MIRL
Marking	Precision	Non-precision
Visual Approach Aids	MALSR (36); VASI-4L (18); REIL (18)	PAPI-4L
Instrument Approaches	ILS (36); LOC/DME (36); GPS	NA

Services Provided - Fuel, Maintenance and Repair, Hangar Storage, Tiedowns, Charter, Flight Training, Aircraft Rental and Sales

COFFEY COUNTY AIRPORT (UKL) - 39 nm S of FOE

Airport Classification: Publicly Owned/Public Use
NPIAS ..... Non-Primary GA
FAA GA Asset Study ..... Local
KASP ..... Business
Elevation ..... 1,174' MSL
Weather Reporting ..... WX AWOS-3
ATCT ..... NA
Annual Operations 20,000
Based Aircraft 15



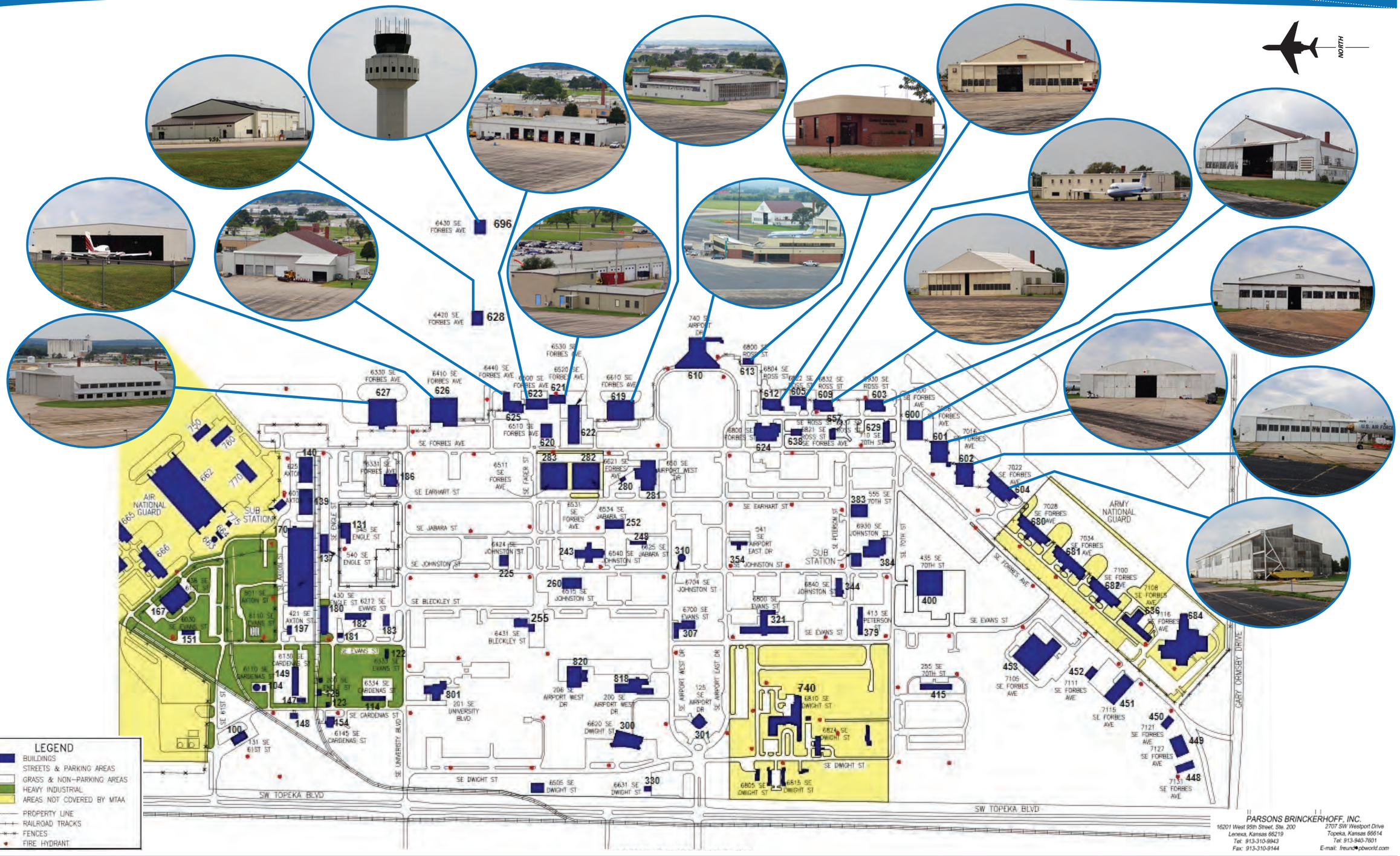
RUNWAYS	18-36
Length	5,500
Width	75
Pavement Strength	
SWL	30,000
DWL	NA
DTWL	NA
Lighting	MIRL
Marking	Non-precision
Visual Approach Aids	PAPI-4L
Instrument Approaches	GPS; NDB (36)

Services Provided - Fuel, Hangar Storage, Tiedowns, Passenger Lounge

KEY

- ASOS - Automated Surface Observation System
- ATCT - Airport Traffic Control Tower
- AWOS - Automated Weather Observation System
- DME - Distance Measuring Equipment
- DWL - Dual Wheel Loading
- DTWL - Dual Tandem Wheel Loading
- HIRL - High Intensity Runway Lighting
- ILS - Instrument Landing System
- LIRL - Low Intensity Runway Lights
- LOC - Localizer
- MALSR - Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights
- MIRL - Medium Intensity Runway Lighting
- NMASP - New Mexico Airport System Plan (2009)
- NPIAS - National Plan of Integrated Airport Systems
- ODALS - Omnidirectional Approach Lighting System
- PAPI - Precision Approach Path Indicator
- PLASI - Pulsating Light Approach Slope Indicator
- REIL - Runway End Identifier Lights
- RNAV - Area Navigation (GPS variant)
- SWL - Single Wheel Loading
- VASI - Visual Approach Slope Indicator
- VOR - VHF Omnidirectional Range

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PARSONS BRINCKERHOFF, INC.
16201 West 95th Street, Ste. 200
Lenexa, Kansas 66219
Tel: 913-310-9943
Fax: 913-310-9144
2707 SW Westport Drive
Topeka, Kansas 66614
Tel: 913-940-7801
E-mail: freund@pbworld.com

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Table 1H presents a list of the hangars at the Airport. All of the hangars are larger conventional style hangars that are capable of housing multiple aircraft. Several of these hangars no longer serve the purpose of housing active aircraft and are instead dedicated as aircraft museums. Other hangar types, such as T-hangars, which are intended to accommodate a single aircraft (typically a small single or multi-engine piston aircraft) are not available at the Airport. Those desiring a T-hangar are encouraged to lease at nearby Philip Billard Municipal Airport, also owned by the MTAA.

TABLE 1H
Civilian Aircraft Hangars
Topeka Regional Airport

Building Number	Total Square Footage	Estimated Square Footage for Active Aircraft	Lease Status
604	24,000	0	Air Combat Museum
602	24,000	0	Air Combat Museum
601	22,000	18,000	FBO Lease
600	21,000	19,000	FBO Lease
603	13,000	13,000	Airport Maintenance/Available
609	11,000	9,000	FBO Lease
605	8,500	7,000	Available
612	11,500	11,500	American Flight Museum
619	32,000	28,000	FBO Lease
621	4,200	3,000	Air Ambulance
625	11,000	9,000	Available
626	25,000	23,000	Vaerus Aviation
627	40,000	36,000	FBO Lease
TOTAL	**247,200**	**176,500**	

Source: Airport records.

COMMERCIAL TERMINAL COMPLEX

The passenger terminal complex is centrally located adjacent to Taxiway A. The major elements include a terminal building, terminal loop road, vehicle parking, and aircraft parking apron.

Terminal Building

The terminal building is a single level, simple design. Departing passengers will enter the building on the south end of the facility where they encounter the ticketing counters. From there, they can flow to a central waiting area. The passenger hold rooms are located to the east closer to the gate areas. Arriving passengers will deplane and enter the building at the gates, and then flow to the north side of the terminal building to baggage claim and transportation counters. These passengers will exit at the north end of the building.

The terminal building was constructed in 1985 and it encompasses approximately 44,000 square feet of space. There are three aircraft gates: two are designated for ground level boarding and one is elevated for second level boarding of larger aircraft. **Exhibit 1Q** illustrates the existing terminal building layout and available vehicle parking.

Terminal Access Roadways

The terminal building is located on SE Airport Drive, which is a two-lane, one-direction, terminal loop road. The loop road has an entrance and exit at intersections with Forbes Avenue. Airport Drive continues west to intersect with Southwest Topeka Boulevard.

In front of the terminal building is the terminal curb which is available for passenger drop-off and pick-up. The terminal curb is approximately 35 feet wide and extends the length of the terminal building, a distance of approximately 530 feet.

Vehicle Parking

The passenger terminal complex has a vehicle parking lot situated within the terminal loop road. There are 134 short term spaces, 130 intermediate spaces and 361 long term spaces. In total there are 625 terminal area parking spaces.

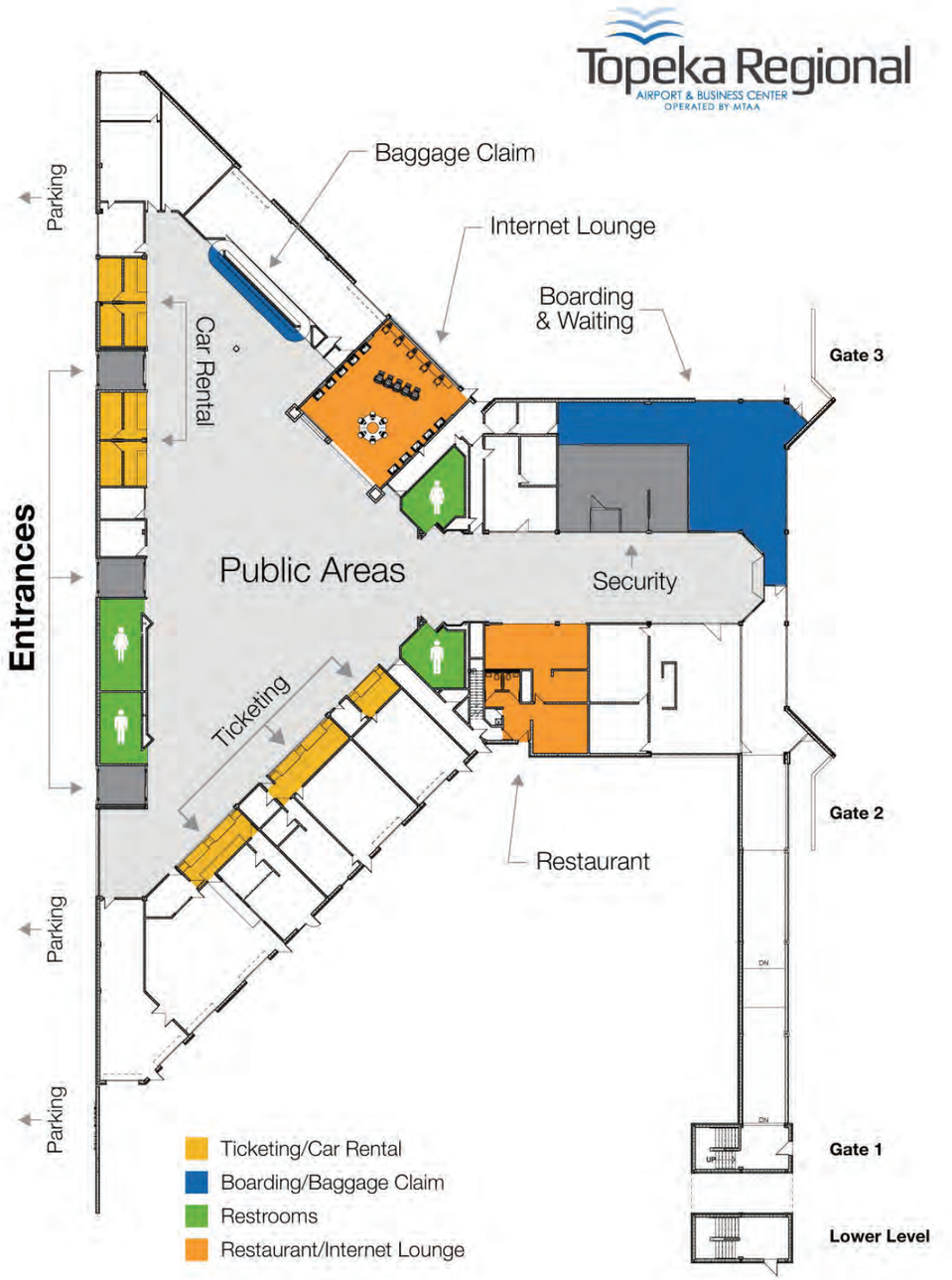
AIRCRAFT APRONS



As is typical with many former military airfields, there are large expanses of aircraft apron areas. At Topeka Regional Airport, these aprons have been segmented to serve specific aviation needs. The main terminal area apron serving the terminal building encompasses approximately 60,000 square yards of pavement. The apron to the immediate south of the terminal apron encompasses approximately 89,000 square yards. Immediately north of the terminal apron is an apron encompassing approximately 135,000 square yards of pavement. There is a linear-shaped apron adjacent to Taxiway E which fronts several conventional hangars, which encompasses approximately 15,000 square yards of pavement. In total, accessible civilian apron areas encompass approximately 299,000 square yards of pavement.

A large portion of the apron area north of the ATCT has been abandoned and is no longer accessible to aircraft. This area encompasses approximately 218,000 square yards.


0
100
200
SCALE IN FEET
NORTH
Terminal Apron
Arrival Curb
Terminal Building
Long Term Parking 194 Spaces
Long Term Parking 167 Spaces
Intermediate Term Parking 130 Spaces
Short Term Parking 134 Spaces
Departure Curb
SE Forbes Ave.
SE Airport Dr.
SE Ross St.
GA Services Building


Topeka Regional
AIRPORT & BUSINESS CENTER
OPERATED BY MTAA
Parking
Baggage Claim
Internet Lounge
Boarding & Waiting
Gate 3
Car Rental
Entrances
Public Areas
Security
Ticketing
Gate 2
Restaurant
Parking
Parking
Gate 1
Lower Level
Ticketing/Car Rental
Boarding/Baggage Claim
Restrooms
Restaurant/Internet Lounge

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The Kansas Air National Guard occupies approximately 319,000 square yards of apron pavement at the north end of the flight line. The vast majority of this pavement is not on Airport property. At the south end of the flight line, the Kansas Army National Guard has a 40,000 square yard apron. Both of the military apron areas are on U.S. Air Force property. **Exhibit 1R** identifies the apron areas at the Airport.

SUPPORT FACILITIES

The previous sections addressed airside and landside facilities. This section discusses other related facilities that support airport operations.

Airport Rescue and Firefighting (ARFF)

14 CFR Part 139 airports are required to provide aircraft rescue and firefighting (ARFF) services during air carrier operations that require a Part 139 certificate. Each certificated airport maintains equipment and personnel based on an ARFF index established according to the length of aircraft and scheduled daily flight frequency. There are five indices, A through E, with A applicable to the smallest aircraft and E the largest (based on length). Topeka Regional Airport falls within ARFF Index A. As such, the Airport is required to maintain a fleet of equipment and properly trained personnel consistent with this standard.

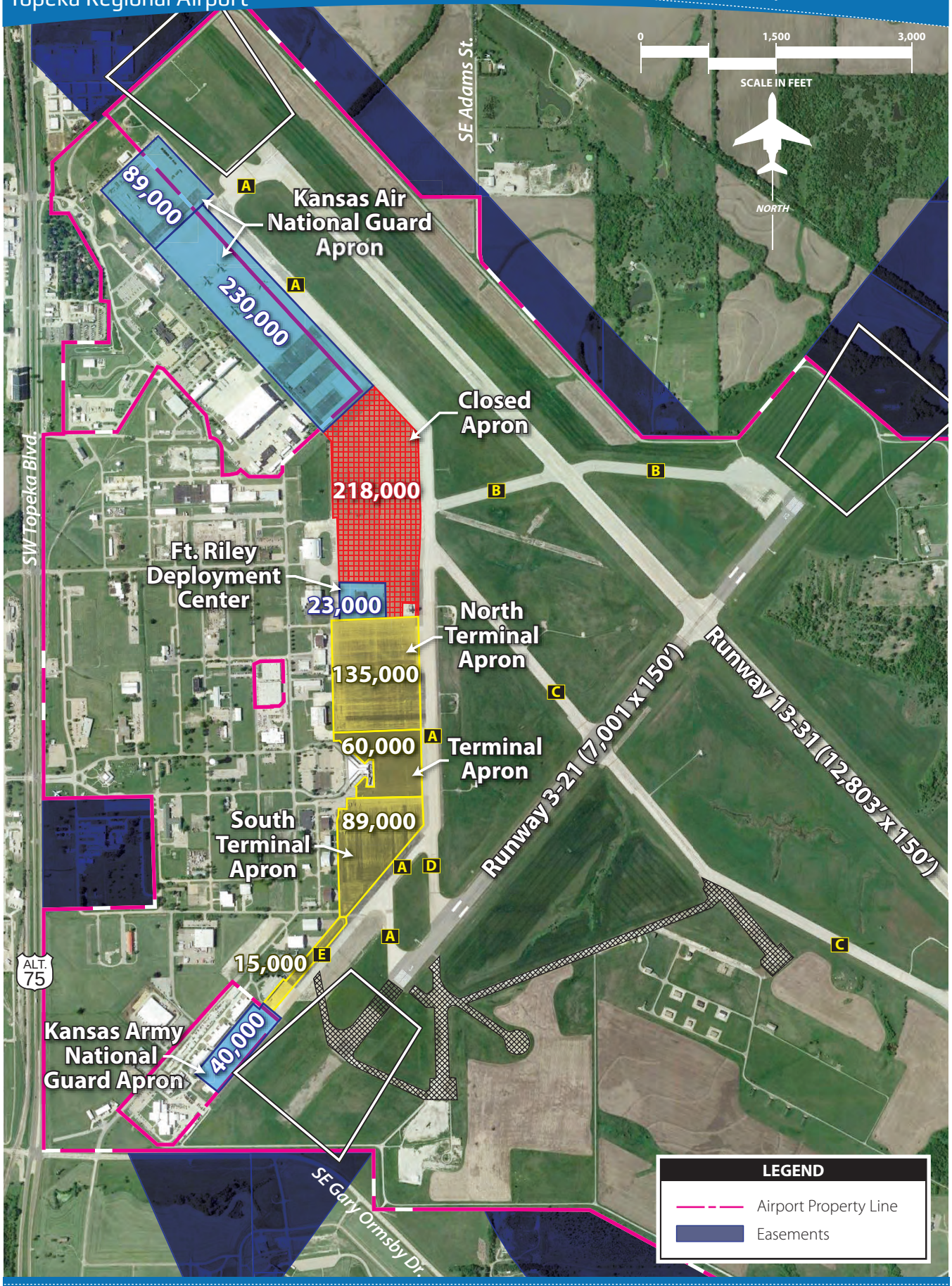
The Topeka Regional Airport ARFF facility is located approximately 1,000 feet north of the terminal building. It faces the north terminal apron providing ready access to the airfield. **Table 1J** lists the airport's ARFF equipment, including firefighting agent capacities.

TABLE 1J
Aircraft Rescue and Firefighting Equipment
Topeka Regional Airport

Year-Make-Model	Condition	Water (gal.)	AFFF (gal.)	AFFF %	Dry Chemical (lbs.)	Halotron (lbs.)
2006 E-One Crash Truck	Excellent	1,500	105	3%	450	150
1986 Oshkosh Crash Truck*	Good	1,500	205	3%	NA	NA

AFFF: Aqueous Film Forming Foam
*Reserve truck available when ARFF index C is needed.
Source: Airport Certification Manual

ARFF operations are provided by the Airport Police and Fire Department. A minimum of two personnel are on duty at all times. A communications link has been established between the ATCT and the ARFF station. A Mutual Assistance Agreement is also in place with the Kansas Air National Guard.



*Area measurements in square yards.

The ARFF station responsibility covers the airport property, including the Topeka Regional Business Center. The Airport has a Mutual Assistance Agreement with the Shawnee Heights Fire District for structural fires, should it become necessary. However, Index "A" requirements are maintained during any structural response.



The Air National Guard maintain their own ARFF facilities and equipment. The Airport has a Mutual Assistance Agreement with the ANG for support in case of an aircraft emergency. **Table 1K** lists the primary ARFF equipment based at the ANG.

TABLE 1K
Aircraft Rescue and Firefighting Equipment (ANG)
Topeka Regional Airport

Year-Make-Model	Pump	Water (gal.)	AFFF (gal.)	Dry Chemical (lbs.)
1994 P-23 Teledyne ARFF	2,000 gpm	3,300	500	500
1994 P-26 International Tender	1,250 gpm	5,000	NA	NA
1995 P-23 Teledyne ARFF	2,000 gpm	3,300	500	500
2006 P-19H Oshkosh ARFF	8,140 gpm	1,500	210	500
2011 P-34 Ford 550	90 gpm, UHP	400	50	NA
2012 P-22 Pierce Structural	1250 gpm	500	50	NA

Source: Air National Guard

Airport Maintenance and Snow Removal

Airport maintenance personnel handle most airport maintenance and all snow removal operations. The Airport does not have a maintenance building large enough to store all of the snow removal equipment (SRE) and general maintenance equipment in one location. The day-to-day equipment is located at 6331 SE Forbes Ave. (Building 186). Most of the SRE is stored at 6930 SE Ross St. (Hangar 603). Consideration has been given to repurposing Hangar 600 for non-aeronautical use and housing all equipment in one location.

Snow removal equipment is deployed when there is an accumulation of ½-inch of slush or two inches of snow. **Exhibit 1S** summarizes snow removal priority and lists the available snow removal equipment.

Fuel Storage

Under revised 14 CFR Part 139.321, *Handling and Storing of Hazardous Substances and Materials*, the FAA has clarified the airport operator's responsibility for fuel storage areas owned or operated by tenant

air carriers. Specifically, the FAA has deleted paragraph (h), which exempted the airport operator from overseeing Part 121 or 135 air carrier fueling operations to ensure compliance with Part 139 fuel fire safety requirements. Accordingly, the FAA holds airport operators responsible for protecting against fire and explosion in air carrier fuel storage facilities. This will ensure that all fuel storage facilities at Part 139 airports are inspected in the same manner and held to the same fuel fire safety standards.

The Airport owns the Jet A fuel farm that is located immediately east of the ATCT and Taxiway A. There are eight underground storage tanks; however, only two are currently utilized. These tanks are of steel construction, an older design, which can be prone to sediment buildup and leaks. Newer fuel storage tanks are constructed of epoxy, which reduces the possibility of sediment and leaks. The FBO (Million Air) installed a state-of-the-art filtration system on the two usable tanks in order to meet current safety standards. The FBO has indicated a need and desire for an additional 200,000 gallons of Jet A capacity.

The FBO owns three Jet A trucks, each with a 5,000-gallon capacity and one Jet A truck with a 10,000-gallon capacity. They also have one Avgas truck with a capacity of 750 gallons.

Security Fencing

The entirety of airport property is enclosed with security fencing topped with three strands of barbed/razor wire. There is over 52,000 linear feet of fencing which is regularly inspected. Some portions of the perimeter fencing are known to be inadequate for the prevention of wildlife entry onto the airport environment, as noted in the *Wildlife Hazard Management Plan*. The Airport plans to improve/upgrade the fencing as funding becomes available from the FAA.

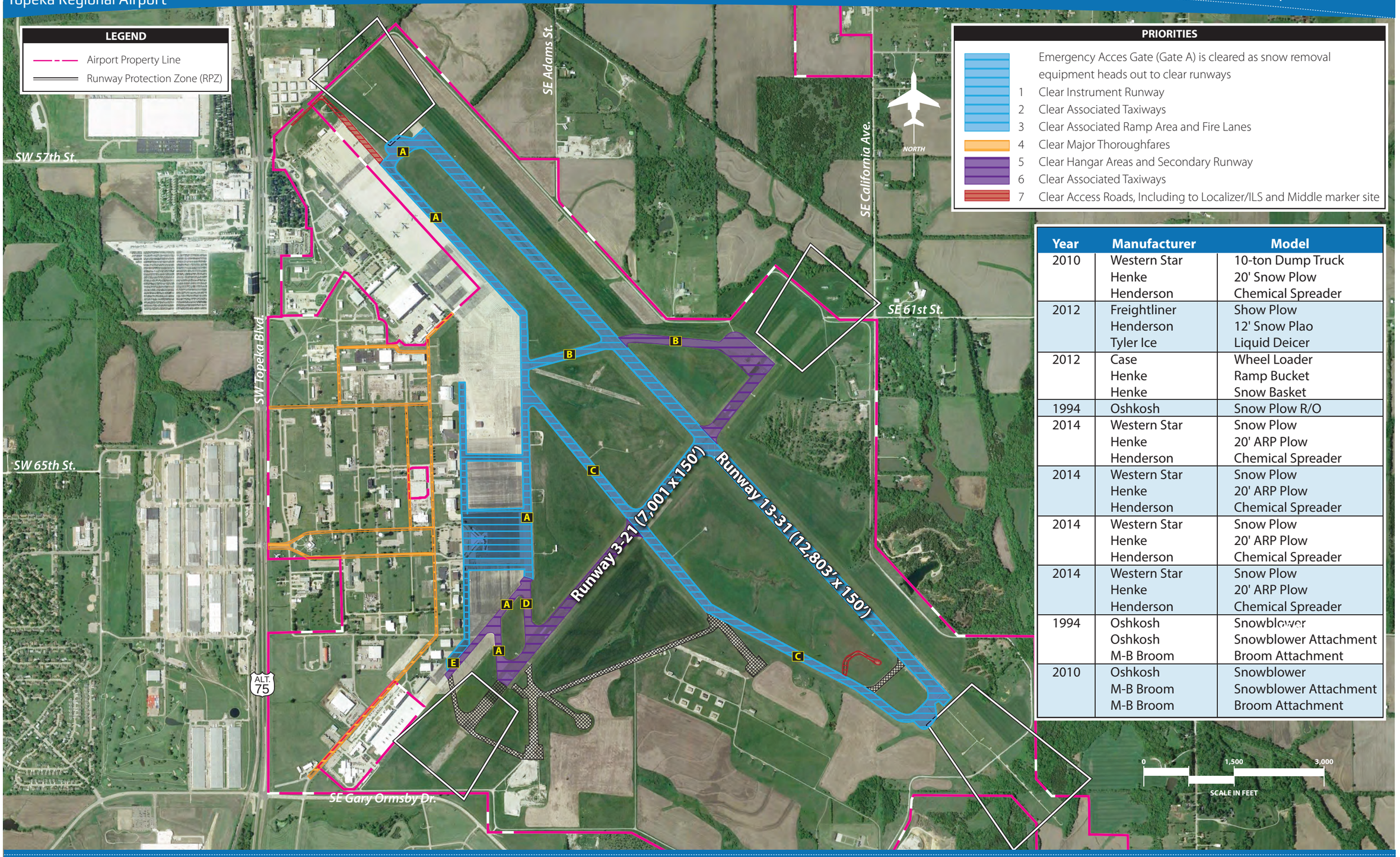
AIRPORT DOCUMENTS

There are a number of additional documents that the Airport maintains. The following briefly discusses each of these documents.

Rules and Regulations: This document outlines the airport rules for administration and tenants.

Minimum Standards: This document outlines the minimum requirements for potential tenants and business operators. The standards outlined in this document are intended to encourage and ensure the provision of adequate services and facilities, economic health, and orderly development of aviation and related aeronautical activities.

Wildlife Hazard Management Plan: As a Part 139 certificated airport and because of the potential for bird/wildlife aircraft strikes, the Airport completed a Wildlife Hazard Management Plan in 2011. The long-term goal for MTAA is to minimize the risk to aviation safety posed by wildlife species of concern on and around the airfield. To accomplish this, the plan outlines procedures for habitat modification which are intended to remove/relocate any hazardous wildlife on the airfield.



PRIORITIES

Emergency Acces Gate (Gate A) is cleared as snow removal equipment heads out to clear runways

1. Clear Instrument Runway
2. Clear Associated Taxiways
3. Clear Associated Ramp Area and Fire Lanes
4. Clear Major Thoroughfares
5. Clear Hangar Areas and Secondary Runway
6. Clear Associated Taxiways
7. Clear Access Roads, Including to Localizer/ILS and Middle marker site

Year	Manufacturer	Model
2010	Western Star Henke Henderson	10-ton Dump Truck 20' Snow Plow Chemical Spreader
2012	Freightliner Henderson Tyler Ice	Show Plow 12' Snow Plao Liquid Deicer
2012	Case Henke Henke	Wheel Loader Ramp Bucket Snow Basket
1994	Oshkosh	Snow Plow R/O
2014	Western Star Henke Henderson	Snow Plow 20' ARP Plow Chemical Spreader
2014	Western Star Henke Henderson	Snow Plow 20' ARP Plow Chemical Spreader
2014	Western Star Henke Henderson	Snow Plow 20' ARP Plow Chemical Spreader
2014	Western Star Henke Henderson	Snow Plow 20' ARP Plow Chemical Spreader
1994	Oshkosh Oshkosh M-B Broom	Snowblower Snowblower Attachment Broom Attachment
2010	Oshkosh M-B Broom M-B Broom	Snowblower Snowblower Attachment Broom Attachment

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Spill Prevention, Control, and Countermeasure Plan: This document provides guidance and regulations for the prevention and control of spills of potentially hazardous materials, particularly oil and fuel. It outlines procedures, including training, inspections, and storage requirements for spill prevention. It provides a methodology for reporting and responding to spills.

SOCIOECONOMIC CHARACTERISTICS

For an airport planning study, socioeconomic characteristics are collected and examined to derive an understanding of the dynamics of growth within the study area. Socioeconomic information related to the approximate airport service area is an important consideration in the master planning process. The primary service area for Topeka Regional Airport is Shawnee County and the surrounding counties. These counties combined comprise the metropolitan statistical area (MSA). The MSA is defined as Shawnee, Jackson, Jefferson, Osage, and Wood Counties. Other nearby counties and communities may influence aviation demand at the Airport, but serve as a secondary service area.

The historic trend in elements, such as population, employment, income, and earnings, provides insight into the long term socioeconomic condition of the region. This information is essential in determining aviation service level requirements, as well as forecasting aviation demand elements for airports. Aviation forecasts are typically related to the population base, economic strength of the region, and the ability of the region to sustain a strong economic base over an extended period of time.

Historical and forecast socioeconomic data for the Topeka MSA was obtained from Woods & Poole Economics - *Complete Economic and Demographic Data Source*, 2015. Woods & Poole utilizes information from the U.S. Census Bureau, as well as other national and state organizations for historic data to project future conditions. The information is presented on **Exhibit 1T**.

ENVIRONMENTAL INVENTORY

The purpose of the following environmental inventory is to identify potential environmental sensitivities that should be considered when planning future improvements at the Airport. Research was done for each of the 14 environmental impact categories described within the FAA's Order 1050.1F *Environmental Impacts: Policies and Procedures*. It was determined that the following resources are not present within the airport environs or cannot be inventoried because they are evaluated during project implementation:

Resources Not Present

- Coastal Resources (Coastal Barriers and Coastal Zones) – the airport is inland and not subject to any coastal restrictions.
- Wild and Scenic Rivers – there are no designated Wild and Scenic Rivers within the State of Kansas.
- Resources that were not inventoried

- Visual effects (including light emissions)
- Natural resources and energy supply
- Noise and compatible land use
- Visual effects (including light emissions)

Land use, which was discussed previously in this chapter, is also identified as an environmental impact category within FAA Order 1050.1F.

The following sections provide a discussion of the remaining resource categories.

AIR QUALITY

Air quality in a given location is described by the concentrations of various pollutants in the atmosphere. The significance of a pollution concentration is determined by comparing it to the state and federal air quality standards. In 1971, the U.S. Environmental Protection Agency (EPA) established standards that specify the maximum permissible short-term and long-term concentrations of various air contaminants. The National Ambient Air Quality Standards (NAAQS) consist of primary and secondary standards for six criteria pollutants which include: Ozone (O_3), Carbon Monoxide (CO), Sulfur Dioxide (SO_2), Nitrogen Oxide (NO_x), Particulate matter (PM_{10} and $PM_{2.5}$), and Lead (Pb).

Based on both federal and state air quality standards, a specific geographic area can be classified as either an "attainment," "maintenance," or "non-attainment" area for each pollutant. The threshold for non-attainment designation varies by pollutant. Topeka Regional Airport is located in Shawnee County, Kansas, which is designated as an attainment area for all federal criteria pollutants.

BIOLOGICAL RESOURCES

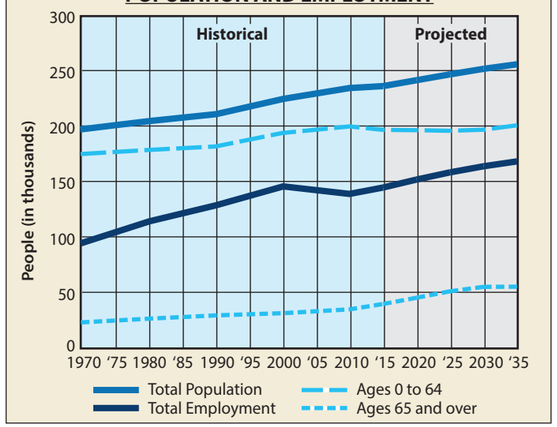
Biological resources include the various types of plants and animals that are present in a particular area. The term also applies to rivers, lakes, wetlands, forests, and other habitat types that support plants, birds, and/or fish. Typically, development in areas such as previously disturbed airport property, populated places, or farmland would result in minimal impacts to biotic resources.

The U.S. Fish and Wildlife Service (USFWS) is charged with overseeing the requirements contained within Section 7 of the *Endangered Species Act*. This Act was put into place to protect animal or plant species whose populations are threatened by human activities. Along with the FAA, the USFWS reviews projects to determine if a significant impact to these protected species will result with implementation of a proposed project. Significant impacts occur when the proposed action could jeopardize the continued existence of a protected species or would result in the destruction or adverse modification of federally designated critical habitat in the area.

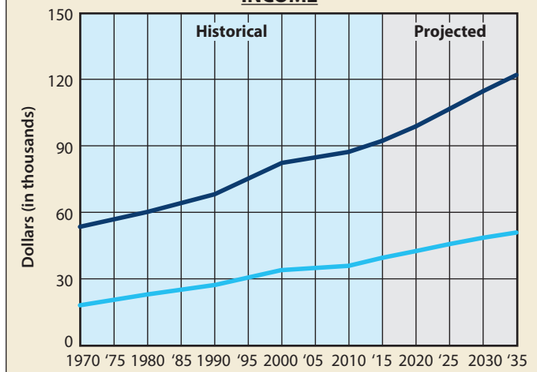
	HISTORICAL						PROJECTED				
	1970	1980	1990	2000	2010	2015	2020	2025	2030	2035	AAGR (2015-2035)
POPULATION											
Total Population	197,605	204,194	210,598	224,859	234,233	235,974	241,303	246,590	251,573	255,683	0.40%
Ages 0 to 64 (in thousands)	174,522	177,771	181,413	193,489	199,604	196,529	196,207	195,669	196,651	200,620	0.10%
Ages 65 and over (in thousands)	23,083	26,423	29,185	31,370	34,629	39,445	45,096	50,921	54,922	55,063	1.68%
Median Age (Years)	28.11	30.91	34.21	37.49	39.1	39.29	39.07	39.38	39.39	39.34	0.01%
Male	96,936	99,240	102,121	109,614	114,327	115,625	118,269	120,989	123,399	125,406	0.41%
Female	100,669	104,954	108,477	115,245	119,906	120,349	123,034	125,601	128,174	130,277	0.40%
Total Households	64,490	76,676	82,184	89,863	94,635	99,307	102,136	103,887	104,763	104,923	0.28%
Persons Per Household	2.95	2.59	2.5	2.44	2.42	2.33	2.31	2.32	2.35	2.39	0.13%
EMPLOYMENT											
Total Employment (In Thousands)	95,349	113,888	128,056	145,291	138,744	144,492	151,696	158,195	163,688	168,094	0.76%
Farm	5,337	5,754	5,133	4,957	4,516	4,471	4,599	4,704	4,785	4,846	0.40%
Forestry, Fishing, Related Activities And Other	140	121	188	252	279	331	343	354	367	379	0.68%
Mining	272	304	299	291	792	1,175	1,244	1,316	1,392	1,471	1.13%
Utilities	1,183	1,270	1,141	1,049	1,036	931	950	968	983	992	0.32%
Construction	5,159	5,900	6,132	8,057	7,093	7,734	8,422	8,957	9,228	9,350	0.95%
Manufacturing	8,555	8,917	8,356	8,586	7,329	7,476	7,518	7,517	7,408	7,237	-0.16%
Wholesale Trade	2,357	4,556	3,467	3,166	3,791	4,069	4,181	4,252	4,273	4,259	0.23%
Retail Trade	11,225	13,012	16,241	18,211	13,117	13,597	14,069	14,250	14,397	14,517	0.33%
Transportation And Warehousing	5,035	5,407	4,807	4,316	3,570	4,059	4,256	4,473	4,687	4,881	0.93%
Information	2,273	2,823	3,210	4,278	2,115	1,611	1,587	1,560	1,533	1,505	-0.34%
Finance And Insurance	5,624	7,737	8,115	8,167	8,769	9,721	10,504	11,298	11,945	12,407	1.23%
Real Estate And Rental And Lease	2,375	3,278	3,419	3,560	3,528	3,535	3,627	3,719	3,809	3,894	0.48%
Professional And Technical Services	2,246	3,305	4,342	6,051	7,007	7,207	7,775	8,397	9,070	9,796	1.55%
Management Of Companies And Enterprises	638	929	1,229	1,474	1,036	1,125	1,141	1,156	1,167	1,176	0.22%
Administrative And Waste Services	3,338	4,491	5,408	6,851	5,951	8,730	9,541	10,373	11,181	11,928	1.57%
Educational Services	565	844	1,105	1,491	1,185	1,271	1,309	1,335	1,349	1,346	0.29%
Health Care And Social Assistance	7,370	10,841	14,225	18,789	18,911	19,597	20,399	21,212	21,971	22,570	0.71%
Arts, Entertainment, And Recreation	879	1,186	1,521	2,161	1,925	2,0 40	2,136	2,213	2,277	2,322	0.65%
Accommodation And Food Services	3,643	4,845	6,238	7,822	8,518	8,568	9,093	9,600	10,015	10,287	0.92%
Other Services, Except Public Administration	3,283	4,791	6,294	8,219	7,739	8,046	8,492	8,967	9,461	9,966	1.08%
Federal Civilian Government	3,627	3,171	2,986	3,242	3,911	3,711	3,850	3,990	4,134	4,278	0.71%
Federal Military	5,412	1,084	1,629	1,322	1,283	1,242	1,245	1,249	1,254	1,257	0.06%
State And Local Government	14,813	19,322	22,571	22,979	25,343	24,245	25,415	26,335	27,002	27,430	0.62%
INCOME & SPENDING											
Total Personal Income Per Capita (in 2009 Dollars)	$18,173	$23,261	$27,233	$33,609	$35,866	$39,485	$42,508	$45,667	$48,515	$50,883	1.28%
Mean Household Total Personal Income (in 2009 dollars)	$53,979	$60,602	$68,422	$82,382	$87,243	$92,225	$98,750	$106,589	$114,568	$121,957	1.41%
Total Retail Sales Per Household (in 2009 dollars)	$27,068	$26,915	$27,402	$31,562	$28,310	$30,255	$31,007	$31,779	$32,635	$33,620	0.53%



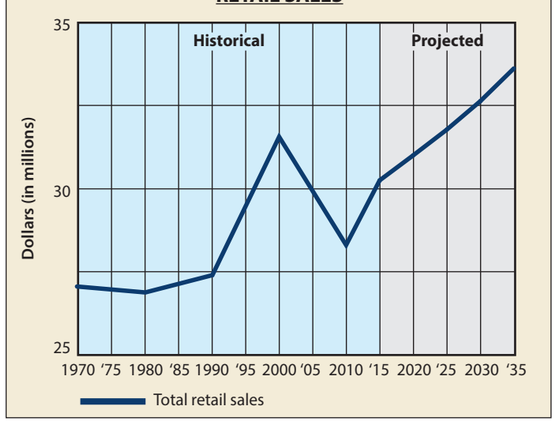
POPULATION AND EMPLOYMENT



INCOME



RETAIL SALES



AAGR: Average Annual Growth Rate

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According to the U.S. Fish and Wildlife Service, there are three threatened or endangered species listed for the vicinity of the airport: Topeka shiner (endangered, fish), interior least tern (endangered, bird), and northern long-eared bat (threatened, mammal). The Topeka shiner is a species of fish that occurs in prairie, or former prairie, perennial streams with clear water and sandy or rocky bottoms. The interior least tern typically occupies barren to sparsely vegetated sandbars along rivers, sand and gravel pits, or lake and reservoir shorelines in late April to August. The northern long-eared bat hibernates in caves during the wintertime. During the summer, the northern long-eared bat roosts in crevices and cavities of live and dead trees. There are no areas of designated critical habitat within the vicinity of the Airport.

In addition to the ESA, the *Migratory Bird Treaty Act* (MBTA) is also applicable at the Airport, as much of the study area constitutes habitat for birds protected under the (MBTA). The U.S. Fish and Wildlife Service IPaC (Information for Planning and Conservation) report for the airport lists 25 bird species that may be affected by projects at the Airport.

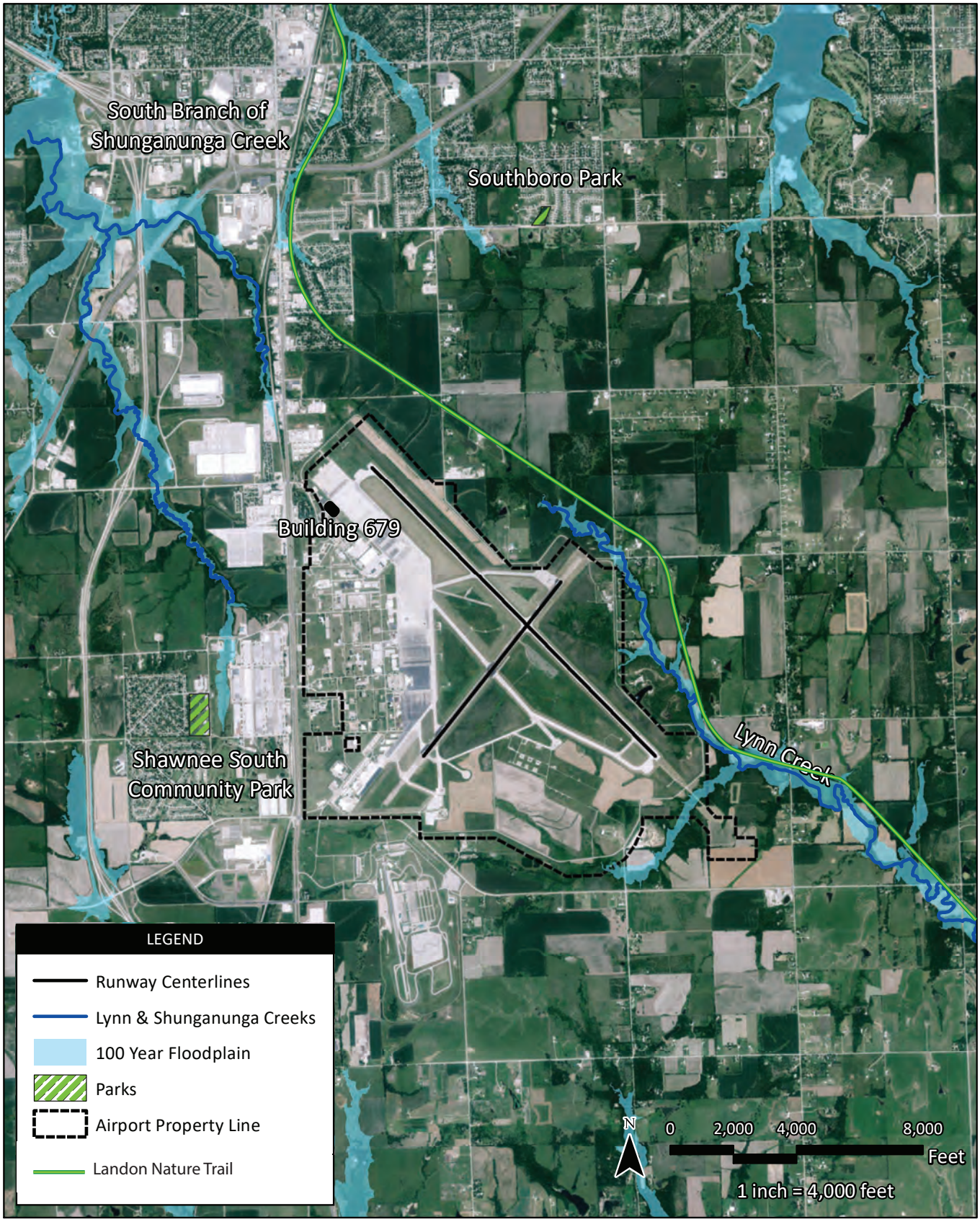
Birds protected under the MBTA may nest, winter, or migrate throughout the area, including those protected by the ESA. Under the requirements of the MBTA, all project proponents are responsible for complying with the appropriate regulations protecting birds when planning and developing a project. Migratory birds known to occur in the study area are listed in **Table 1L.**

A review of the National Hydrography Dataset, published by the United States Geological Survey, was conducted to determine the presence of perennial streams, rivers, sand and gravel pits, lakes and reservoirs within the study area. There are two perennial stream segments within the study area, Lynn Creek, located east of the runway complex, and the South Branch of Shunganunga Creek, located west of the runway complex. Both of the streams are located off airport property as indicated on **Exhibit 1U**. Additionally, there are several features classified in the National Hydrography Dataset that are classified as lakes/ponds within the study area. None of these features are located on airport property.

TABLE 1L
Birds Protected Under the *Migratory Bird Treaty Act*
Shawnee County, Kansas

Acadian Flycatcher	Henslow's Sparrow
Bald Eagle	Hudsonian Godwit
Bell's Vireo	Least Bittern
Bewick's Wren	Loggerhead Shrike
Black-billed Cuckoo	Mississippi Kite
Black-crowned Night-heron	Northern Flicker
Cerulean Warbler	Painted Bunting
Dickcissel	Red-headed Woodpecker
Field Sparrow	Rusty Blackbird
Golden Eagle	Short-eared Owl
Grasshopper Sparrow	Swainson's Hawk
Harris's Sparrow	Upland Sandpiper

Source: U.S. Fish and Wildlife Service - Information for Planning and Conservation (IPaC)



Sources: ESRI Basemap Imagery, FEMA NFHL 2012 Floodplain,
National Hydrography Dataset Streams.

HISTORICAL, ARCHITECTURAL, ARCHEOLOGICAL, AND CULTURAL RESOURCES

Determination of a project's environmental impact to historic and cultural resources is made under guidance in the *National Historic Preservation Act* (NHPA) *of 1966*, as amended, the *Archaeological and Historic Preservation Act* (AHPA) *of 1974*, the *Archaeological Resources Protection Act* (ARPA), and the *Native American Graves Protection and Repatriation Act* (NAGPRA) *of 1990*. In addition, the *Antiquities Act of 1906*, the *Historic Sites Act of 1935*, and the *American Indian Religious Freedom Act of 1978* also protect historical, architectural, archaeological, and cultural resources. Impacts may occur when the proposed project causes an adverse effect on a property which has been identified (or is unearthed during construction) as having historical, architectural, archaeological, or cultural significance.

A cultural resources survey was conducted for Forbes Field Air National Guard Base, which is located at Topeka Regional Airport, in April 2008. The report, titled *Cultural Resources Survey and Evaluation Report for Kansas Air National Guard Properties at Forbes Field, Topeka, Kansas,* was prepared for the military portions of the Airport, but also provides historic context for the entire Airport. As part of the survey, a records search was conducted. The survey notes that based on Kansas State Historic Preservation Officer (SHPO) records, "four archaeological surveys had been conducted within a 5-mile radius of the base. Three of the four archaeological surveys were for linear projects, including realignment of a stream channel and two road realignments. The other project involved survey of an area used as a borrow pit. No archaeological sites were identified as a result of any of these projects."[1] The report concludes that based on the field work conducted, the "archaeological potential and sensitivity for archaeological resources [for Forbes Air National Guard Base] is considered to be low."

The survey identified one existing structure that is eligible for listing on the National Register of Historic Places. Identified as Building 679 (referred to as the "Molehole" and identified on **Exhibit 1U**) and located on the west side of Runway 13-31 abeam the Runway 13 threshold markings, this structure is described as a 150-man alert mission dormitory. This building underwent extensive renovations between 2010 and 2012 and currently houses the Kansas Air National Guard's 190th Operations Group, 190th Operations Support Flight, the 117th Air Refueling Squadron, and several airfield support functions.[2]

DEPARTMENT OF TRANSPORTATION ACT (DOT), SECTION 4(F)

Section 4(f) of the DOT Act, which was recodified and renumbered as Section 303(c) of 49 USC, provides that the Secretary of Transportation will not approve any program or project that requires the use of any publicly owned land from a historic site, public parks, recreation areas, or waterfowl and wildlife refuges of national, state, regional, or local importance unless there is no feasible and prudent alternative to the use of such land, and the project includes all possible planning to minimize harm resulting from the use.

[1] https://www.kshs.org/resource/survey/forbesfieldreport042808.pdf, accessed November 2015
[2] http://www.kansastag.gov/press_release_detail.asp?PRid=977, accessed November 2015

The following list summarizes the nearest properties of each type that may be protected under Section 4(f) of the DOT Act:

- Wilderness Area – There are no Wilderness Areas within 100 miles of Topeka Regional Airport.
- Historic Site Listed on the National Register – Horace G. Lyons House (four miles east).
- Locally Owned Public Park – The two closest publically owned parks are Shawnee South Community Park (located approximately 2 miles west of the intersection of Runway 13-31 and Runway 3-21) and Southboro Park (located 2.4 miles north of the runway intersection). These locations are shown on **Exhibit 1U**.
- Wildlife Refuge – Flint Hills National Wildlife Refuge (45 miles south).
- Landon Nature Trail – Part of the Kanza Rail-Trails Conservancy located ½ mile east of the Runway 21 threshold.

FARMLANDS

Under the *Farmland Protection Policy Act* (FPPA), federal agencies are directed to identify and take into account the adverse effects of federal programs on the preservation of farmland, to consider appropriate alternative actions which could lessen adverse effects, and to assure that such federal programs are, to the extent practicable, compatible with state or local government programs and policies to protect farmland. The FPPA guidelines developed by the U.S. Department of Agriculture (USDA) apply to farmland classified as prime or unique, or of state or local importance as determined by the appropriate government agency, with concurrence by the Secretary of Agriculture.

Information obtained from the Natural Resource Conservation Service's (NRCS) Web Soil Survey indicates that much of the Airport property, and property adjacent to the Airport, is classified as prime farmland, if irrigated.[3] Additionally, there are soils located immediately east of the Airport, associated with Lynn Creek, which are classified as farmlands of statewide importance.

HAZARDOUS MATERIALS, SOLID WASTE, AND POLLUTION PREVENTION

Federal, state, and local laws regulate hazardous materials use, storage, transport, and disposal. These laws may extend to past and future landowners of properties containing these materials. In addition, disrupting sites containing hazardous materials or contaminates may cause significant impacts to soil, surface water, groundwater, air quality, and the organisms using these resources. According to EPA's *EJSCREEN*, there are no Superfund sites within five miles of the Airport.

[3] NRCS Web Soil Survey, http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx, accessed November 2015

SOCIOECONOMICS, ENVIRONMENTAL JUSTICE, AND CHILDREN'S ENVIRONMENTAL HEALTH AND SAFETY RISKS

Executive Order 12898, *Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations,* and the accompanying Presidential Memorandum, and Order DOT 5610.2, *Environmental Justice*, require FAA to provide for meaningful public involvement by minority and low-income populations, as well as analysis that identifies and addresses potential impacts on these populations that may be disproportionately high and adverse. The EPA's *EJSCREEN* online tool was consulted regarding the presence of environmental justice areas within the Airport environs. According to the tool, 11 percent of the population within the Census tract encompassing the Airport is below the poverty level. Additionally, the population of the Census block group which encompasses the Airport is eight percent minority.

WATER RESOURCES

Wetlands. The U.S. Army Corps of Engineers regulates the discharge of dredged and/or fill material into waters of the United States, including adjacent wetlands, under Section 404 of the *Clean Water Act*. Wetlands are defined in Executive Order 11990, *Protection of Wetlands*, as "those areas that are inundated by surface or groundwater with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetation or aquatic life that requires saturated or seasonably saturated soil conditions for growth and reproduction." Wetlands can include swamps, marshes, bogs, sloughs, potholes, wet meadows, river overflows, mud flats, natural ponds, estuarine areas, tidal overflows, and shallow lakes and ponds with emergent vegetation. Wetlands exhibit three characteristics: the soil is inundated or saturated to the surface at some time during the growing season (hydrology), has a population of plants able to tolerate various degrees of flooding or frequent saturation (hydrophytes), and soils that are saturated enough to develop anaerobic conditions during the growing season (hydric).

According to the U.S. Fish and Wildlife Service, which manages the National Wetlands Inventory[4] on behalf of all federal agencies, there are no wetlands present at the Airport. Additionally, based on a review of information from the NRCS Web Soil Survey, it is indicated that soils present at the Airport have less than 10 percent hydric components.[2]

Floodplains. Executive Order 11988 directs federal agencies to take action to reduce the risk of flood loss, minimize the impact of floods on human safety, health, and welfare, and restore and preserve the natural and beneficial values served by the floodplains. Based on a review of Federal Emergency Management Agency (FEMA) maps dated September 29, 2011, the 100-year floodplain associated with Lynn Creek is located immediately east of the Airport. The extent of this floodplain is shown on **Exhibit 1U**.

Surface Waters. The *Clean Water Act* provides the authority to establish water quality standards, control discharges, develop waste treatment management plans and practices, prevent or minimize the loss of

[4] http://www.fws.gov/wetlands/Data/Mapper.html, accessed November 2015

wetlands, and regulate other issues concerning water quality. Water quality concerns related to airport development most often relate to the potential for surface runoff and soil erosion, as well as the storage and handling of fuel, petroleum products, solvents, etc. Additionally, Congress has mandated (under the *Clean Water Act*) the National Pollutant Discharge Elimination System (NPDES). This program addresses non-agricultural storm water discharges. Through the use of NPDES permits, certain procedures are required to prevent contamination of water bodies from storm water runoff.

Examples of direct impacts to surface waters include any in-water work resulting from expansion of an existing FAA facility adjacent to surface waters, or a withdrawal of water from surface water for construction or operations.

According to *EJSCREEN*, the closest *Clean Water Act* Section 303d impaired streams or water body is a portion of the South Branch of Shunganunga Creek located 1.8 miles west of the runway intersection.

Topeka Regional Airport receives water service from the City of Topeka. Increased operations may increase water usage at the Airport; however, the increased demand is unlikely to exceed the delivery capacity of the existing service.

Groundwater. Groundwater is subsurface water that occupies the space between sand, clay, and rock formations. The term aquifer is used to describe the geologic layers that store or transmit groundwater, such as to wells, springs, and other water sources. Examples of direct impacts to groundwater could include withdrawal of groundwater for operational purposes, reduction of infiltration, or recharge area due to new impervious surfaces.

Much of eastern Kansas is underlain by the Western Interior Plains aquifer system. As discussed in the *Ground Water Atlas of the United States*, the Western Interior Plains aquifer system is classified as a minor aquifer which yields little water because it is deeply buried and contains highly mineralized water.[5]

DOCUMENT SOURCES

A variety of sources were used during the inventory process. The following listing reflects a partial compilation of these sources. In addition, considerable information was provided directly to the consultant by Topeka Regional Airport.

Airport/Facility Directory North Central U.S., U.S. Department of Transportation, Federal Aviation Administration, National Aeronautical Charting Office. Effective August 2015.

Kansas City Sectional Chart, U.S. Department of Transportation, Federal Aviation Administration, National Aeronautical Charting Office. Effective May 1, 2014 – November 13, 2014.

[5] http://pubs.usgs.gov/ha/ha730/ch_d/D-text7.html, Ground Water Atlas of the United States, accessed November 2015.

U.S. Terminal Procedures, North Central U.S., U.S. Department of Transportation, Federal Aviation Administration, National Aeronautical Charting Office. 94th Edition, May 28, 2015.

National Plan of Integrated Airport Systems (NPIAS), U.S. Department of Transportation, Federal Aviation Administration, 2015-2019.

Topeka Regional Airport Master Plan Update – Final Report, 2003. Prepared by BWR, Corp.
A number of internet websites were also used to collect information for the inventory chapter. These include the following:

Topeka Regional Airport:
http://www.mtaa-topeka.org/topeka-regional-airport

KDOT- Division of Aviation:
http://www.ksdot.org/divaviation/

Various FAA Websites:
Historical FAA Grants:
http://www.faa.gov/airports/aip/grant_histories/

Terminal Area Forecast:
http://aspm.faa.gov/main/taf.asp

Traffic Flow Management System Counts (TFMSC):
https://aspm.faa.gov/tfms/sys/main.asp

FAA 5010 Data:
http://www.airnav.com and http://www.gcr1.com/5010Web

U.S. Census Bureau:
http://www.census.gov

U.S. Bureau of Labor Statistics:
http://www.bls.gov

City of Topeka:
http://www.topeka.org/
Shawnee County:
http://www.snco.us/

EPA, Currently Designated Nonattainment Areas for All Criteria Pollutants:
http://www.epa.gov/oar/oaqps/greenbk/ancl3.html

U.S. Fish and Wildlife Service Information, Planning, and Conservation System:
http://ecos.fws.gov/ipac/

FEMA Map Service Center:
https://msc.fema.gov/portal/

EPA MyWaters Mapper:
http://watersgeo.epa.gov/

Topeka Regional Airport

CHAPTER TWO
Aviation Demand Forecasts







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Aviation Demand Forecasts

The definiı on of demand that may reasonably be expected to occur during the useful life of an airport's key components (e.g., runways, taxiways, terminal buildings, etc.) is an important factor in facility planning. In airport master planning, this involves projecı ng potenı al aviaı on acı vity for at least a 20-year ı meframe. Aviaı on demand forecası ng for Topeka Regional Airport will focus on demand indicators such as based aircraı , based aircraı fleet mix, operaı ons, and peaking operaı onal periods. In addiı on, certain commercial service demand indicators, such as enplanements, will be forecast as well to ensure the Airport is well-posiı oned should commercial service return in the future.

The Federal Aviaı on Administraı on (FAA) has oversight responsibility to review and approve aviaı on forecasts developed in conjuncı on with airport planning studies. In addiı on, aviaı on acı vity forecasts may be an important input to future benefit-cost analyses associated with airport development, and FAA reviews these analyses when federal funding requests are submiı ed.

The FAA will review individual airport forecasts with the objecı ve of comparing them to its *Terminal Area Forecasts* (TAF) and the *National Plan of Integrated Airport Systems* (NPIAS). Even though the TAF is updated annually, in the past there was almost always a disparity between the TAF and master planning forecasts. This was primarily because the TAF forecasts did not consider local condiı ons or recent trends. In recent years, however, the FAA has improved its forecast model to be a demand-driven forecast for aviaı on services based upon local and naı onal economic condiı ons, as well as condiı ons within the aviaı on industry.







As stated in FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems* (NPIAS), forecasts should be:

- Realistic;
- Based on the latest available data;
- Reflective of current conditions at the airport (as a baseline);
- Supported by information in the study; and
- Able to provide adequate justification for airport planning and development.

The forecast process for an airport master plan consists of a series of basic steps that vary in complexity depending upon the issues to be addressed and the level of effort required. The steps include a review of previous forecasts, determination of data needs, identification of data sources, collection of data, selection of forecast methods, preparation of the forecasts, and evaluation and documentation of the results. FAA Advisory Circular (AC) 150/5070-6C, *Airport Master Plans*, outlines seven standard steps involved in the forecast process, including:

1) **Identify Aviation Activity Measures**: The level and type of aviation activities likely to impact facility needs. For general aviation, this typically includes based aircraft and operations.
2) **Review Previous Airport Forecasts**: May include the FAA *Terminal Area Forecast*, state or regional system plans, and previous master plans.
3) **Gather Data**: Determine what data are required to prepare the forecasts, identify data sources, and collect historical and forecast data.
4) **Select Forecast Methods**: There are several appropriate methodologies and techniques available, including regression analysis, trend analysis, market share or ratio analysis, exponential smoothing, econometric modeling, comparison with other airports, survey techniques, cohort analysis, choice and distribution models, range projections, and professional judgment.
5) **Apply Forecast Methods and Evaluate Results**: Prepare the actual forecasts and evaluate for reasonableness.
6) **Summarize and Document Results**: Provide supporting text and tables as necessary.
7) **Compare Forecast Results with FAA's TAF**: Follow guidance in FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems*. In part, the Order indicates that forecasts should not vary significantly (more than 10 percent) from the TAF. When there is a greater than 10 percent variance, supporting documentation should be supplied to the FAA. (FAA Central Region has provided additional guidance indicating forecasts are consistent with the TAF when they differ by less than 10 percent in the first five years, and less than 15 percent in the 10-year period.)

Aviation activity can be affected by many influences on the local, regional, and national levels, making it virtually impossible to predict year-to-year fluctuations of activity over 20 years with any certainty. Therefore, it is important to remember that forecasts are to serve only as guidelines, and planning must remain flexible enough to respond to a range of unforeseen developments.

The following forecast analysis for Topeka Regional Airport was produced following these basic guidelines. Existing forecasts are examined and compared against current and historic activity. The historical aviation activity is then examined along with other factors and trends that can affect demand. The intent is to provide an updated set of aviation demand projections for Topeka Regional Airport that will permit

airport management to make planning adjustments as necessary to maintain a viable, efficient, and cost-effective facility.

SOCIOECONOMIC TRENDS

The socioeconomic conditions provide an important baseline for preparing aviation demand forecasts. Local socioeconomic variables, such as population, employment, and income, are indicators for understanding the dynamics of the community and can relate to local trends in aviation activity. Analysis of the demographics of the airport service area will give a more comprehensive understanding of the socioeconomic situations affecting the region which supports Topeka Regional Airport. The following is a summary of the historical demographic trends presented in Chapter One, as well as forecasts of those socioeconomic characteristics.

Table 2A summarizes historical and forecast population, employment, and income estimates for Shawnee County, the State of Kansas, and the Topeka Metropolitan Statistical Area (MSA), which includes Shawnee, Jefferson, Jackson, Osage, and Wabaunsee Counties. Over the next 20 years, the population of Shawnee County is projected to add approximately 14,000 people. This equates to an average annual growth rate of 0.27 percent. Employment is projected to grow at 0.49 percent annually. Income for Shawnee County is projected to grow significantly at 0.92 percent annually. Each of these indicators is below those for the Topeka MSA and the state.

TABLE 2A
Socioeconomic History and Forecasts
Topeka Area and Kansas

	HISTORY				FORECAST			
	2000	2010	2015*	AAGR 2000-2015	2020	2025	2035	AAGR 2015-2035
Shawnee County								
Population	170,027	178,279	180,084	0.38%	183,896	187,662	194,029	0.27%
Employment	122,038	115,271	120,625	-0.08%	126,459	131,697	139,492	0.49%
Income (PCPI)	$35,000	$36,822	$40,182	0.92%	$43,252	$46,519	$51,935	0.92%
Topeka Metropolitan Statistical Area (MSA)								
Population	224,859	234,233	235,974	0.32%	241,303	246,590	255,683	0.40%
Employment	145,291	138,744	144,492	-0.04%	151,696	158,195	168,094	0.76%
Income (PCPI)	$33,609	$35,866	$39,485	1.08%	$42,508	$45,667	$50,883	1.28%
State of Kansas								
Population	2,693,681	2,858,910	2,928,256	0.56%	3,027,781	3,130,591	3,329,158	0.64%
Employment	1,759,475	1,802,609	1,916,499	0.57%	2,040,842	2,160,841	2,375,093	1.08%
Income (PCPI)	$34,601	$38,180	$42,709	1.41%	$46,036	$49,535	$55,725	1.34%

AAGR: Average annual growth rate
PCPI: Per capita personal income ($2009)
*2015 is an estimate.
Topeka MSA includes Shawnee, Jackson, Jefferson, Osage, and Wabaunsee Counties

Sources: U.S. Census Bureau; Woods & Poole Economics - 2015.

FORECAST APPROACH

An important factor in facility planning involves a definition of demand that may reasonably be expected to occur during the useful life of the facility's key components. For Topeka Regional Airport, this involves projecting potential aviation demand for a 20-year timeframe. In this report, forecasts of annual operations, peak operational activity, based aircraft, and based aircraft fleet mix will serve as the basis for facility planning. An additional forecast of potential passenger enplanements will be made in order to better prepare airport decision-makers should commercial service return to the Airport.

The resulting forecast may be used for several purposes including facility needs assessments and environmental evaluations. The forecasts will be reviewed and approved by the FAA to ensure that they are reasonable projections of aviation activity. The intent is to permit the Airport to make the necessary planning adjustments to ensure the Airport facilities meet projected demands in an efficient and cost-effective manner.

Because aviation activity can be affected by many influences at the local, regional, and national levels, it is important to remember that forecasts are to serve only as guidelines, and planning must remain flexible enough to respond to unforeseen facility needs.

FORECASTING APPROACH

The development of aviation forecasts proceeds through both analytical and judgmental processes. A series of mathematical relationships is tested to establish statistical logic and rationale for projected growth. However, the judgment of the forecast analyst, based upon professional experience, knowledge of the aviation industry, and assessment of the local situation, is important in the final determination of the preferred forecast. The most reliable approach to estimating aviation demand is through the utilization of more than one analytical technique. Methodologies frequently considered include trend line/time-series projections, correlation/regression analysis, and market share analysis.

The development of aviation forecasts proceeds through both analytical and judgmental processes.

Trend line/time-series projections are probably the simplest and most familiar of the forecasting techniques. By fitting growth curves to historical data, then extending them into the future, a basic trend line projection is produced. A basic assumption of this technique is that outside factors will continue to affect aviation demand in much the same manner as in the past. As broad as this assumption may be, the trend line projection does serve as a reliable benchmark for comparing other projections.

Correlation analysis provides a measure of direct relationship between two separate sets of historic data. Should there be a reasonable correlation between the data sets, further evaluation using regression analysis may be employed.

Regression analysis measures statistical relationships between dependent and independent variables, yielding a "correlation coefficient." The correlation coefficient (Pearson's "r") measures association between the changes in the dependent variable and the independent variable(s). If the "r^2" value (coefficient determination) is greater than 0.95, it indicates good predictive reliability. A value less than 0.95 may be used, but with the understanding that the predictive reliability is lower.

Market share analysis involves a historical review of the airport activity as a percentage, or share, of a larger regional, state, or national aviation market. A historical market share trend is determined, providing an expected market share for the future. These shares are then multiplied by the forecasts of the larger geographical area to produce a market share projection. This method has the same limitations as trend line projections, but can provide a useful check on the validity of other forecasting techniques.

It is important to note that one should not assume a high level of confidence in forecasts that extend beyond five years. Facility and financial planning usually require at least a 10-year purview since it often takes more than five years to complete a major facility development program. However, it is important to use forecasts which do not overestimate revenue-generating capabilities or understate demand for facilities needed to meet public (user) needs.

NATIONAL AVIATION TRENDS

Each year, the FAA updates and publishes a national aviation forecast. Included in this publication are forecasts for the large air carriers, regional/commuter air carriers, general aviation, and FAA workload measures. The forecasts are prepared to meet budget and planning needs of the constituent units of the FAA and to provide information that can be used by state and local authorities, the aviation industry, and the general public. The current edition when this chapter was prepared was *FAA Aerospace Forecasts – Fiscal Years 2015-2035*, published in March 2015. The FAA primarily uses the economic performance of the United States as an indicator of future aviation industry growth. Similar economic analyses are applied to the outlook for aviation growth in international markets. The following discussion is summarized from the FAA Aerospace Forecasts.

U.S. Economic Outlook

According to the FAA Aerospace Forecasts, as the economy recovers from the most serious economic downturn and the subsequent slow recovery since the Great Depression, aviation will continue to grow over the long run. Fundamentally, demand for aviation is driven by economic activity. As economic growth picks up, so will growth in aviation activity. The FAA forecast calls for passenger growth over the next 20 years to average 2.0 percent annually. The steep decline in the price of oil in 2014 and into 2015 is a catalyst for a short-lived uptick in passenger growth; however, growth is anticipated to be somewhat muted, primarily due to the uncertainty that surrounds the U.S. and global economies.

U.S. economic performance in 2014 continued to be mixed, with modest growth in real GDP and real incomes, a slowly falling unemployment rate, and oil prices and consumer inflation remaining in check.

The economy grew at an average annual rate of 2.6 percent in fiscal year (FY) 2014 after expanding 1.8 percent in FY 2013. GDP growth was strong in the second half of 2014 after shrinking in the second quarter primarily due to adverse weather conditions spurred on by the polar vortex. There were favorable signs in 2014 as the housing market continued to improve, the stock market entered record territory, and the labor market saw steady improvement with almost 2.8 million new jobs created during the year, the best figure since 1999. The unemployment rate fell steadily throughout 2014 from 7.2 percent to 5.6 percent by December.

In the medium term, (the three-year period between 2016 and 2019), U.S. economic growth is projected to average 2.6 percent per year with rates ranging between 2.4 and 2.7 percent. Income growth picks up during the same period, averaging 3.2 percent per year. For the balance of the forecast period, annual average growth of U.S. real GDP and real income slow to around 2.4 and 2.5 percent, respectively. The long-term stability of U.S. economic growth depends on sustained growth in the workforce and capital stock, along with improved productivity and competitiveness.

FAA General Aviation Forecasts

The FAA forecasts the fleet mix and hours flown for single engine piston aircraft, multi-engine piston aircraft, turboprops, business jets, piston and turbine helicopters, light sport, experimental, and others (gliders and balloons). The FAA forecasts "active aircraft," not total aircraft. An active aircraft is one that is flown at least one hour during the year. From 2010 through 2013, the FAA undertook an effort to have all aircraft owners re-register their aircraft. This effort resulted in a 10.5 percent decrease in the number of active general aviation aircraft, mostly in the piston category.

After growing rapidly for most of the decade, the demand for business jet aircraft slowed over the past few years, as the industry was hard hit by the 2008-2009 economic recession. Nonetheless, the FAA forecast calls for growth through the long-term, driven by higher corporate profits and continued concerns about safety, security, and flight delays. Overall, business aviation is projected to outpace personal/recreational use.

In 2014, the FAA estimated there were 139,890 piston-powered aircraft in the national fleet. The total number of piston-powered aircraft in the fleet is forecast to decline by 0.5 percent from 2014-2035, resulting in 125,935 by 2035. This includes -0.6 percent annually for single engine pistons and -0.4 percent for multi-engine pistons.

Total turbine aircraft are forecast to return to growth in 2014 and have an annual growth rate of 2.4 percent through 2035. The FAA estimates there were 28,085 turbine-powered aircraft in the national fleet in 2014, and there will be 45,905 by 2035. This includes annual growth rates of 1.5 percent for turboprops, 2.8 percent for business jets, and 2.8 percent for turbine helicopters.

While comprising a much smaller portion of the general aviation fleet, experimental aircraft, typically identified as home-built aircraft, are projected to grow annually by 1.4 percent through 2035. The FAA estimates there were 24,480 experimental aircraft in 2014, and these are projected to grow to 33,040 by 2035. Sport aircraft are forecast to grow 4.3 percent annually through the long term, growing from

2,200 in 2014 to 5,360 by 2035. **Exhibit 2A** presents the historical and forecast U.S. active general aviation aircraft.

The FAA also forecasts total operations based upon activity at control towers across the U.S. Operations are categorized as air carrier, air taxi/commuter, general aviation, and military. General aviation operations, both local and itinerant, declined significantly as a result of the 2008-2009 recession and subsequent slow recovery. Through 2035, total general aviation operations are forecast to grow 0.4 percent annually. Air taxi/commuter operations are forecast to decline by 3.6 percent through 2024, and then increase slightly through the remainder of the forecast period. Overall, air taxi/commuter operations are forecast to decline by 1.2 percent annually from 2014 through 2035.

General Aviation Aircraft Shipments and Revenue

As previously discussed, the 2008-2009 economic recession has had a negative impact on general aviation aircraft production and activity, and the industry was slow to recover. Aircraft manufacturing declined for three straight years from 2008 through 2010. According to the General Aviation Manufacturers Association (GAMA), there is optimism that aircraft manufacturing will stabilize and return to growth, which has been evidenced since 2011. **Table 2B** presents historical data related to general aviation aircraft shipments.

TABLE 2B
Annual General Aviation Airplane Shipments
Manufactured Worldwide and Factory Net Billings

Year	Total	Single Engine Piston	Multi-Engine Piston	Turboprop	Jet	Net Billings ($millions)
1994	1,132	544	77	233	278	3,749
1995	1,251	605	61	285	300	4,294
1996	1,437	731	70	320	316	4,936
1997	1,840	1043	80	279	438	7,170
1998	2,457	1508	98	336	515	8,604
1999	2,808	1689	112	340	667	11,560
2000	3,147	1,877	103	415	752	13,496
2001	2,998	1,645	147	422	784	13,868
2002	2,677	1,591	130	280	676	11,778
2003	2,686	1,825	71	272	518	9,998
2004	2,963	1,999	52	321	591	11,918
2005	3,590	2,326	139	375	750	15,156
2006	4,053	2,513	242	412	886	18,815
2007	4,276	2,417	258	465	1,136	21,837
2008	3,970	1,943	176	538	1,313	24,772
2009	2,279	893	70	446	870	19,474
2010	2,020	781	108	368	763	19,715
2011	2,120	761	137	526	696	19,097
2012	2,133	790	91	580	672	18,873
2013	2,345	900	122	645	678	23,450
2014	2,445	986	143	603	722	24,499

Source: General Aviation Manufacturers Association 2013 Statbook; 2014 data from Year End Report.

Worldwide shipments of general aviation airplanes increased for the fourth year in a row in 2014. A total of 2,445 units were delivered around the globe, as compared to 2,345 units in 2013. Worldwide general aviation billings were also higher than the previous year.

Business Jets: General aviation manufacturers delivered 722 business jets in 2014, as compared to 678 units in 2013. Similar to 2013, demand was stronger in 2014 for large-cabin business jets than it was for medium and light business jets.

Turboprops: In 2014, 603 turboprop airplanes were delivered to customers around the world, a slight decline from the 645 delivered in 2013. Overall, the turboprop market has experienced significant gains since 2010.

Pistons: Piston deliveries increased from 1,022 units during 2013 to 1,129 in 2014. The piston segment continued to fare best for unit deliveries among the three segments by which GAMA tracks the airplane manufacturing industry. This is due in part by deliveries to flight schools in emerging markets.

Most industry observers believe that the general aviation market, particularly the business aviation market, is in a position for sustained growth. Industry net orders are back to positive and most leading indicators continue to improve. The large jet category of the market is expected to expand faster than the other categories.

FAA Commercial Service Forecasts

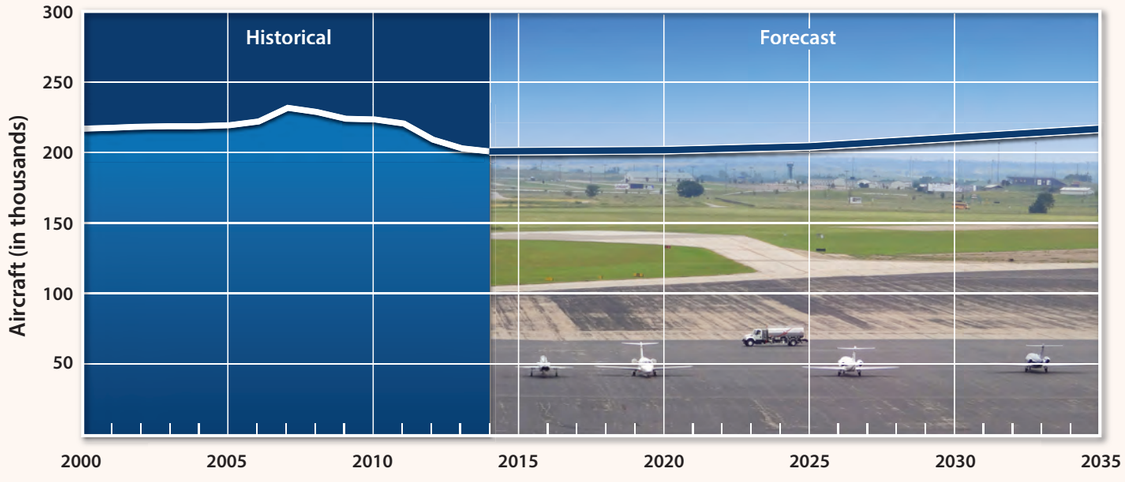
Although the 2008-2009 recession has been officially over for several years, in 2014, carriers continued to deal with economic uncertainties as business travel budgets remained strained, unemployment was still high relatively high compared to pre-recession years, and uncertainty surrounding federal fiscal policy remained. In such an uncertain but slowly improving economic environment, industry capacity growth was somewhat restrained (up 2.2 percent in 2014), after only a 0.8 percent increase in 2013. Given the minimal increase in seats available to the traveling public, carriers were still able to raise airfares despite the slow growth in demand. Higher airfares and ancillary revenue, coupled with flat to falling fuel prices, resulted in U.S. carriers being profitable in 2014.

According to the FAA, system capacity is projected to increase modestly (up 2.4 percent) in 2015. In the domestic market, mainline carrier capacity expanded only slightly (1.8 percent) in 2014 but is projected to grow at a more robust rate (2.6 percent) in 2015, while capacity for the regional carriers is projected to post its first increase since FY 2011 (up 4.0 percent). In the international sector, capacity is forecast to increase slowly in the Atlantic and Pacific markets and increase modestly in the Latin market, resulting in an overall international capacity increase of 1.6 percent in 2015.

Passenger demand growth is in line with capacity growth in 2015, with system revenue passenger miles (RPMs) forecast to grow 2.6 percent. Supported by a growing U.S. and world economy, year over year RPM growth is forecast to be 2.5 percent on average over the period from 2015-2035. Over the same time period, system capacity growth averages 2.5 percent per year.

U.S. ACTIVE GENERAL AVIATION AIRCRAFT

	2014	2020	2025	2035	AAGR 2014-2035
Fixed Wing					
Piston					
Single Engine	123,440	117,770	113,905	108,810	-0.60%
Multi-Engine	13,215	12,920	12,545	12,135	-0.41%
Turbine					
Turboprop	9,485	9,315	9,855	12,970	1.50%
Turbojet	11,750	13,115	15,000	20,815	2.76%
Rotorcraft					
Piston	3,235	3,785	4,165	4,990	2.09%
Turbine	6,850	8,410	9,595	12,120	2.75%
Experimental					
	24,480	26,795	28,875	33,040	1.44%
Sport Aircraft					
	2,200	3,170	3,970	5,360	4.33%
Other					
	4,205	4,130	4,060	4,020	-0.21%
Total Pistons	**139,890**	**134,475**	**130,615**	**125,935**	**-0.50%**
Total Turbines	**28,085**	**30,840**	**34,450**	**45,905**	**2.37%**
Total Fleet	**198,860**	**199,410**	**201,970**	**214,260**	**0.36%**

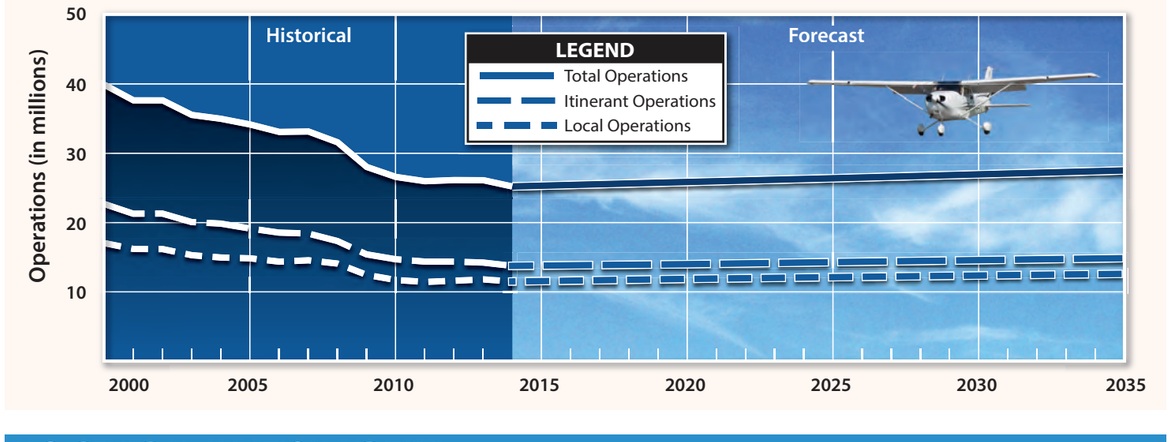


Notes: An active aircraft is one that has a current registration and was flown at least one hour during the calendar year.

Source: FAA Aerospace Foreast - Fiscal Years 2015-2035

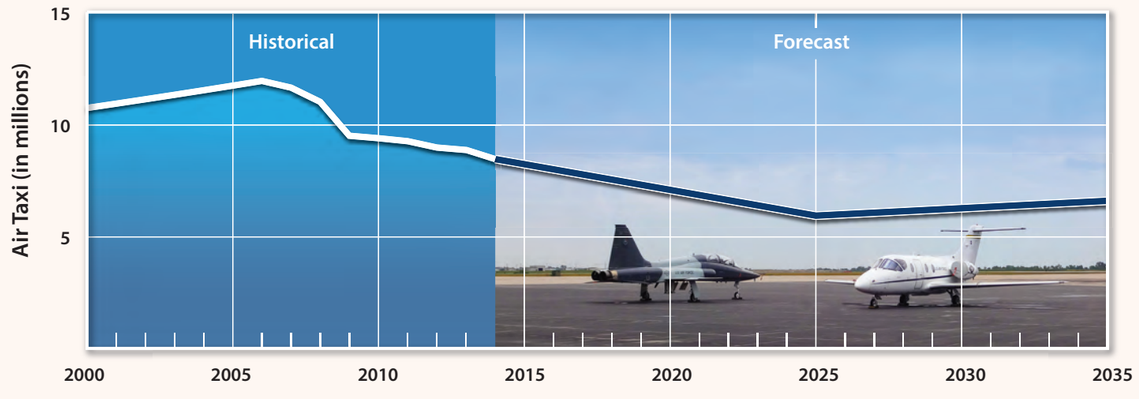
U.S. GENERAL AVIATION OPERATIONS

	2014	2020	2025	2035	AAGR 2014-2035
Itinerant					
	13,977,500	14,209,500	14,499,400	15,118,400	0.37%
Local					
	11,674,100	12,048,000	12,298,900	12,834,800	0.45%
Total GA Operations	**25,651,600**	**26,257,500**	**26,798,200**	**27,953,200**	**0.41%**



U.S. GENERAL AVIATION AIR TAXI

	2014	2020	2025	2035	AAGR 2014-2035
Air Taxi/Commuter Operations					
Itinerant	8,439,300	7,075,700	5,918,500	6,580,200	-1.18%



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System passengers are projected to increase an average of 1.9 percent a year, with mainline carriers growing at 2.0 percent a year, slightly higher than their regional counterparts (up 1.6 percent). By 2035, U.S. commercial air carriers are projected to fly 1.71 trillion ASMs and transport 1.14 billion enplaned passengers – a total of 1.44 trillion passenger miles.

Over the forecast period, domestic enplanements are projected to grow at an average annual rate of 1.7 percent.

Planes will remain crowded, with load factors projected to grow moderately during the early years of the forecast period, then tapering during the mid to latter years to 84.2 percent in 2035 (up 0.6 points compared to the beginning of the forecast period in 2015).

The FAA forecasts indicate that enplanements are forecast to grow (up 2.6 percent) in 2015, following a 2.1 percent increase in 2014. Over the forecast period, domestic enplanements are projected to grow at an average annual rate of 1.7 percent, with mainline and regional carriers growing at the same rate. **Exhibit 2B** presents the annual historical and forecast enplanement totals for both large air carriers and commuter airlines in the U.S. as forecast by the FAA.

FAA Commercial Aircraft Fleet Forecast

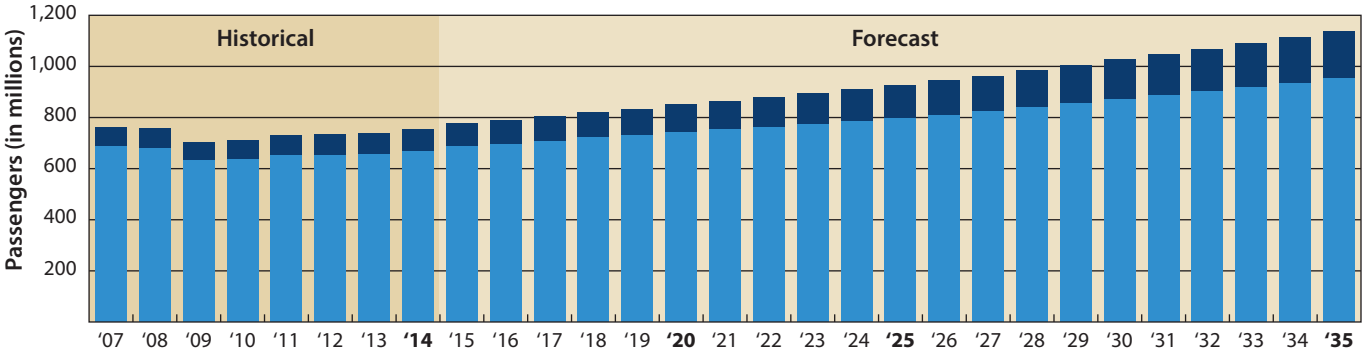
The commercial passenger carrier fleet is undergoing transformation. The mainline carriers are retiring older, less fuel-efficient aircraft (e.g., 737-300/400/500, 757/767, and MD-80) and replacing them with more technologically advanced A319/320 and 737-700/800/900 aircraft. The regional carriers are growing their fleet of 70-90 seat regional jet aircraft and reducing their fleet of 50-seat jet aircraft. The total number of aircraft in the U.S. commercial fleet (including regional carriers) is estimated at 6,727 for 2014, a decrease of 86 aircraft from 2013. This total includes 3,774 mainline air carrier passenger aircraft (over 90 seats), 740 mainline air cargo aircraft, and 2,213 regional carrier aircraft (jets, turboprops, and pistons).

Mainline passenger jet aircraft are forecast to increase 1.5 percent annually through 2034.

The number of passenger jets in the mainline fleet is estimated to have increased by 41 in 2014. After 2014, the mainline aircraft fleet was projected to add approximately 64 aircraft annually, totaling 5,112 aircraft in 2035. The mainline narrow-body fleet (including the Embraer 190s) was projected to grow by 42 aircraft annually from 2015-2035. The wide-body fleet (including the Boeing 787 and Airbus A-350) was projected to grow by 24 aircraft annually over the same period. Mainline passenger jet aircraft are forecast to increase 1.5 percent annually through 2034.

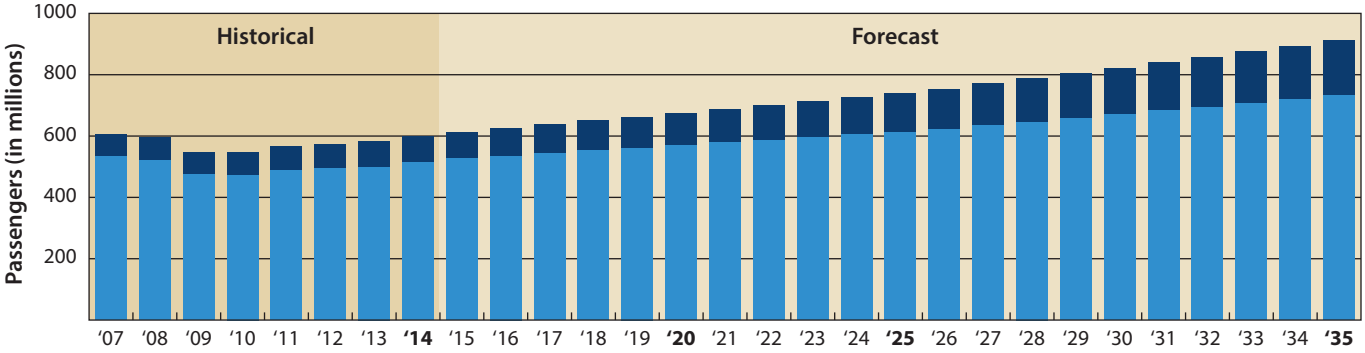
The regional passenger aircraft fleet is estimated to have decreased by 86 aircraft in 2014, as decreases in 50-seat and smaller regional jets and turboprops outpace production of new larger regional jets. After 2014, the regional carrier fleet (turboprops and jets) is expected to decrease by 0.2 percent per year over the remaining years of the forecast period, totaling 2,141 aircraft in 2035. The number of regional jets (90 seats or fewer) is projected to grow from 1,642 in 2014 to 1,953 in 2034, an average annual increase of 0.8 percent. All of the growth in regional jets over the forecast period occurs in the larger,

U.S. AIR CARRIER PASSENGER ENPLANEMENTS[1]



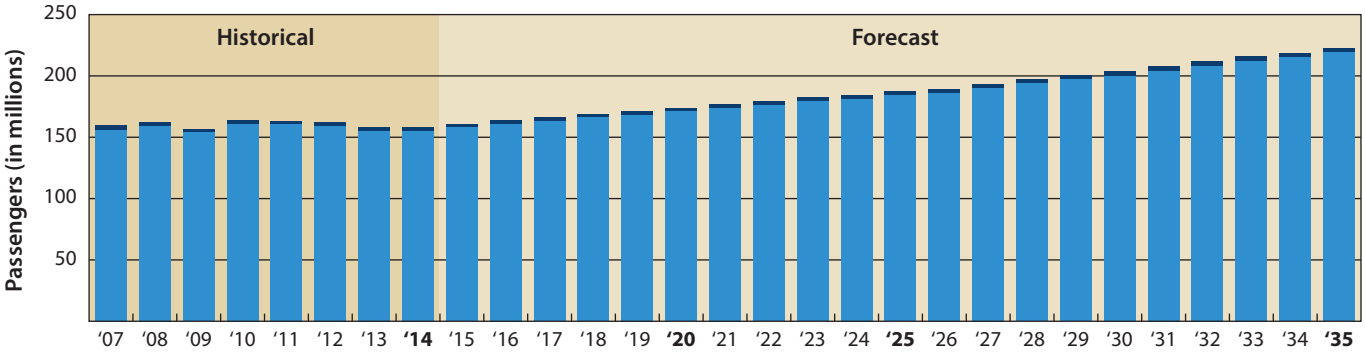
SOURCE	2014	2020	2025	2035	AAGR 2014-2035
Domestic Revenue Enplanements	668.4	742.0	796.6	951.0	1.69%
International Revenue Enplanements	88.0	109.1	130.8	185.5	3.61%
TOTAL	756.3	851.1	927.4	1,136.5	1.96%

U.S. MAINLINE AIR CARRIER PASSENGER ENPLANEMENTS



SOURCE	2014	2020	2025	2035	AAGR 2014-2035
Domestic Revenue Enplanements	513.2	570.5	612.7	731.7	1.70%
International Revenue Enplanements	85.1	105.9	127.4	181.4	3.67%
TOTAL	598.3	676.4	740.2	913.1	2.03%

U.S. REGIONAL AIR CARRIER PASSENGER ENPLANEMENTS



SOURCE	2014	2020	2025	2035	AAGR 2014-2035
Domestic Revenue Enplanements	155.2	171.5	183.9	219.3	1.66%
International Revenue Enplanements	2.9	3.2	3.4	4.0	1.54%
TOTAL	158.1	174.6	187.3	223.3	1.66%

[1]Sum of U.S. Mainline and Regional Air Carrier Enplanements

Source: FAA Aerospace Forecast - Fiscal Years 2015-2035

Note: All figures measured in millions

70- to 90-seat aircraft category. During the forecast period, all regional jets of 50 or less seats are projected to be retired from the fleet.

Large cargo jet aircraft are forecast to grow from an estimate of 740 in 2014 to a total 1,182 aircraft in 2035. The narrow-body, cargo jet fleet is projected to increase by two aircraft per year over the 20-year forecast period as older 757s and 737s are converted to cargo service. The wide-body, cargo jet fleet is projected to increase by 14 aircraft annually. **Exhibit 2C** presents the FAA commercial aircraft fleet forecast through 2025.

AVIATION FORECASTS

For a general aviation airport, such as Topeka Regional Airport, forecasts of based aircraft, operations, and peak activity levels are the most basic indicators of future demand. Future facility requirements, such as hangars and apron area, are derived from the general aviation forecasts. In addition, a passenger enplanement forecast will be developed in case such service was to return in the future.

FAA TERMINAL AREA FORECAST

On an annual basis, the FAA publishes the *Terminal Area Forecast* (TAF) for each airport included in the National Plan of Integrated Airport Systems (NPIAS). The TAF is a generalized forecast of airport activity used by FAA for internal planning purposes. It is available to airports and consultants to use as a point of comparison for development of local forecasts. **Table 2C** presents the *Terminal Area Forecast* for Topeka Regional Airport.

TABLE 2C
2016 FAA Terminal Area Forecast
Topeka Regional Airport

	2015	2020	2025	2030	2035
ENPLANEMENTS					
Air Carrier	3,476	3,501	3,526	3,551	3,576
Commuter	5	5	5	5	5
Total	***3,481***	***3,506***	***3,531***	***3,556***	***3,581***
ANNUAL OPERATIONS					
Itinerant					
Air Carrier	180	180	180	180	180
Air Taxi	474	474	474	474	474
General Aviation	5,641	6,490	6,590	6,690	6,790
Military	8,709	8,709	8,709	8,709	8,709
Total Itinerant	15,004	15,853	15,953	16,053	16,153
Local					
General Aviation	1,261	1,038	1,048	1,058	1,068
Military	10,661	10,661	10,661	10,661	10,661
Total Local	11,922	11,699	11,709	11,719	11,729
Total Operations	***26,926***	***27,552***	***27,662***	***27,772***	***27,882***
Based Aircraft	***32***	***34***	***38***	***43***	***48***

Source: FAA Terminal Area Forecast (TAF); January 2016

As can be seen in the table, the TAF indicates almost no growth in activity at the Airport over the next 20 years. The TAF present an enplanement forecast in which enplanements are projected to be less than 10,000 annually. As there is currently no commercial service at the Airport, to achieve over 10,000 annual enplanements, the Airport will have to rely on charter activity including troop deployments from Fort Riley. Operations are forecast to continue to be dominated by the military; however, the TAF provides a flat-line military operations forecast. Because of the potential for a rapidly changing military mission, it is common to forecast military activity in this manner. Based aircraft are forecast to increase by 16 additional aircraft over the next 20 years. As noted previously, the FAA will compare the new forecasts developed for this Master Plan to the TAF.

In 2015, there were a total of 25,989 operations as counted by the tower which is slightly below the TAF. The TAF also shows a total of 32 based aircraft for 2015; however, Airport records show that there are actually 42 based aircraft as of 2015. Therefore, it is especially important to develop additional forecasts of aviation demand for the Topeka Regional Airport. Once a new forecast of aviation demand for the Airport is approved by the FAA, the FAA has the responsibility to update the TAF.

BASED AIRCRAFT

The number of based aircraft is the most basic indicator of general aviation demand. By first developing a forecast of based aircraft for the Airport, other general aviation activity and demand can be projected. The process of developing forecasts of based aircraft begins with an analysis of aircraft ownership in the primary general aviation service area through a review of historical aircraft registrations.

The number of based aircraft is the most basic indicator of general aviation demand.

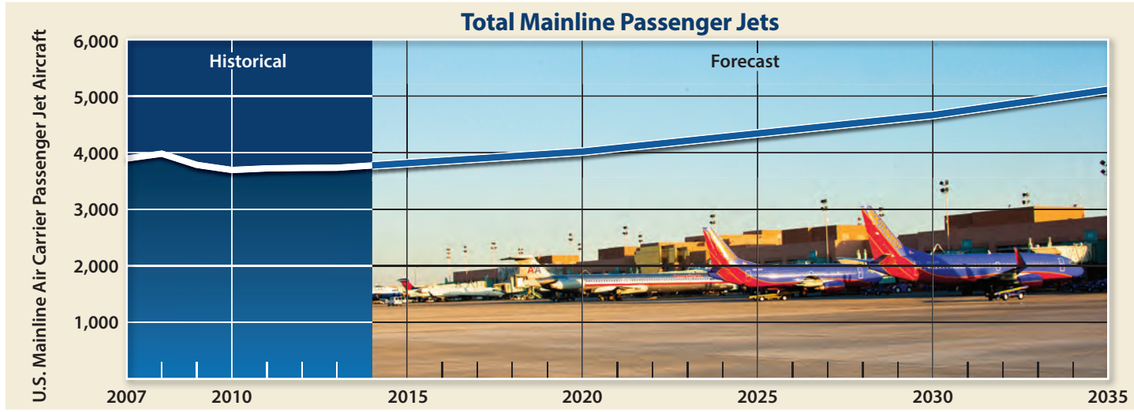
Area Aircraft Ownership (Registered Aircraft)

Analysis presented earlier indicates that the Topeka MSA is the primary service area for general aviation demand. Aircraft ownership trends for the primary service area typically dictate the based aircraft trends for an airport. As such, an analysis of the Topeka MSA aircraft registrations was made.

Table 2D presents the history of registered aircraft in the Topeka MSA from 1994 through 2015. These figures are derived from the FAA aircraft registration database that categorized registered aircraft by county based on the zip code of the registered aircraft. Although this information generally provides a correlation to based aircraft, it is not uncommon for some aircraft to be registered in the county, but based at an airport outside the county or vice versa.

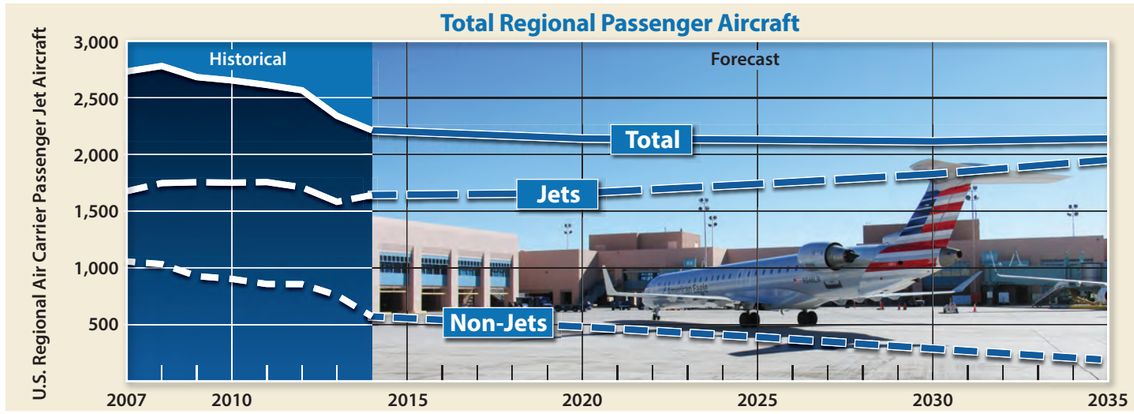
U.S. MAINLINE AIR CARRIER PASSENGER JET AIRCRAFT

	2014	2020	2025	2035	AAGR 2014-2035
Large Narrow Body					
2 Engine	3,155	3,291	3,512	4,016	1.16%
3/4 Engine	5	5	0	0	0.00%
Large Wide Body					
2 Engine	481	594	731	983	3.46%
3/4 Engine	40	31	0	0	0.00%
Total Large Jets	**3,681**	**3,921**	**4,243**	**4,999**	**1.47%**
Total Regional Jets	**93**	**97**	**97**	**113**	**0.93%**
Total Mainline Passenger Jets	**3,774**	**4,018**	**4,340**	**5,112**	**1.46%**



U.S. REGIONAL AIR CARRIER PASSENGER JET AIRCRAFT

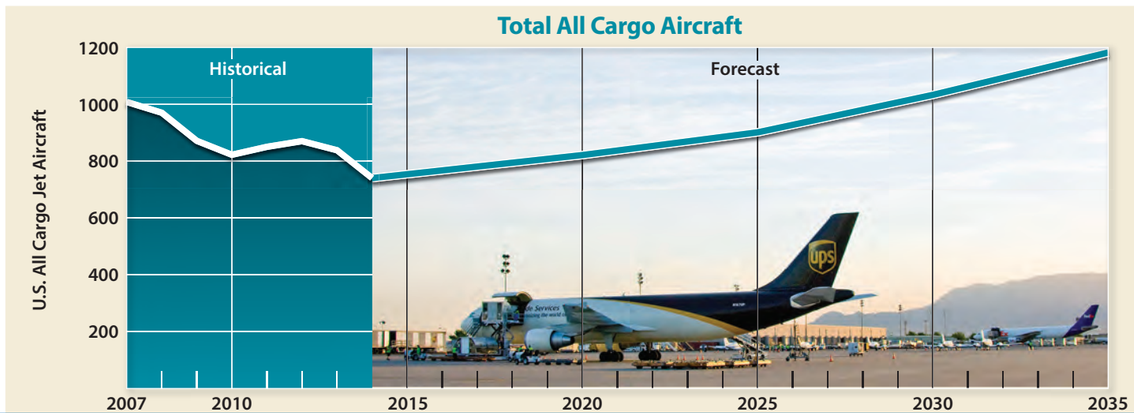
	2014	2020	2025	2035	AAGR 2014-2035
Less than 30 Seats					
Turboprop	483	388	293	79	-8.26%
31-40 Seats					
Turboprop	37	30	22	6	-8.30%
Over 40 Seats					
Turboprop	51	62	75	103	3.40%
Jet	1,642	1,660	1,740	1,953	0.83%
Non-Jet Total	**571**	**480**	**390**	**188**	**-5.15%**
Jet Total	**1,642**	**1,660**	**1,740**	**1,953**	**0.83%**
Total Regional Passenger Aircraft	**2,213**	**2,140**	**2,130**	**2,141**	**-0.16%**



U.S. ALL CARGO JET AIRCRAFT

	2014	2020	2025	2035	AAGR 2014-2035
Large Narrow Body					
2 Engine	191	213	243	306	2.27%
3/4 Engine	15	13	0	0	0.00%
Large Wide Body					
2 Engine	296	356	439	628	3.65%
3/4 Engine	238	239	219	248	0.20%
Total All Cargo Jets	**740**	**821**	**901**	**1,182**	**2.26%**

Source: FAA Aerospace Forecast - Fiscal Years 2015-2035



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TABLE 2D
Registered Aircraft by County in the Topeka MSA

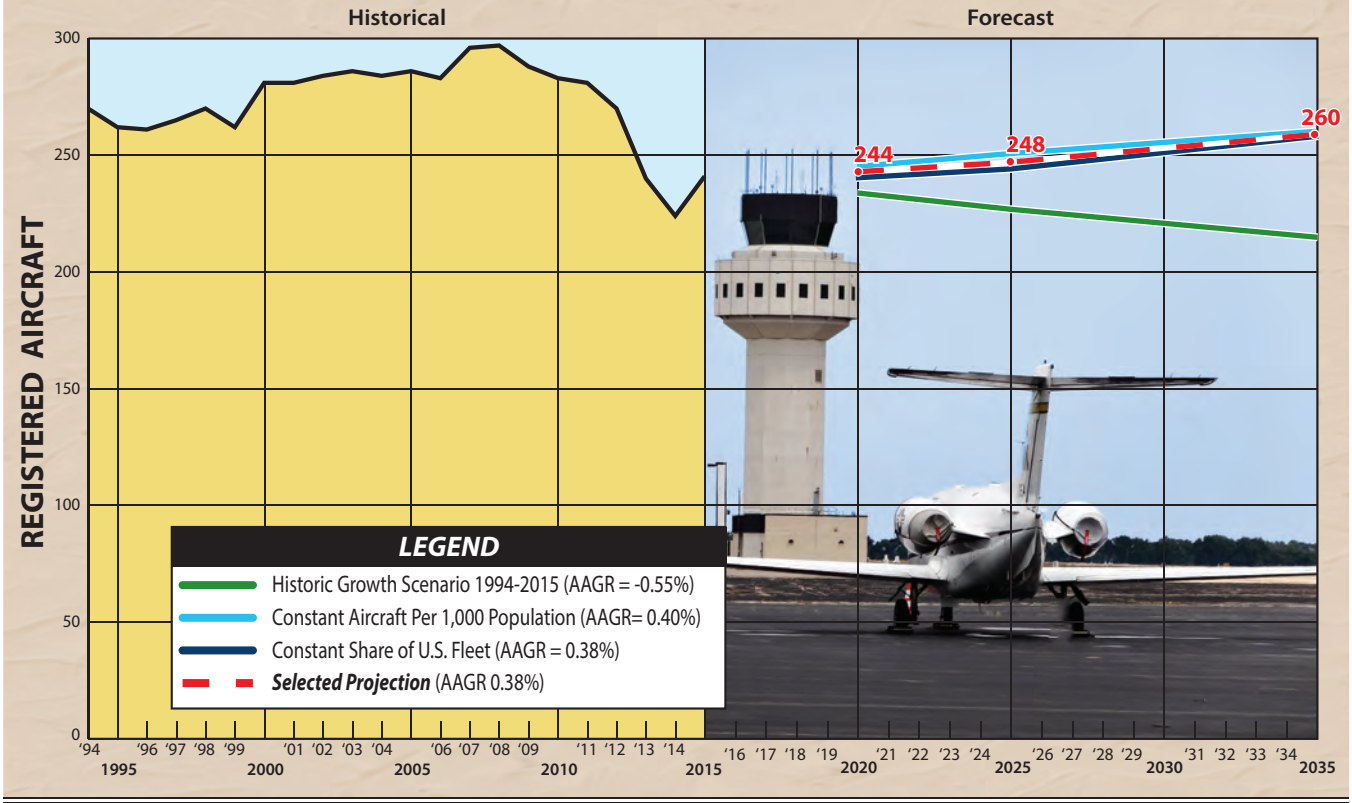
Year	Shawnee	Jackson	Jefferson	Osage	Wabaunsee	TOTAL
1994	215	7	19	23	6	270
1995	201	7	21	26	7	262
1996	200	9	20	26	6	261
1997	204	11	18	27	5	265
1998	204	12	18	29	7	270
1999	201	9	18	29	5	262
2000	211	13	19	33	5	281
2001	211	12	22	32	4	281
2002	217	11	21	31	4	284
2003	212	9	23	38	4	286
2004	208	9	21	41	5	284
2005	214	11	19	37	5	286
2006	213	10	20	35	5	283
2007	223	9	25	34	5	296
2008	222	9	25	36	5	297
2009	220	10	25	26	7	288
2010	219	10	22	25	7	283
2011	214	10	23	26	8	281
2012	208	9	23	22	8	270
2013	188	11	20	16	5	240
2014	177	12	17	13	5	224
2015	187	13	15	16	10	241
AAGR 1994-2015	**-0.66%**	**2.99%**	**-1.12%**	**-1.71%**	**2.46%**	**-0.54%**

Topeka MSA includes Shawnee, Jefferson, Jackson, Osage, and Wabaunsee Counties
AAGR: Average annual growth rate
Source: FAA Aircraft Registry Database; FAA Census of U.S. Civil Aircraft

In 2015, there were 241 aircraft registered in the Topeka MSA. This was the first year-over-year increase since 2008, when there were 297 registered aircraft. This is an indicator of how significantly the national recession of 2008-2009 negatively impacted general aviation activity in the region. In fact, the region has been slow to recover as the last three years reflect the lowest registered aircraft count since records began being kept in 1994. With the number of registered aircraft identified, several projections of future registered aircraft are considered.

Several regression and time-series analyses were first considered. Because of the declining trend in several variables, including registered aircraft and U.S. active aircraft, regression and time-series analyses did not result in reliable forecasts. As a result, these analytical methods were not considered further.

Exhibit 2D presents three different projections of registered aircraft for the Topeka MSA. The first is simply a trend line analysis applying the historic trend since 1994. This results in a continuing decline in registered aircraft over the next 20 years. This figure may not properly reflect current trends as registered aircraft did increase in 2015 over 2014. Between 2008 and 2014, two factors contributed greatly



YEAR	TOPEKA MSA REGISTRATIONS[1]	U.S. ACTIVE AIRCRAFT[2]	% of U.S. ACTIVE AIRCRAFT	TOPEKA MSA POPULATION [3]	AIRCRAFT PER 1,000 RESIDENTS
2005	286	224,257	0.1275%	228,208	1.2532
2006	283	221,942	0.1275%	229,400	1.2337
2007	296	231,606	0.1278%	230,599	1.2836
2008	297	228,664	0.1299%	231,804	1.2813
2009	288	223,876	0.1286%	233,015	1.2360
2010	283	223,370	0.1267%	234,233	1.2082
2011	281	220,453	0.1275%	234,796	1.1968
2012	270	209,034	0.1292%	234,668	1.1506
2013	240	199,927	0.1200%	234,203	1.0248
2014	224	198,860	0.1126%	235,031	0.9531
2015	241	198,780	0.1212%	235,974	1.0213
Historic Growth Scenario 1994-2015 (AAGR = -0.55%)					
2020	235	199,410	0.1178%	241,303	0.9739
2025	228	201,970	0.1129%	246,590	0.9246
2035	216	214,260	0.1008%	255,683	0.8448
Constant Aircraft Per 1,000 Population (AAGR= 0.40%)					
2020	246	199,410	0.1236%	241,303	1.0213
2025	252	201,970	0.1247%	246,590	1.0213
2035	261	214,260	0.1219%	255,683	1.0213
Constant Share of U.S. Fleet (AAGR = 0.38%)					
2020	242	199,410	0.1212%	241,303	1.0019
2025	245	201,970	0.1212%	246,590	0.9930
2035	260	214,260	0.1212%	255,683	1.0160
Selected Forecast (AAGR = 0.38%)					
2020	244	199,410	0.1224%	241,303	1.0112
2025	248	201,970	0.1228%	246,590	1.0057
2035	260	214,260	0.1213%	255,683	1.0169

[1]FAA Aircraft Registration Database
[2]FAA Aerospace Forecasts Fiscal Years 2015-2035
[3]Woods & Poole Economics 2015

Topeka MSA includes Shawnee, Jefferson, Jackson, Osage, and Wabaunsee Counties
Source: Coffman Associates analysis.

to the decline in registered aircraft nationally: 1) the 2008-2009 national recession and subsequent slow recovery; and 2) the re-registration of aircraft from 2010-2013, which identified a greater than 10 percent decrease in the actual number of active general aviation aircraft. With these two major factors now in the past, it is reasonable to anticipate a return to more normal growth trends.

Two market share forecasts are also presented in **Exhibit 2D**. The first considers the relationship between population and registered aircraft. In 2015, there was 1.0213 registered aircraft per 1,000 people in the Topeka MSA. By keeping this ratio as a constant, a forecast emerges which shows very modest growth in registered aircraft.

The second forecast considers the relationship of local registered aircraft to the number of national active aircraft. In 2015, registered aircraft in the Topeka MSA represented 0.1212 percent of the national fleet. By maintaining this as a constant ratio, a long term forecast results.

Both of the market share projections are considered reasonable. The recent declining trend in registered aircraft and U.S. active aircraft following the 2008-2009 recession is shown to slowly level off and ultimately return to growth over time. The selected forecast is an average of the two market share projections. In 2020, registered aircraft are forecast to increase slightly to 244. By 2035, registered aircraft for the county are forecast to reach 260. Over the next 20 years, county registered aircraft are forecast to grow slowly at 0.38 percent annually.

The registered aircraft projection is one data point to be used in the development of a based aircraft forecast. The following section will present several potential based aircraft forecasts, as well as the selected based aircraft forecast, to be utilized in this study.

Based Aircraft Forecast

Determining the number of based aircraft at an airport can be a challenging task. Aircraft storage can be somewhat transient in nature, meaning aircraft owners can and do move their aircraft. Some aircraft owners may store their aircraft at an airport for only part of the year. For many years, the FAA did not require based aircraft records; therefore, historical records are often incomplete or non-existent.

Management at the Airport maintains a based aircraft inventory. As of June 2015, there were 42 based aircraft. Of this total, 24 are operated by the two Kansas National Guard units and are comprised of 12 KC-135 air tankers and 12 Black Hawk helicopters. Interviews with representatives of the Guard units indicated that neither of these is anticipated to change during the 20-year planning period. On the civilian side, there are 18 based aircraft comprised of 8 single engine pistons, 2 twin pistons, 2 turboprops, and 6 business jets.

Future civilian based aircraft are not anticipated to increase significantly for a number of reasons. Philip Billard Municipal Airport is owned and operated by MTAA and is intended to serve the general aviation community. Specific general aviation services are available at Billard that are not available at Topeka Regional Airport, such as T-hangar aircraft storage and on-site aircraft maintenance and repair. Users of Billard also do not have to intermix with frequent military activity.

Exhibit 2E presents the based aircraft forecast for Topeka Regional Airport. The growth rates for variables that influence aviation demand to some degree have been applied to the known number of civilian based aircraft (18). The first projection considers the 2015 FAA TAF growth rate for based aircraft at the Airport which is 2.10 percent. When applying this growth rate to the civilian based aircraft, a projection emerges which identifies the potential for 27 based civilian aircraft during the term of this master plan. Several additional growth rates were applied including the forecast growth rate for registered aircraft in the Topeka MSA (0.38%) to generate additional forecasts.

The selected based aircraft forecast shows no change in the number of military based aircraft. Civilian based aircraft are forecast to grow slightly from 18 currently to 24 in the future. This results in an overall growth rate of 0.67 percent.

Civilian based aircraft are forecast to grow slightly from 18 currently to 24 in the future.

Based Aircraft Fleet Mix

It is important to have an understanding of the current and projected based aircraft fleet mix at an airport. This will ensure the planning of proper facilities in the future.

The forecast mix of based aircraft was determined by comparing existing and forecast U.S. general aviation fleet trends to the fleet mix at the Airport. The national trend in general aviation is toward a greater percentage of larger, more sophisticated aircraft as part of the national fleet. In addition, Topeka Regional Airport is much better suited to accommodate a larger percentage of business jets rather than smaller piston-powered aircraft. **Table 2E** presents the current and forecast based aircraft fleet mix.

TABLE 2E
Based Aircraft Fleet Mix
Topeka Regional Airport

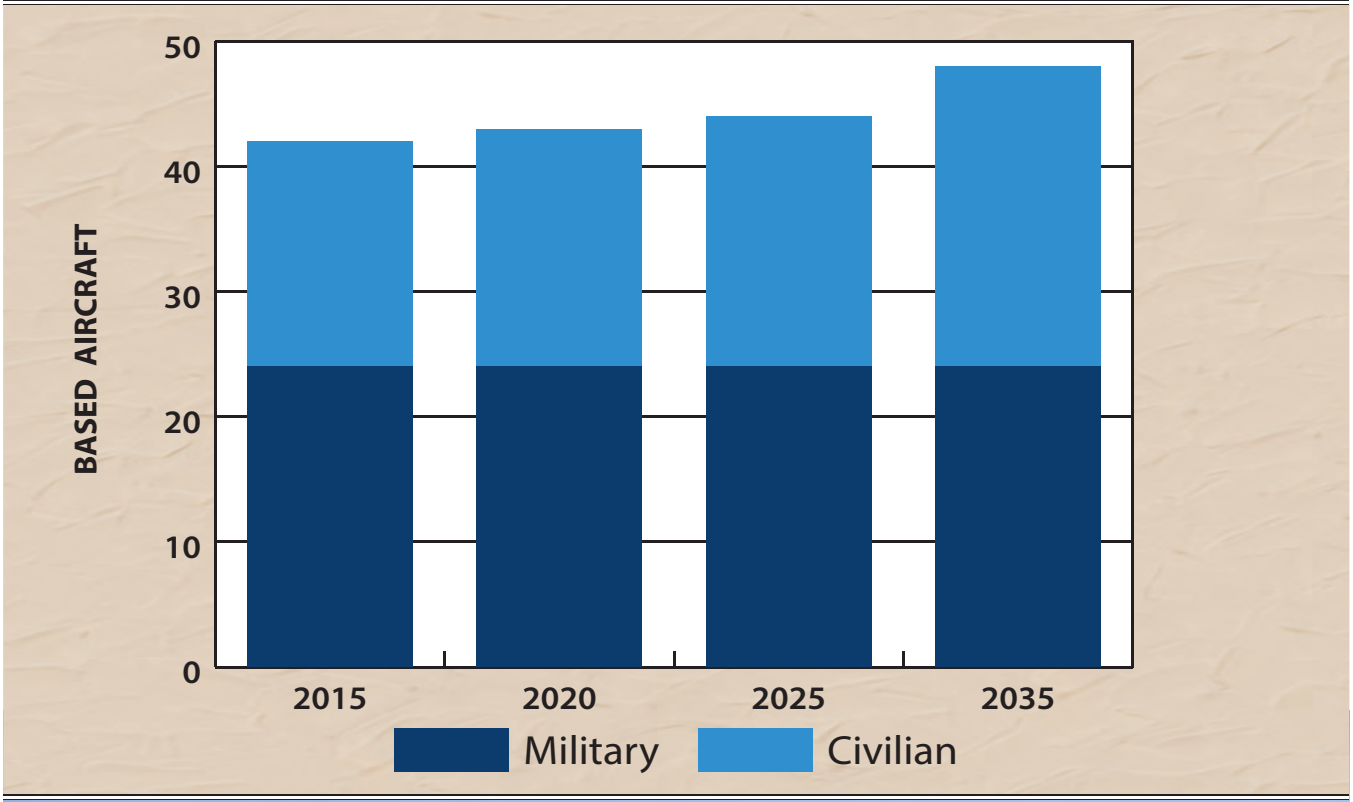
Year	Civilian						Military			Total
	SEP	MEP	TP	Jet	Helo	Sub	Jet	Helo	Sub	
2015	8	2	2	6	0	18	12	12	24	42
FORECAST										
2020	8	2	2	7	0	19	12	12	24	43
2025	8	2	2	8	0	20	12	12	24	44
2035	8	1	4	10	1	24	12	12	24	48

SEP-Single Engine Piston; MEP-Multi-engine Piston, TP-Turboprop; Helo-Helicopter
Source: Coffman Associates analysis

As noted previously, military aircraft are anticipated to remain at their current levels through the planning period. Namely, there are 12 KC-135 air tankers and 12 Black Hawk helicopters. Growth in civilian based aircraft is anticipated in turboprops, business jets, and helicopters.

PROJECTION SOURCES	2015 (Base Year)*	2020	2025	2035	AACGR 2015-2035
2015 TAF Growth Rate (2.10%)	18	20	22	27	2.10%
2015 FAA Active Aircraft Growth Rate (0.40%)	18	18	19	19	0.40%
Topeka MSA Population Growth Rate (0.40%)	18	18	19	19	0.40%
Topeka MSA Employment Growth Rate (0.77%)	18	19	19	21	0.76%
Topeka MSA Income Growth Rate (1.28%)	18	19	20	23	1.28%
Topeka MSA Registered Aircraft Growth Rate (0.38%)	18	18	19	19	0.38%
Civilian Based Aircraft Forecast	**18**	**19**	**20**	**24**	**1.45%**
Military Aircraft Forecast	**24**	**24**	**24**	**24**	**0.00%**
SELECTED BASED AIRCRAFT FORECAST	**42**	**43**	**44**	**48**	**0.67%**

*Base year set to 2015 based aircraft figure as identified by Airport staff.
AAGR: Average annual growth rate
Source: Coffman Associates analysis





ANNUAL OPERATIONS

Operations are categorized as air carrier, air taxi/commuter, general aviation, and military. They are further classified as local or itinerant. A local operation is a take-off or landing performed by an aircraft that operates within sight of an airport, or which executes simulated approaches or touch-and-go operations at an airport. Itinerant operations are those performed by aircraft with a specific origin or destination away from an airport. Generally, local operations are characterized by training operations. Itinerant operations increase with business and commercial use, since business aircraft operate on a high frequency and are not typically utilized for local training operations.

Table 2F summarizes historical operations at the Airport since 2000. This data was obtained from the FAA Operations Network (OPSNET) database of tower operations counts. As can be seen from 2000 through 2007, the airport averaged around 42,000 annual operations. Following the 2008-2009 recession, operations have declined by nearly 40 percent on average. Since 2008, annual operations have averaged approximately 26,000.

TABLE 2F
Historical Operations
Topeka Regional Airport

Year	ITINERANT OPERATIONS					LOCAL OPERATIONS			Total
	AC	AT	GA	MIL	*Subtotal*	GA	MIL	*Subtotal*	
2000	144	2,778	11,952	3,951	*18,825*	8,161	14,622	*22,783*	**41,608**
2001	152	2,688	10,852	5,179	*18,871*	5,672	16,800	*22,472*	**41,343**
2002	126	2,737	11,478	9,061	*23,402*	4,690	13,385	*18,075*	**41,477**
2003	183	1,453	11,787	8,816	*22,239*	6,829	14,117	*20,946*	**43,185**
2004	181	821	10,867	11,995	*23,864*	5,288	15,588	*20,876*	**44,740**
2005	156	1,153	11,239	11,327	*23,875*	3,533	15,185	*18,718*	**42,593**
2006	362	1,274	12,937	10,909	*25,482*	3,980	14,400	*18,380*	**43,862**
2007	385	668	12,430	9,812	*23,295*	2,602	12,351	*14,953*	**38,248**
2008	223	748	8,446	9,098	*18,515*	2,042	9,060	*11,102*	**29,617**
2009	197	483	5,884	10,556	*17,120*	1,251	9,610	*10,861*	**27,981**
2010	225	476	5,838	9,528	*16,067*	897	8,584	*9,481*	**25,548**
2011	196	444	4,643	8,086	*13,369*	1,251	10,187	*11,438*	**24,807**
2012	191	415	4,648	9,751	*15,005*	690	7,709	*8,399*	**23,404**
2013	253	326	4,668	9,468	*14,715*	1,052	7,812	*8,864*	**23,579**
2014	212	1,104	4,555	8,509	*14,380*	1,042	7,751	*8,793*	**23,173**
2015	200	462	5,749	8,186	*14,597*	971	10,421	*11,392*	**25,989**

KEY: AC-Air Carrier; AT-Air Taxi; GA-General Aviation; MIL-Military
Source: The Operations Network (OPSNET), official FAA operations count from the on-airport tower

Itinerant General Aviation Operations Forecast

Two forecasts of itinerant general aviation operations have been developed and are presented in **Table 2G**. The first considers the Airport maintaining its share of total U.S. itinerant general aviation operations at a constant level. In 2015, the Airport accounted for 0.0413 percent of U.S. itinerant operations. By carrying this percentage forward to the plan years of this study, a forecast emerges.

TABLE 2G
Itinerant General Aviation Operations Forecast
Topeka Regional Airport

Year	FOE Itinerant Ops	US Itinerant GA Ops[1]	% of US Itinerant GA Ops	Civilian Based Aircraft	Itinerant GA Ops Per Based Aircraft
2015	5,749	13,931,800	0.0413%	18	319
Constant Market Share of U.S. Itinerant GA Operations (AAGR = 0.41%)					
2020	5,864	14,209,500	0.0413%	19	309
2025	5,983	14,499,400	0.0413%	20	299
2035	6,239	15,118,400	0.0413%	24	260
Constant Itinerant Operations Per Based Aircraft (AAGR = 1.45%)					
2020	6,068	14,209,500	0.0427%	19	319
2025	6,388	14,499,400	0.0441%	20	319
2035	7,665	15,118,400	0.0507%	24	319
Planning Forecast (AAGR = 0.92%)					
2020	**5,900**	14,209,500	0.0415%	19	311
2025	**6,100**	14,499,400	0.0421%	20	305
2035	**6,900**	15,118,400	0.0456%	24	288

KEY: AAGR-Average annual growth rate; FOE-Topeka Regional Airport; GA-General aviation; Ops-Operations
[1]FAA Aerospace Forecasts 2015-2035

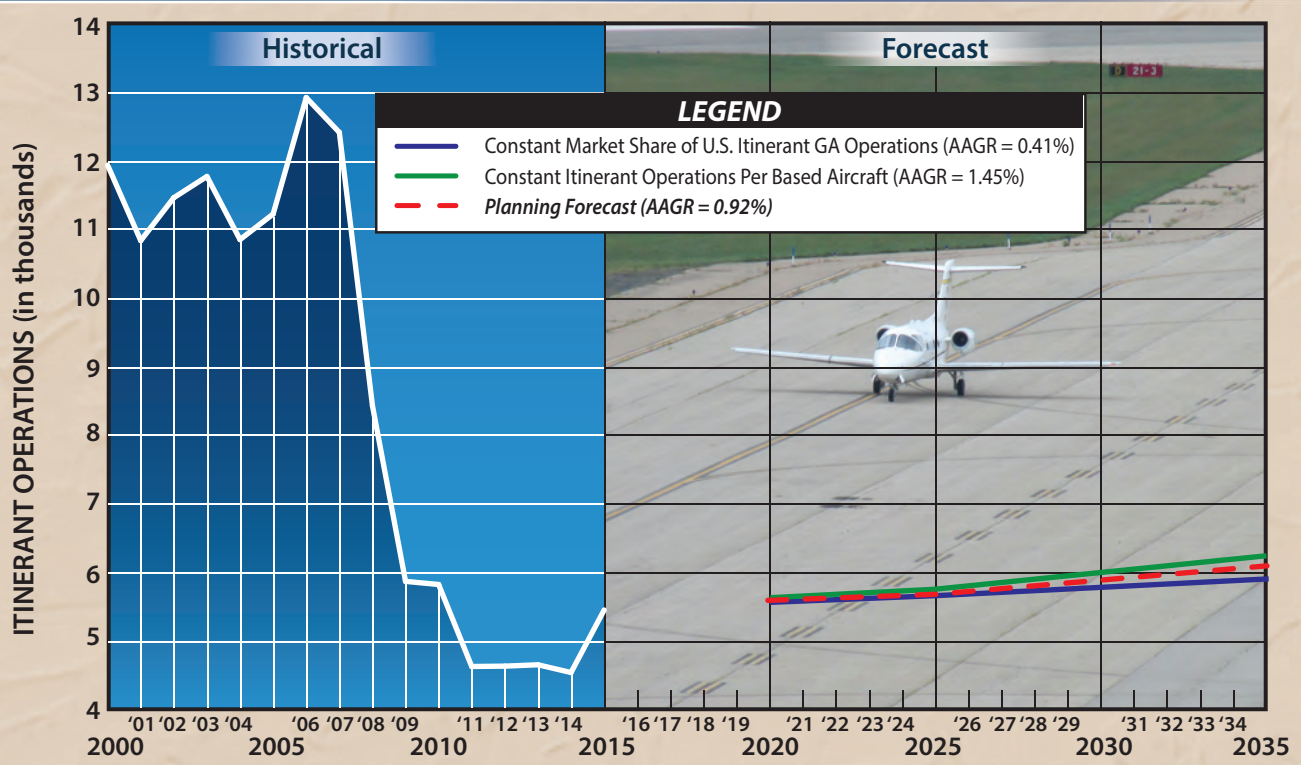
The second forecast considers a more localized projection by comparing the number of itinerant operations at the Airport to the number of civilian based aircraft. There were 319 itinerant general aviation operations per based aircraft in 2015. This forecast carries this figure through to the plan years.

The selected planning forecast is the approximate average of the two forecasts. The average annual growth rate is 0.92 percent, which is above the FAA forecast growth rate of 0.37 percent for total itinerant general aviation operations in the U.S. over the next 20 years. **Exhibit 2F** shows the itinerant and local general operations forecasts.

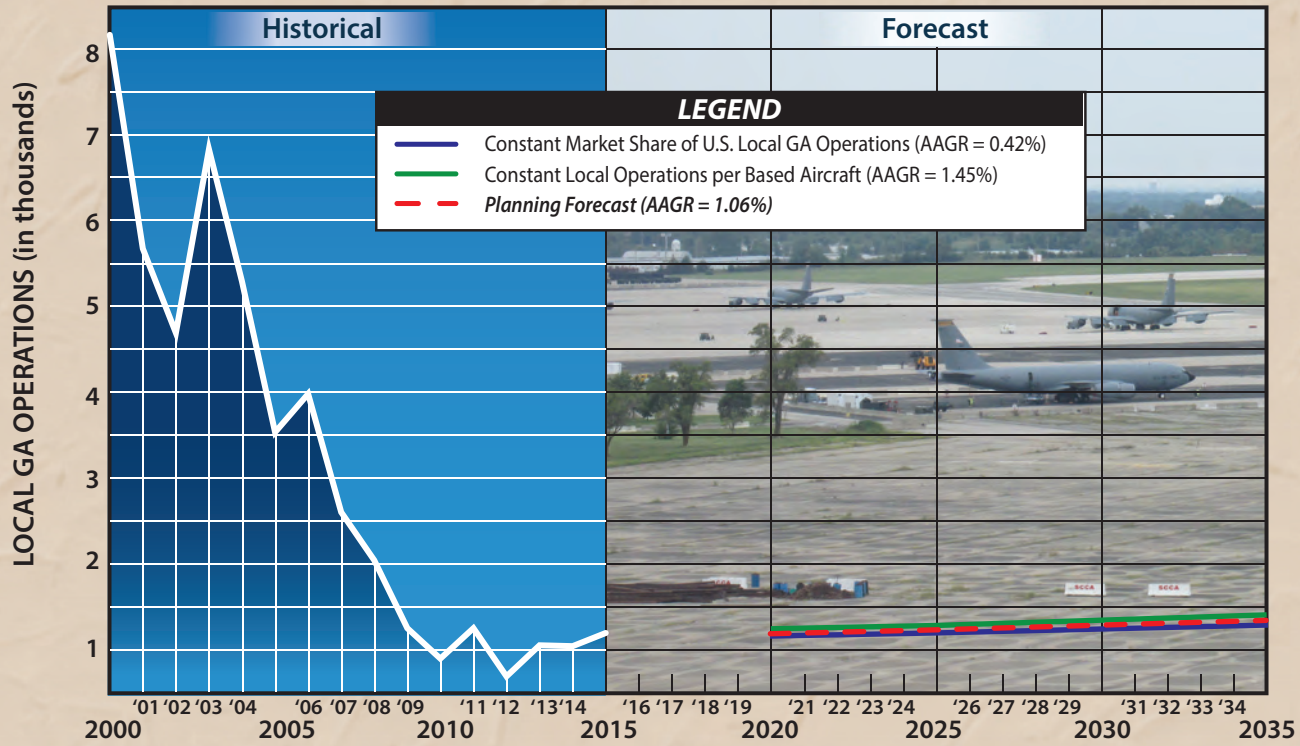
Local General Aviation Operations Forecast

A similar methodology was utilized to generate a planning forecast for local general aviation operations. Two forecasts were developed with the first considering the Airport maintaining a constant percentage of U.S. local general aviation operations. The second forecast maintains a constant number of local operations per based aircraft. Both forecasts are shown in **Table 2H**.

GENERAL AVIATION ITINERANT OPERATIONS



GENERAL AVIATION LOCAL OPERATIONS



KEY: AAGR-Average annual growth rate; GA-General aviation
Source: FAA Operations Network (OPSNET) tower count database

TABLE 2H
Local General Aviation Operations Forecast
Topeka Regional Airport

Year	FOE Local GA Ops	US Local GA Ops[1]	% of U.S. Local Ops	Civilian Based Aircraft	Local GA Ops Per Based Aircraft
2015	971	11,807,500	0.0082%	18	54
Constant Market Share of U.S. Local GA Operations (AAGR = 0.42%)					
2020	991	12,048,000	0.0082%	19	52
2025	1,011	12,298,900	0.0082%	20	51
2035	1,055	12,834,800	0.0082%	24	44
Constant Local Operations per Based Aircraft (AAGR = 1.45%)					
2020	1,025	12,048,000	0.0085%	19	54
2025	1,079	12,298,900	0.0088%	20	54
2035	1,295	12,834,800	0.0101%	24	54
Planning Forecast (AAGR = 1.06%)					
2020	**1,000**	12,048,000	0.0083%	19	53
2025	**1,050**	12,298,900	0.0085%	20	53
2035	**1,200**	12,834,800	0.0093%	24	50

KEY: AAGR-Average annual growth rate; FOE-Topeka Regional Airport; GA-General aviation; Ops-Operations
[1]*FAA Aerospace Forecasts 2015-2035*

The selected planning forecast is an approximate average of the two forecasts. The average annual growth rate is 1.06 percent, which is slightly above the FAA forecast growth rate of 0.45 percent for total local general aviation operations in the U.S. over the next 20 years.

Exhibit 2F shows in graph form the forecasts for both itinerant and local general aviation operations. As can be seen, the forecasts developed create a planning envelope and the selected forecast is within the envelope.

Air Taxi Operations Forecast

Air taxi operations are those with authority to provide "on-demand" transportation of persons or property via aircraft with fewer than 60 passenger seats. Air taxi includes a broad range of operations, including some smaller commercial service aircraft, some charter aircraft, air cargo aircraft, many fractional ownership aircraft, and air ambulance services.

The history of air taxi operations is included on **Table 2J**. As can be seen, there was a significant spike in air taxi operations at the Airport in 2014. This is directly attributable to the presence of scheduled passenger service utilizing the 50-seat regional jet, which are counted as air taxi and not air carrier operations. That service was discontinued at the end of 2014 and total air taxi operations decreased significantly in 2015 reflecting this loss of passenger service.

TABLE 2J
Air Taxi Operations Forecast
Topeka Regional Airport

Year	FOE Air Taxi Operations	U.S. Air Taxi Operations[1]	FOE Percent
2000	2,778	10,760,500	0.0258%
2005	1,153	12,550,500	0.0092%
2010	476	9,410,400	0.0051%
2011	444	9,278,500	0.0048%
2012	415	8,994,400	0.0046%
2013	326	8,803,400	0.0037%
2014	1,104	8,439,300	0.0131%
2015	462	8,026,200	0.0058%
Constant Market Share of U.S. Air Taxi Operations (AAGR = -0.99%)			
2020	407	7,075,700	0.0058%
2025	341	5,918,500	0.0058%
2035	379	6,580,200	0.0058%
Increasing Market Share of U.S. Air Taxi Operations (AAGR=4.43%)			
2020	500	7,075,700	0.0071%
2025	700	5,918,500	0.0118%
2035	1,100	6,580,200	0.0167%
Planning Forecast (AAGR = 2.78%)			
2020	**500**	7,075,700	0.0071%
2025	**600**	5,918,500	0.0101%
2035	**800**	6,580,200	0.0122%

KEY: AAGR-Average annual growth rate; FOE-Topeka Regional Airport; GA-General aviation; Ops-Operations
[1]*FAA Aerospace Forecasts 2015-2035*

The FAA national air taxi forecast projects a 3.6 percent decrease in air taxi operations through 2024, followed by modest increases thereafter. The primary reason for this decrease is the transition by commuter airlines to larger aircraft with more than 60 passenger seats which are then counted as air carrier operations. While air taxi operations that are represented by commuter airlines using aircraft with fewer than 60 seats are decreasing, the business jet segment of the air taxi category is expected to continue to grow nationally. The facilities and FBO services available at Topeka Regional Airport are especially accommodating to operators of business jets. Therefore, it is reasonable to expect the business jet component of air taxi activity to increase moderately over time at the Airport.

Table 2J presents two forecasts for air taxi operations at the Airport. The first simply considers the Airport capturing a constant market share of national air taxi operations which results in a decreasing number of air taxi operations. This forecast is not thought to reflect the local condition at Topeka for two reasons:

1) The decreasing national air taxi forecast is the result of the phase-out of regional jets with fewer than 60 seats. A process that has already occurred at the Airport and is reflected in the current year air taxi operations.

2) The services available at the Airport cater to certain segments of the air taxi market, namely charters and fractional jet operators.

The second forecast considers an increasing market share of air taxi operations that is more closely aligned to recapturing air taxi operational levels experienced at the Airport prior to the 2008-2009 recession. From 2000 to 2007, the Airport averaged nearly 1,700 air taxi operations annually. This forecast considers recapturing a portion of this average up to 1,100 air taxi operations annually.

The selected planning forecast takes a conservative approach to air taxi operations, which is between the two projections. For planning purposes, air taxi operations are forecast at 500 in five years, 600 in 10 years, and 800 in 20 years.

A portion of air taxi operations should be considered commercial operations, which is important to distinguish for determining certain passenger processing facility requirements for the terminal building and aircraft apron. While the tower operations count does not make this distinction, the Airport maintains an accounting of the types of aircraft utilized in charter service (primarily team charters and casino charters). With this data, it is possible to determine what percentage of air taxi operations should be considered commercial in nature and what percent is attributable to other air taxi activity, such as fractional ownership, air ambulance, etc. From this data, it was determined that approximately 15 percent of the air taxi operations were conducted by charter operators of aircraft with fewer than 60 seats. These operations will be extracted from the total air taxi operations category and included in the commercial operations category for planning purposes.

Military Operations Forecast

The military has a significant presence at the Airport. The 190th Air Refueling Wing of the Kansas Air National Guard bases 12 KC-135 air tanker aircraft at the Airport. The Kansas Army National Guard bases 12 Black Hawk helicopters at the Airport. Historically, military operations have accounted for approximately 60 percent of all operations and more than 90 percent of local operations activity.

The FAA has taken the stance that it is inherently difficult to forecast military operations because of the variable nature of the military mission. For example, a Guard unit could be deployed, leaving no aircraft at the Airport. Therefore, the FAA recommends examining historical military activity and carrying a reasonable estimate of activity into the future. As noted previously, the FAA TAF projects 8,246 itinerant military and 7,190 local military operations for each year throughout the 20-year planning period. The FAA Forecasts 2015-2035, also identifies a flat-line, no-growth scenario for military operations at civilian airports nationally.

As part of the inventory data collection effort, representatives from the Guard units were interviewed. They indicated that both units are planned to remain at the Airport for at least the next 20 years and that the respective fleet of KC-135 and Black Hawk helicopters is not planned to change. As a result, the TAF projection for military operations will be utilized but the figures are rounded slightly for planning purposes.

For this forecasting effort, military operations, both local and itinerant, were examined over the previous 20 years. During this time, the military has experienced periods of peace time and periods of extensive deployment. The 20-year average of military operations is utilized for the military operations forecast. Local military operations are estimated at 8,200 annually and itinerant military operations estimated at 11,200 annually.

Commercial Operations Forecast

Commercial operations are classified as either air carrier or air taxi/commuter. Air carrier operations are those by aircraft with 60 or more passenger seats and/or 18,000-pound payload capacity and they are engaged in CFR Part 135 commercial operations. Air carrier operations include both scheduled passenger service and non-scheduled charter operations. Charter flights currently account for all air carrier operations at the Airport since scheduled passenger service was discontinued at the end of 2014. Many of the team charter aircraft for the University of Kansas and their athletic opponents utilize the Airport. In addition, casino charters and other vacation charters utilize the Airport.

The Airport maintains records of landings by charter operators. Since 2009, there have been, on average, 162 annual operations by charter aircraft. Over the last three years, the average has been nearly 200 operations. This figure is not anticipated to grow significantly during the forecast period because the number of team flights won't change much. Casino and vacation flights also appear to be relatively few and consistent over time. For planning purposes, air carrier activity via charter flights is planned to grow slightly from 200 in 2015 to 230 annually through the 20-year planning horizon.

As noted previously, a portion of the air taxi operations, those charters utilizing fewer than 60 passenger seat aircraft, are to be included in the commercial operations forecast.

ENPLANEMENTS

Forecasts of passenger enplanements (passenger boardings) are critical in airport planning primarily because current federal law provides that any airport that has more than 10,000 annual enplanements is entitled to at least $1 million in airport development grant funding. This is particularly important for Topeka Regional Airport, where meeting this threshold has not been consistent year-over-year, which makes capital planning challenging.

Current Federal law provides at least $1 million to airports with more than 10,000 enplanements.

Table 2K presents enplanement and deplanement data for the Airport since 2009. As can be seen over the past seven years, the Airport had over 10,000 enplanements in four of those years. In only one of those years, 2014, did the Airport have regularly scheduled commercial passenger service, which is the most common and reliable way to gain enplanements. The scheduled passenger service that existed in 2014 has since been discontinued. As a result, the Airport is currently relying on enplanements from charter operators.

TABLE 2K
Passenger Activity
Topeka Regional Airport

	2009	2010	2011	2012	2013	2014	2015
Military							
Enplaned	9,121	12,550	3,907	6,075	5,530	7,687	860
Deplaned	7,674	8,282	7,712	4,873	4,910	6,130	7,869
Other Charters							
Enplaned	2,656	2,662	3,191	3,280	4,805	4,194	4,099
Deplaned	3,035	2,581	2,868	3,271	3,732	3,936	3,527
Commercial Service							
Enplaned	0	0	0	0	0	10,302	0
Deplaned	0	0	0	0	0	10,169	0
TOTALS							
Total Enplaned	11,777	15,212	7,098	9,355	10,335	22,183	4,959
Total Deplaned	10,709	10,863	10,580	8,144	8,642	20,235	11,396

Source: Airport records

The charter operations include military deployments from Fort Riley, university athletic team charters, casino and vacation charters, and other smaller charter activity. Forecasting unscheduled charter activity is inherently challenging; however, the Airport has maintained records of charter enplanements. This data is utilized to identify general enplanement trends and to aid in the development of enplanement forecasts.

Military Enplanements

Between 2009 and 2015, troop deployments accounted for an annual average of 6,500 enplanements. The high year was 2010 when there were 12,550 enplanements and the low is 2015 with 860. Clearly, there can be a wide range of military enplanements. When removing both the high and low enplanement figures, the annual average is still nearly 6,500. For planning purposes, 6,500 annual military enplanements are considered through the plan years.

It should be noted that Fort Riley has historically utilized both Topeka Regional Airport and Salina Municipal Airport for troop deployments. While deployments from Topeka were down significantly in 2015, the general command at Fort Riley has not indicated to the Airport FBO (the processing agent) that this represents a long term change.

Charter Enplanements

The Airport is regularly used by many athletic teams going to or from the University of Kansas. It is also utilized by various casino charter flights. These enplanements have increased somewhat in recent years,

with 2009 being the low with 2,656 enplanements and 2013 being the high with 4,805 enplanements. In 2015, these charter enplanements decreased slightly to 4,099.

Forecast charter enplanements are based on the anticipated increase in commercial operations. Commercial operations include air carrier and some air taxi operations. Combined, these operations are anticipated to grow 1.66 percent annually. By applying this growth rate to the current year charter enplanement total the forecast results. By 2020, charter enplanements are forecast to be approximately 5,200, by 2025 charter enplanements are forecast to be approximately 5,600, and by 2035 charter enplanements are anticipated to be approximately 6,600.

Enplanement Forecast Summary

The FAA requires that the enplanement forecast for an airport not differ from the TAF by more than 10 percent in the 5-year period and 15 percent in the 10-year period. **Table 2L** shows that the enplanement forecast presented exceeds these tolerances, therefore for purposes of FAA planning, the TAF enplanement forecast will be utilized.

TABLE 2L
Enplanement Forecast
Topeka Regional Airport

	2015	2020	2025	2035
Military	860	6,500	6,500	6,500
Other Charter	4,099	5,200	5,600	6,600
Total Enplanements[1]	4,959	11,700	12,100	13,100
TAF 2016	3,481	3,506	3,531	3,581
Percent Difference with TAF	35.0%	107.8%	109.6%	114.1%
Forecast Enplanements[2]	**4,959**	**3,506**	**3,531**	**3,581**
Percent Difference with TAF	35.0%	0.0%	0.0%	0.0%

[1]Forecast enplanements without a return of commercial service
[2]TAF forecast to be utilized for this Master Plan
TAF: FAA Terminal Area Forecast

PEAKING CHARACTERISTICS

Many airport facility needs are related to the level of activity during peak periods for both operations and enplanements. The periods used in developing facility requirements for this study are as follows:

- **Peak Month –** The calendar month when peak activity occurs.
- **Design Day –** The average day in the peak month.
- **Busy Day –** The busy day of a typical week in the peak month.
- **Design Hour –** The peak hour within the design day.

It is important to realize that only the peak month is an absolute peak within the year. Each of the other periods will be exceeded at various times during the year. However, each provides reasonable planning standards that can be applied without overbuilding or being too restrictive.

A review of tower reports shows that the peak month for operations has averaged 10.66 percent of total annual operations. This factor is carried to the plan years. The design day is simply the peak month divided by the number of days in that month. Over the last five years, the peak month has averaged 30.66 days; therefore, the peak month estimate is divided by 30.66 to arrive at the design day. The busy day is calculated as 30 percent higher than the design day, which is derived based on the average of the peak day for each week of the peak month. The design hour is an average of the peak hour of the peak day of each week in the peak month. **Table 2M** presents the peaking characteristics for the Airport.

TABLE 2M
Peak Operations Forecast
Topeka Regional Airport

	2015	2020	2025	2030
Annual Operations	**25,989**	**27,000**	**27,360**	**28,530**
Peak Month	2,842	2,906	2,945	3,071
Busy Day	191	196	198	207
Design Day	93	95	96	100
Design Hour	18	18	18	19

Source: Coffman Associates analysis of ATCT data.

ANNUAL INSTRUMENT APPROACHES

An instrument approach, as defined by the FAA, is "an approach to an airport with the intent to land an aircraft in accordance with an Instrument Flight Rule (IFR) flight plan, when visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude." To qualify as an instrument approach, aircraft must land at an airport after following one of the published instrument approach procedures. Forecasts of annual instrument approaches (AIAs) provide guidance in determining an airport's requirements for navigational aid facilities. Practice or training approaches do not count as AIAs nor do instrument approaches that occur in visual conditions.

It is highly unusual for pilots to perform local operations when IFR conditions are in effect. AIAs may be expected to increase as transient operations and operations by more sophisticated aircraft (e.g., turboprops and business jets) increase through the planning period. For this reason, AIA projections consider a constant estimate of two percent of annual itinerant operations. The projections are presented in **Table 2N**.

TABLE 2N
Annual Instrument Approaches (AIAs)
Topeka Regional Airport

Year	AIAs	Itinerant Operations	Ratio
2015	291	14,750	2.00%
2020	387	19,364	2.00%
2025	408	20,404	2.00%
2035	428	21,424	2.00%

Source: Coffman Associates analysis

FORECAST COMPARISON TO THE TERMINAL AREA FORECAST

The FAA will review the forecasts presented in this Master Plan for consistency with the *Terminal Area Forecast*. The local FAA Airport District Office (ADO) or Regional Airports Division (RO) are responsible for forecast approvals. When reviewing a sponsor's forecast, FAA must ensure that the forecast is based on reasonable planning assumptions, uses current data, and is developed using appropriate forecast methods. Forecasts of enplanements, operations and based aircraft are considered consistent with the TAF if they differ by less than 10 percent in the five-year period and 15 percent in the 10-year forecast period. If the forecast is not consistent with the TAF, differences must be resolved if the forecast is to be used for FAA decision-making. **Table 2P** presents the direct comparison of the master planning forecasts with the TAF published in January 2016.

TABLE 2P
Forecast Comparison to the Terminal Area Forecast
Topeka Regional Airport

	BASE YEAR	FORECAST			
	2015	2020	2025	2035	AAGR 2015-2035
Passenger Enplanements					
Master Plan Forecast	4,959	3,506	3,531	3,581	-1.61%
2016 FAA TAF	3,481	3,506	3,531	3,581	0.14%
% Difference	35.02%	0.00%	0.00%	0.00%	
Total Operations					
Master Plan Forecast	25,989	27,000	27,360	28,530	0.47%
2016 FAA TAF	26,926	27,552	27,662	27,882	0.17%
% Difference	3.54%	2.02%	1.01%	2.30%	
Based Aircraft					
Master Plan Forecast	42	43	44	48	0.67%
2016 FAA TAF	32	34	38	48	2.10%
% Difference	27.03%	23.38%	14.63%	0.00%	

KEY: AAGR - Average annual growth rate
Source: Coffman Associates analysis

The reason the FAA allows this differential is because the TAF forecasts are not meant to replace forecasts developed locally (i.e., in this Master Plan). While the TAF can provide a point of reference or comparison, their purpose is much broader in defining FAA national workload measures.

As discussed previously, the TAF forecast for enplanements is being utilized in this Master Plan. Two additional enplanements forecasts have been provided for the benefit of airport management should other scenarios arise. The first scenario considers only charter enplanements based upon historical averages. As noted, four of the last eight years, the Airport has exceeded 10,000 annual enplanements and only one of these four years did the Airport have commercial service. The second enplanement scenario considers a return of commercial service to a level comparable to other regions with similar characteristics such as population and distance to a hub airport.

For total operations, the master plan forecast is within the FAA tolerances.

For based aircraft, the TAF identifies a total of 32 based aircraft (18 military and 14 civilian). In reality, there were 24 military aircraft and 18 based aircraft for a total of 42 based aircraft in 2015. The actual based aircraft count has been verified through hangar leases and interviews with the military. In the five-year planning horizon, the TAF based aircraft count differs from the Master Plan forecast by 23,38 percent exceeding the FAA tolerance of 10 percent. The Master Plan based aircraft forecast does fall within the FAA TAF tolerance in the 10-and20-year planning horizons.

Exhibit 2G presents a summary of the Master Plan forecasts. Moderate growth is forecast for all activity demand indicators.

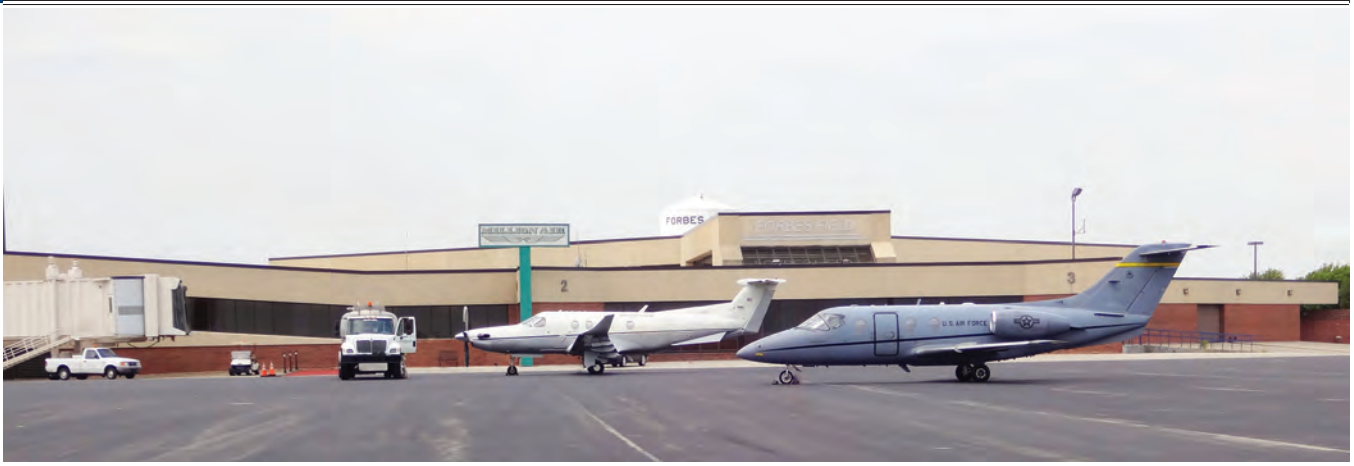
POTENTIAL COMMERCIAL SERVICE OPERATIONS AND ENPLANEMENTS

Topeka Regional Airport has had scheduled commercial passenger service as recently as the end of 2014. Prior to that the Airport has had service off and on through the years. A return of scheduled commercial service is feasible considering the history at the Airport. Estimating the number of scheduled commercial service operations is a function of the type of aircraft in use and the load factors. In the following sections, enplanement and commercial operations that may result from a return to commercial service will be presented. These forecasts will be considered separate from the forecasts to be approved by the FAA and are developed in order to provide the airport important facility planning information should commercial service return to the Airport.

Scheduled Commercial Service Enplanements

Scheduled commercial service has been intermittent at Topeka Regional Airport. Following more than 10 years with no service, the Airport had service in 2014 from United Airlines with two scheduled daily departures to Chicago. This service was highly subsidized locally, as is typically necessary for smaller communities. Unfortunately, the service was sporadic with many cancellations. Ultimately, the subsidies were exhausted and the airline discontinued service at the end of 2014.

	2015 (Base Year)	2020	2025	2035
ENPLANEMENTS				
Total Enplanements	**4,959**	**3,506**	**3,531**	**3,581**
ANNUAL OPERATIONS				
Commercial Operations (Itinerant)				
Air Carrier (Charter with >59 seats)	200	200	210	230
Air Taxi/Commuter (Charter <60 seats)	64	70	90	120
Total Commercial Operations	***264***	***270***	***300***	***350***
Other Air Taxi	398	430	510	680
General Aviation Operations				
Itinerant	5,749	5,900	6,100	6,900
Local	971	1,000	1,050	1,200
Total General Aviation Operations	***6,720***	***6,900***	***7,150***	***8,100***
Military Operations				
Military Ininerant	8,186	11,200	11,200	11,200
Military Local	10,421	8,200	8,200	8,200
Total Military Operations	***18,607***	***19,400***	***19,400***	***19,400***
Total Local Operations	***11,392***	***9,200***	***9,250***	***9,400***
Total Itinerant Operations	***14,597***	***17,800***	***18,110***	***19,130***
Total Annual Operations	**25,989**	**27,000**	**27,360**	**28,530**
BASED AIRCRAFT				
Military	24	24	24	24
Civilian	18	19	20	24
Total Based Aircraft	***42***	***43***	***44***	***48***
PEAKING CHARACTERISTICS				
Peak Month	2,842	2,906	2,945	3,071
Busy Day	191	196	198	207
Design Day	93	95	96	100
Design Hour	18	18	18	19
ANNUAL INSTRUMENT APPROACHES	**292**	**356**	**362**	**383**



Because of a lack of consistent history of scheduled passenger service, it is challenging to develop a reasonable forecast of future passenger enplanements. Traditional trend-line and regression analyses do not generate a reasonable forecast. The method employed here is to examine communities throughout the U.S. with similar sized populations as quantified by the metropolitan statistical area (MSA) and other similar characteristics, such as proximity to a larger hub airport, being a capital city, and/or proximity to major universities. The relationship between a service area's population and enplanements is called the travel propensity factor (TPF).

Table 2Q presents the 15 MSAs that are larger and smaller in size than the Topeka MSA. The table then shows the 2014 enplanements each of the communities had at their local airport. Note that several of these communities did not have commercial service. A travel propensity factor is then determined by dividing the MSA population with the 2014 enplanements. The closest commercial service or hub airport and the distance to that airport are then considered.

TABLE 2Q
Travel Propensity Factor (TPF)

Metropolitan Statistical Area	MSA Population[1]	2014 Enplanements[2]	Travel Propensity Factor	Closest CS/Hub Airport	Distance
Springfield, IL	211,567	86,198	0.4074	St. Louis	90 miles
Lafayette-West Lafayette	211,697	247,857	1.1708	Baton Rouge	60 miles
Rochester, MN	212,778	119,874	0.5634	Minneapolis	80 miles
Las Cruces, NM	213,676	NA	0	El Paso	60 miles
Barnstable Town	214,914	85,184	0.3964	Providence	70 miles
Burlington, VT	216,167	602,932	2.7892	Albany, NY	130 miles
Longview, TX	217,481	21,867	0.1005	Shreveport	60 miles
Tyler, TX	218,842	86,625	0.3958	Dallas	100 miles
Prescott, AZ	218,844	3,862	0.0176	Phoenix	130 miles
Charleston, WV	222,878	241,566	1.0838	Columbus, OH	140 miles
Chico, CA	224,241	17,141	0.0764	Sacramento	80 miles
Charlottesville, VA	226,968	250,666	1.1044	Richmond	75 miles
Fargo, ND	228,291	456,372	1.9991	Minneapolis	220 miles
Macon, GA	230,450	NA	0	Atlanta	90 miles
Appleton, WI	231,497	249,656	1.0784	Milwaukee	110 miles
Topeka, KS	**233,758**	**21,730**	**0.0930**	**Kansas City**	**70 miles**
Champaign-Urbana, IL	237,252	95,351	0.4019	Springfield	80 miles
Tuscaloosa, AL	237,761	NA	0	Birmingham	60 miles
College Station-Bryan	242,905	91,127	0.3752	Houston	75 miles
Binghamton, NY	247,219	82,625	0.3342	Syracuse	60 miles
Yakima, WA	247,687	57,076	0.2304	Seattle	110 miles
Sioux Falls, SD	248,351	490,448	1.9748	Sioux City	90 miles
Bremerton-Silverdale, WA	254,183	NA	0	Seattle	50 miles
Lynchburg, VA	257,835	78,876	0.3059	Richmond	120 miles
Crestview-Fort Walton, FL	258,042	360,542	1.3972	New Orleans	220 miles
Amarillo, TX	259,885	362,412	1.3945	Oklahoma City	240 miles
Hagerstown, MD	260,070	15,189	0.0584	Baltimore	80 miles
Waco, TX	260,430	66,631	0.2558	Dallas	100 miles
San Rafael, CA	260,750	NA	0	San Francisco	40 miles
Cedar Rapids, IA	263,885	570,571	2.1622	Des Moines	120 miles
Olympia-Tumwater, WA	265,851	NA	0	Seattle	60 miles
Average TPF of airports within 100 miles of a hub airport:			**0.3671**		
Topeka Enplanements Based on the Average TPF:			**85,800**		

KEY: MSA-Metropolitan Statistical Area; CS-Commercial Service
[1]Woods & Poole Economics CEDDS 2015
[2]Federal Aviation Administration

Those communities of similar size to Topeka and within at least 100 miles of a commercial service airport were then identified and an average TPF was determined. This average TPF was then multiplied by the Topeka MSA population to arrive at a peak potential enplanement figure of 85,800.

The potential enplanement estimates are based on a limited set of factors, primarily population and distance to a hub airport. Several communities of similar size and proximity do not have commercial service. Factors that may positively affect enplanement levels include reliability of the airline, frequency of the schedule, advertising budget, as well as an unlimited number of community factors, such as industry, businesses, places of higher education, and recreational attractions.

There are an unlimited number of other factors that could be considered when determining a potential enplanement figure for Topeka Regional Airport and special studies can be undertaken to identify those. The purpose here is to identify a both a short term and long term potential enplanement figure that can be refined at a later date if necessary. One additional factor to consider is the willingness of a passenger to drive a long distance to a hub airport. Passengers in certain regions of the country, such as the Midwest, are more willing to drive long distances to an Airport than those in the northeast, for example.

Scheduled Commercial Operations Forecast

With a long term potential enplanement figure, it is now possible to make an estimate of enplanements and scheduled commercial operations for the forecast years based on a typical flight schedule and aircraft type. The most recent air service at the Airport primarily utilized the 50-seat ERJ-145. The fleet of 50-seat regional jets are rapidly being phased out of service by the airlines because they are inefficient compared to new aircraft. Today, airlines are likely to utilize an aircraft such as the 76-seat Q-400 turboprop or the 90-seat CRJ 900 commuter jet. Some communities may still see the 50-seat regional jet if the airline finances make sense. Larger aircraft such as the Boeing 737 or Airbus 320 may ultimately be utilized for scheduled commercial service and both are currently utilized for charter activity.

Table 2R presents the enplanement and commercial operations forecast for the forecast years. An assumption has been made that the Airport will gradually capture enplanement market share and that the long term potential enplanement level will only be achieved over time.

In the short term a flight schedule that includes both the ERJ-145 and the CRJ-900 is considered. A load factor of 70 percent is assumed for these daily flights. In addition, a weekly flight utilizing a larger aircraft is considered. This type of operations is typically associated with a casino or vacation carrier and they have operated at the Airport in the past. In total, this service could account for approximately 43,000 annual enplanements.

An intermediate and long term flight schedule is also considered. In the long term the ERJ-145 is considered to be phased out and replaced by the larger Q-400 turboprop aircraft. In the long term, enplanements from the scheduled carriers are forecast to reach approximately 72,700.

TABLE 2R
Enplanements and Operations Based On a Potential Flight Schedule
Topeka Regional Airport

SHORT TERM (Years 1-5)							
Aircraft Type	**ARC**	**Seats**	**BLF %**	**Occupied Seats**	**Frequency**	**Total Enplanements**	**Total Commercial Operations**
Q-400	C-III	76	70	53	-	-	-
CRJ-900	C-III	90	70	63	1x Daily	22,995	730
ERJ-145	C-II	50	70	35	1x Daily	12,775	730
MD-88	D-III	150	90	135	1x Weekly	7,020	104
TOTALS						**42,790**	**1,564**
INTERMEDIATE TERM (Years 6-10)							
Aircraft Type	**ARC**	**Seats**	**BLF %**	**Occupied Seats**	**Frequency**	**Total Enplanements**	**Total Commercial Operations**
Q-400	C-III	76	70	53	-	-	-
CRJ-900	C-III	90	70	63	1x Daily	22,995	730
ERJ-145	C-II	50	70	35	2x Daily	25,550	1,460
MD-88	D-III	150	90	135	1x Weekly	7,020	104
TOTALS						**55,565**	**2,294**
LONG TERM (Years 11-20)							
Aircraft Type	**ARC**	**Seats**	**BLF %**	**Occupied Seats**	**Frequency**	**Total Enplanements**	**Total Commercial Operations**
Q-400	C-III	76	71	54	1x Daily	19,670	730
CRJ-900	C-III	90	70	63	2x Daily	45,990	1,460
ERJ-145	C-II	50	70	35	-	-	-
MD-88	D-III	150	90	135	1x Weekly	7,020	104
TOTALS						**72,680**	**2,294**

AIRCRAFT/AIRPORT/RUNWAY CLASSIFICATION

The FAA has established several aircraft classification systems that group aircraft types based on their performance (approach speed in landing configuration) and design characteristics (wingspan and landing gear configuration). These classification systems are used to determine the appropriate airport design standards for specific airport elements, such as runways, taxiways, taxilanes, and aprons.

AIRCRAFT CLASSIFICATION

The selection of appropriate FAA design standards for the development and location of airport facilities is based primarily upon the characteristics of the aircraft which are currently using or are expected to use an airport. The critical design aircraft is used to define the design parameters for an airport. The design aircraft may be a single aircraft type or, more commonly, is a composite aircraft representing a collection of aircraft with similar characteristics. The critical design aircraft is defined by three parameters: Aircraft Approach Category (AAC), Airplane Design Group (ADG), and Taxiway Design Group (TDG).

FAA AC 150/5300-13A, *Airport Design*, describes the following airplane classification systems, the parameters of which are presented on **Exhibit 2H**.

Aircraft Approach Category (AAC): A grouping of aircraft based on a reference landing speed (V_{REF}), if specified, or if V_{REF} is not specified, 1.3 times stall speed (V_{SO}) at the maximum certificated landing weight. V_{REF}, V_{SO}, and the maximum certificated landing weight are those values as established for the aircraft by the certification authority of the country of registry.

The AAC generally refers to the approach speed of an aircraft in landing configuration. The higher the approach speed, the more restrictive the applicable design standards. The AAC, depicted by a letter A through E, is the aircraft approach category and relates to aircraft approach speed (operational characteristic). The AAC generally applies to runways and runway-related facilities, such as runway width, runway safety area (RSA), runway object free area (ROFA), runway protection zone (RPZ), and separation standards.

Airplane Design Group (ADG): The ADG, depicted by a Roman numeral I through VI, is a classification of aircraft which relates to aircraft wingspan or tail height (physical characteristic). When the aircraft wingspan and tail height fall in different groups, the higher group is used. The ADG influences design standards for taxiway safety area (TSA), taxiway object free (TOFA), taxilane object free area, apron wingtip clearance, and various separation distances.

Taxiway Design Group (TDG): A classification of airplanes based on outer-to-outer Main Gear Width (MGW) and Cockpit to Main Gear (CMG) distance. The TDG relates to the undercarriage dimensions of the design aircraft. The taxiway design elements determined by the application of the TDG include the taxiway width, taxiway edge safety margin, taxiway shoulder width, taxiway fillet dimensions, and, in some cases, the separation distance between parallel taxiways/taxilanes. Other taxiway elements, such as the taxiway safety area (TSA), taxiway/taxilane object free area (TOFA), taxiway/taxilane separation to parallel taxiway/taxilanes or fixed or movable objects, and taxiway/taxilane wingtip clearances are determined solely based on the wingspan (ADG) of the design aircraft utilizing those surfaces. It is appropriate for taxiways to be planned and built to different TDG standards based on expected use.

Exhibit 2J presents the aircraft classification of the most common jet aircraft in operation today.

AIRPORT AND RUNWAY CLASSIFICATION

These classifications, along with the aircraft classifications defined previously, are used to determine the appropriate FAA design standards to which the airfield facilities are to be designed and built.

***Airport Reference Code (ARC)*:** An airport designation that signifies the airport's highest Runway Design Code (RDC), minus the third (visibility) component of the RDC. The ARC is used for planning and design only and does not limit the aircraft that may be able to operate safely on the airport. The current ALP for the Airport, which will be updated as part of this planning effort, identifies an ARC of D-II for civilian activity and ARC C-IV for military activity.

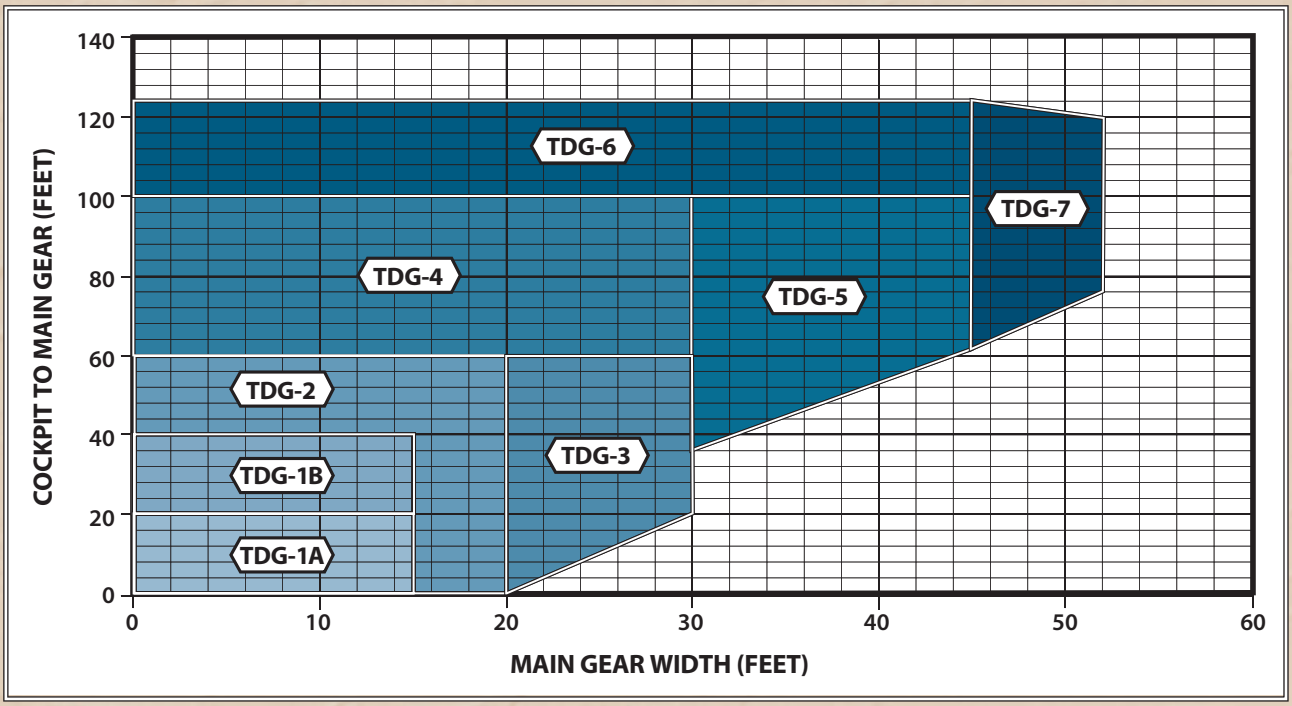
AIRCRAFT APPROACH CATEGORY (AAC)	
Category	**Approach Speed**
A	less than 91 knots
B	91 knots or more but less than 121 knots
C	121 knots or more but less than 141 knots
D	141 knots or more but less than 166 knots
E	166 knots or more

AIRPLANE DESIGN GROUP (ADG)		
Group #	**Tail Height (ft)**	**Wingspan (ft)**
I	<20	<49
II	20-<30	49-<79
III	30-<45	70-<118
IV	45-<60	118-<171
V	60-<66	171-<214
VI	66-<80	214-<262

VISIBILITY MINIMUMS	
RVR* (ft)	**Flight Visibility Category (statute miles)**
VIS	3-mile or greater visibility minimums
5,000	Not lower than 1-mile
4,000	Lower than 1-mile but not lower than ¾-mile
2,400	Lower than ¾-mile but not lower than ½-mile
1,600	Lower than ½-mile but not lower than ¼-mile
1,200	Lower than ¼-mile

***RVR**: Runway Visual Range

TAXIWAY DESIGN GROUP (TDG)



Source: FAA AC 150/5300-13A, Airport Design

Runway Design Code (RDC): A code signifying the design standards to which the runway is to be built. The RDC is based upon planned development and has no operational component. The AAC, ADG, and runway visual range (RVR) are combined to form the RDC of a particular runway. The RDC provides the information needed to determine certain design standards that apply. The first component, depicted by a letter, is the AAC and relates to aircraft approach speed (operational characteristics). The second component, depicted by a Roman numeral, is the ADG and relates to either the aircraft wingspan or tail height (physical characteristics), whichever is most restrictive. The third component relates to the visibility minimums expressed by RVR values in feet of 1,200 (⅛-mile); 1,600 (¼-mile); 2,400 (½-mile); 4,000 (¾-mile); and 5,000 (1-mile). The RVR values approximate standard visibility minimums for instrument approaches to the runways. The third component should read "VIS" for runways designed for visual approach use only.

Approach Reference Code (APRC): A code signifying the current operational capabilities of a runway and associated parallel taxiway with regard to landing operations. Like the RDC, the APRC is composed of the same three components: the AAC, ADG, and RVR. The APRC describes the current operational capabilities of a runway under particular meteorological conditions where no special operating procedures are necessary, as opposed to the RDC which is based upon planned development with no operational component. The APRC for a runway is established based upon the minimum runway-to-taxiway centerline separation.

Departure Reference Code (DPRC): A code signifying the current operational capabilities of a runway and associated parallel taxiway with regard to take-off operations. The DPRC represents those aircraft that can take off from a runway while any aircraft are present on adjacent taxiways, under particular meteorological conditions with no special operating conditions. The DPRC is similar to the APRC, but is composed of two components: ACC and ADG. A runway may have more than one DPRC depending on the parallel taxiway separation distance.

CRITICAL DESIGN AIRCRAFT

The selection of appropriate FAA design standards for the development and location of airport facilities is based primarily upon the characteristics of the aircraft which are currently using or are expected to use an airport. The critical design aircraft is used to define the design parameters for an airport. The design aircraft may be a single aircraft or a composite aircraft representing a collection of aircraft classified by the three parameters: AAC, ADG, and TDG. In the case of an airport with multiple runways, a design aircraft is selected for each runway.

The first consideration is the safe operation of aircraft likely to use an airport. Any operation of an aircraft that exceeds design criteria of an airport may result in either an unsafe operation or a lesser safety margin; however, it is not the usual practice to base the airport design on an aircraft that uses the airport infrequently.

The critical design aircraft is defined as the most demanding aircraft type, or grouping of aircraft with similar characteristics, that make regular use of the airport. Regular use is 500 annual operations,

TURBINE AIRCRAFT CLASSIFICATION

AIRCRAFT	AAC	ADG	TDG
Eclipse 500	A	I	1
Premier 390	B	I	1
Beechjet 400, T-1, Hawker 400	B	I	1
Cessna 500, 501, Citation I, SP	B	I	1
Cessna Mustang 510	B	I	1
Cessna 525, 526, CitationJet, CJ1	B	I	1
Embraer Phenom 100	B	I	1
Falcon 10	B	I	1



Cessna 525A (CJ2)	B	II	2
Cessna 525B (CJ3)	B	II	2
Cessna Citation II Bravo 550, SP	B	II	2
Cessna Citation V, Ultra, Encore 560	B	II	2
Cessna 560 XLS	B	II	2
Cessna Citation III, VI, VII, 650	B	II	2
Cessna Citation Sovereign 680	B	II	3
Falcon 20**, 50,** 900, 2000	B	II	2
Embraer Phenom 300	B	II	2



BAe HS 125-1, 2, 3, 400, 600	C	I	2
BAe HS 125, 700, 800, Hawker 800	C	I	2
Learjet 23, 24, 25, 28	C	I	1
Learjet 31 A/B	C	I	1
Learjet 35, 36, **45**, 55	C	I	2
Lear 60	C	I	4
IAI Westwind	C	I	2



IAI Astra 1125	C	II	2
Cessna Citation 750 (X)	C	II	3
Challenger 300	C	II	3
Challenger 600, 601, 604	C	II	3
Lockheed 1329 Jetstar	C	II	3
Gulfstream III, G300, G-1159	C	II	3
Hawker 800XP, 1000, 4000	C	II	3
Falcon 900EX, F-Series	C	II	3
Embraer ERJ 135, 140, 145	C	II	3
Canadair CRJ 200, 700, 900	C	II	3



AIRCRAFT	AAC	ADG	TDG
Gulfstream G150	D	II	3
Gulfstream II, G200	D	II	3
Gulfstream IV, G400	D	II	3
IAI Galaxy, Gulfstream G200	D	II	3



Global Express, 5000	C	III	3
Gulfstream V, 550, 650	C	III	3
Falcon 7FX	C	III	3
B727-200	C	III	5
B-737-100, 200, 300, 400, 500, 600, 700	C	III	3
MD-81, 82, 87, 90	C	III	4
A318, A319, A320	C	III	3
A321	C	III	5
Embraer 170, 175, 190, 195	C	III	3
B-737-800, 900	D	III	3
MD-83, 88	D	III	4



B-707	C	IV	4
B-757-200	C	IV	5
B-767-200, 300	C	IV	5
B-787 -800	C	IV	5
B-777-200	C	V	6
A330-200F	C	V	5
A330-200, 300	C	V	6



MD-11	D	IV	6
DC-10	D	IV	5
B-747-100,200,300,400	D	V	6
B-757-300	D	IV	5
B-777-300	D	V	6
A340-200,300,500,600	D	V	6
A350-900	D	V	6



B-747 -8, F	D	VI	6
B-767-200ER, 300ER, 400	D	VI	5
A380-800	D	VI	7



KEY: **AAC** - Aircraft Approach Category (based on approach speed); **ADG** - Airplane Design Group (based on wingspan); **TDG** - Taxiway Design Group (based on width/length of landing gear)

Note: Plane pictured is in bolded text.

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excluding touch-and-go operations. Planning for future aircraft use is of particular importance since the design standards are used to plan separation distances between facilities. These future standards must be considered now to ensure that short term development does not preclude the reasonable long range potential needs of the airport. Therefore, if the critical design aircraft is anticipated to change within the next five years, that that aircraft (or family of aircraft) should be used as the current critical design aircraft.

AIRPORT CRITICAL DESIGN AIRCRAFT

The FAA maintains the Traffic Flow Management System Count (TFMSC) database which documents aircraft operations at most NPIAS airports. Information is added to the TFMSC database when pilots file flight plans and/or when flights are detected by the National Airspace System, usually via radar. The database includes documentation of commercial traffic (air carrier and air taxi), general aviation, and military aircraft. Due to factors, such as incomplete flight plans and limited radar coverage, TFMSC data does not account for all aircraft activity at an airport by a given aircraft type. Most VFR and some non-enroute IFR traffic is excluded. Therefore, it is likely that there are more operations at an airport than are captured by this methodology. TFMSC data is available for activity at Topeka Regional Airport and was utilized in this analysis.

Prudent facility planning includes consideration of the requirements of all airport users, including military and civilian operators. Therefore, it is necessary to identify both a civilian and a military critical aircraft for Topeka Regional Airport. However, it should be noted that only those capital projects benefiting civilian aviation are eligible for FAA funding.

Current Civilian Critical Design Aircraft

Exhibit 2K presents the TFMSC operational mix at the Airport for civilian jet operations for the last 10 years. As can be seen, the Airport experiences activity by the full range of business jets, including some of the largest in the national fleet. In addition, the Airport has activity by commercial type aircraft such as the Airbus 319/320, Boeing 737, 747, 757 and 767. Activity by these larger commercial type aircraft has typically been associated with non-scheduled charter flights.

Table 2S presents a historical summary of TFMSC data. Over the last 10 years, the Airport has averaged 1,589 jet operations in AAC B, 1,163 in AAC C, and 183 in AAC D. These figures comfortably place the airport in AAC C from a civilian operations perspective.

Over the last 10 years, the Airport has averaged 1,027 operations by jets in ADG II, 371 in ADG III, and 90 in ADG IV. Combined operations in ADG III and IV have averaged 461. In fact, in five of the last 10 years the Airport has exceeded the 500 operations threshold when combining ADG III and IV operations.

The civilian critical design aircraft for the Airport is best described as C-III-3.

TABLE 2S
Historic Civilian Jet Operations by Classification
Topeka Regional Airport

AIRCRAFT APPROACH CATEGORY (AAC)											
AAC	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Average
A	0	0	8	10	8	12	48	50	66	72	27
B	1,636	1,064	1,074	1,472	1,628	1,730	2,330	1,803	1,446	1,710	1,589
C	1,542	1,312	1,214	1,030	1,254	1,150	940	758	1,570	856	1,163
D	188	200	202	184	162	144	172	174	222	186	183
TOTAL	**3,366**	**2,576**	**2,498**	**2,696**	**3,052**	**3,036**	**3,490**	**2,785**	**3,304**	**2,824**	**2,963**
AIRPLANE DESIGN GROUP (ADG)											
ADG	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Average
I	1,680	1,086	908	1,352	1,578	1,748	2,242	1,647	1,264	1,240	1,475
II	1,166	896	1,136	776	846	776	888	810	1,708	1,268	1,027
III	494	512	340	452	534	422	260	224	226	244	371
IV	26	82	114	116	94	90	100	104	106	72	90
TOTAL	**3,366**	**2,576**	**2,498**	**2,696**	**3,052**	**3,036**	**3,490**	**2,785**	**3,304**	**2,824**	**2,963**

Source: FAA Traffic Flow Management System Count (TFMSC) database.

Table 2T presents a forecast of civilian jet operations. As can be seen, the Airport currently exceeds the operations threshold for those in AAC C but it does not exceed the threshold for those in AAC D, however, five times over the last 10 years the Airport has exceeded the operations threshold for aircraft in ADG III (combined ADG III and IV). In the future the Airport is anticipated to regularly exceed the 500 operations threshold for aircraft in ADG III or larger. **Therefore, the current civilian critical design aircraft for the Airport is best described as C-III-3**.

TABLE 2T
Civilian Jet Operations Forecast by Design Category
Topeka Regional Airport

	HISTORICAL JET OPERATIONS[1]				FORECAST JET OPERATIONS			
Design Categories	**2006**	**Percent**	**2015**	**Percent**	**Short Term**	**Inter. Term**	**Long Term**	**Percent**
Approach Category A/B	1,636	49%	1,782	63%	1,950	2,144	2,484	69%
Approach Category C	1,542	46%	856	30%	810	768	756	21%
Approach Category D	188	6%	186	7%	240	288	360	10%
Total	**3,366**	**100%**	**2,824**	**100%**	**3,000**	**3,200**	**3,600**	**100%**
Airplane Design Group I	1,680	50%	1,240	44%	1,260	1,280	1,296	36%
Airplane Design Group II	1,166	35%	1,268	45%	1,290	1,408	1,656	46%
Airplane Design Group III/IV	520	15%	316	11%	450	512	648	18%
Total	**3,366**	**100%**	**2,824**	**100%**	**3,000**	**3,200**	**3,600**	**100%**

[1]*Traffic Flow Management System Count (TFMSC) - FAA activity database.*

	ARC	Aircraft Type	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
	A-I	Eclipse 400/500	0	0	8	10	8	12	48	50	66	72
		Total	*0*	*0*	*8*	*10*	*8*	*12*	*48*	*50*	*66*	*72*
	B-I	Beechjet 400	142	144	108	700	838	842	1354	917	622	686
		Cessna Citation I/SP	184	92	66	48	56	46	52	40	30	14
		Cessna Citation Mustang	0	0	0	8	2	18	24	14	16	16
		Cessna CJ1, CJ2, CJ3, CJ4	238	92	68	54	66	36	40	92	56	58
		Dassault Falcon/Mystère 10	6	14	4	6	0	4	2	0	4	0
		Embraer Phenom 100	0	0	0	4	16	6	14	14	16	4
		Hawker 400/MU-300	46	14	12	12	26	104	98	74	8	8
		L-39 Albatross	0	2	2	2	0	0	0	0	0	0
		North American Rockwell Sabre 40/60	22	22	2	20	10	6	2	0	2	2
		Raytheon Premier I	44	66	46	36	18	84	86	76	76	82
		Total	*682*	*446*	*308*	*890*	*1032*	*1146*	*1672*	*1227*	*830*	*870*
	B-II	Cessna Citation III/VI/VII	212	104	70	22	16	18	20	2	4	8
		Cessna Citation Bravo/SP	72	100	84	32	24	20	16	32	20	72
		Cessna Citation Excel/XLS	88	66	100	80	128	156	242	316	384	442
		Cessna Citation Sovereign	8	8	14	8	6	18	8	12	10	24
		Cessna Citation V/Encore/Ultra	350	228	458	398	390	352	336	186	160	260
		Dassault Falcon 20/50	186	84	12	28	18	12	20	12	12	20
		Dassault Falcon 2000	26	20	20	12	8	4	8	8	8	12
		Dassault Falcon 900	12	8	8	2	6	4	8	8	6	6
		Embraer Phenom 300	0	0	0	0	0	0	0	0	12	4
		Total	*954*	*618*	*766*	*582*	*596*	*584*	*658*	*576*	*616*	*848*
	C-I	BAE HS 125-1/2/3/125/400/600	168	134	106	80	98	70	78	60	52	66
		IAI 1124 Westwind	6	8	10	4	10	8	10	0	2	0
		IAI 1124/1125 Westwind	24	14	20	10	18	18	22	16	14	2
		Learjet 20 Series	20	10	16	6	48	24	2	2	2	0
		Learjet 30 Series	624	346	316	246	256	386	340	202	220	180
		Learjet 55	16	16	10	20	8	8	2	6	2	4
		Total	*858*	*528*	*478*	*366*	*438*	*514*	*454*	*286*	*292*	*252*
	C-II	Bombardier CRJ All Series	0	0	4	4	8	0	16	52	36	40
		Cessna Citation X	72	86	86	44	52	52	36	56	44	110
		Challenger 300/600	66	90	70	54	110	68	82	48	48	64
		Embraer ERJ 135/140/145/Legacy	6	22	34	42	40	14	28	26	908	132
		Gulfstream 200/300	12		10	2	0	0	4	0	8	24
		Hawker 800/1000/4000	4	8	2	2	12	4	8	4	8	8
		IAI 1126 Galaxy	30	48	130	18	18	22	32	14	8	4
		Lockheed L-1329	2	0	2	0	0	2	0	0	0	0
		Total	*192*	*266*	*338*	*166*	*240*	*162*	*206*	*200*	*1060*	*382*
	C-III	Airbus A319/320 Series	6	0	2	2	14	24	6	40	16	12
		BAC 111	0	0	0	0	0	0	0	0	0	6
		Boeing 717/727/737 Series	54	54	38	42	50	8	34	26	42	50
		Bombardier Global 5000	4	4	8	4	18	16	6	10	12	18
		Dassault Falcon 7X	0	0	0	2	0	2	0	0	2	4
		Embraer 170/190 Series	0	0	0	0	2	2	2	0	0	4
		Mcdonnel Douglas DC-9/MD-80	424	428	284	392	420	366	188	136	106	96
		Total	*488*	*486*	*332*	*442*	*504*	*418*	*236*	*212*	*178*	*190*
	C-IV	Boeing 707	2	0	4	2	0	0	0	0	0	0
		Boeing 767 Series	2	32	62	54	72	56	44	60	40	24
		Total	*4*	*32*	*66*	*56*	*72*	*56*	*44*	*60*	*40*	*24*
	D-I	Learjet 40/45/60	140	112	114	86	100	76	68	84	76	46
		Total	*140*	*112*	*114*	*86*	*100*	*76*	*68*	*84*	*76*	*46*
	D-II	Gulfstream 150	0	0	2	6	0	0	0	6	0	0
		Gulfstream 400/500	20	12	28	16	10	30	24	22	32	34
		Gulfstream G-150	0	0	2	6	0	0	0	6	0	12
		Total	*20*	*12*	*32*	*28*	*10*	*30*	*24*	*34*	*32*	*46*
	D-III	Boeing 737-800/900	6	26	8	6	26	2	20	10	42	42
		Boeing 737-900	0	0	0	4	4	2	4	2	6	4
		Total	6	26	8	10	30	4	24	12	48	46
	D-IV	Boeing 747 Series	10	8	16	22	6	6	24	18	30	26
		Boeing 757 Series	12	42	32	38	16	28	32	26	36	22
		Total	*22*	*50*	*48*	*60*	*22*	*34*	*56*	*44*	*66*	*48*
		Grand Total Operations	**3366**	**2576**	**2498**	**2696**	**3052**	**3036**	**3490**	**2785**	**3304**	**2824**

Year	Aircraft Approach Category			Airplane Design Group			
	A/B	C	D	I	II	III	IV
2006	1,636	1,542	188	1,680	1,166	494	26
2007	1,064	1,312	200	1,086	896	512	82
2008	1,082	1,214	202	908	1,136	340	114
2009	1,482	1,030	184	1,352	776	452	116
2010	1,636	1,254	162	1,578	846	534	94
2011	1,742	1,150	144	1,748	776	422	90
2012	2,378	940	172	2,242	888	260	100
2013	1,853	758	174	1,647	810	224	104
2014	1,512	1,570	222	1,264	1,708	226	106
2015	1,782	856	186	1,240	1,268	244	72

Source: Traffic Flow Management System Counts (TFMSC) - FAA activity database.

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If scheduled commercial service were to return to the Airport, the airlines may utilize several different aircraft. The ERJ-145 (ARC C-II) could return for a period of time; however, these 50-seat regional jets are being phased out of service. Eventually, the FAA forecasts that all 50-seat regional jets will be phased out. The 50-seat regional jets are being replaced by slightly larger aircraft such as the 76-seat Q-400 (ARC C-III) turboprop, the 70-90 seat CRJ 700 (C-II)/900 (ARC C-III) and ERJ 700/900 (C-III). The flight schedule presented previously in **Table 2R**, showed the potential for more than a 1,000 annual operations by scheduled commercial aircraft. In addition, if the weekly casino/vacation flights were to resume at the Airport, utilizing the typical aircraft such as the MD-88 (ARC D-III), B-757 (ARC C-IV), or B-737-800 (C-III), 104 more annual ADG III operations would be experienced. This potential for additional commercial service jet operations is for airport management planning purposes and is not reflected in **Table 2T**.

Future Civilian Design Aircraft

The future civilian design aircraft is expected to remain unchanged over the next 20-years. Therefore, the future design aircraft will continue to be classified as C-III-3.

Current and Future Military Critical Design Aircraft

The TFMSC database also captures a portion of military operations. The database was examined for activity by heavy military jets, those weighing more than 255,000 pounds, as shown on **Table 2U**. In 2015, the KC-135 accounted for 956 operations and has averaged 1,239 annually over the last 10 years. The KC-135 is the only heavy military jet that exceeds the 500 operations threshold for critical design aircraft determination. The KC-135 is derived from the Boeing 707 aircraft frame; therefore, the TDG is 4. **The military critical design aircraft is best described as C-IV-4.**

The military critical design aircraft for the Airport is best described as C-IV-4.

TABLE 2U
Military Heavy Jet (> 255,000 lbs.) Operations
Topeka Regional Airport

	Classification		Annual Operations									
Aircraft	AAC	ADG	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
C-17	C	IV	24	2	18	30	18	24	34	50	72	28
KC-135	C	IV	1,154	975	1,222	1,514	1,488	1,072	1,557	1,178	1,272	956
B-747	D	V	8	8	6	2	-	-	4	-	2	2
C5	D	VI	2	2	4	20	2	8	6	-	8	8
E6	C	IV	48	54	56	42	58	50	46	44	18	2
DC10	C	IV	-	32	48	34	12	2	-	-	-	2
B-52	E	V	2	-	2	4	-	2	-	-	-	-
B-767	C	IV	-	14	32	32	4	-	-	-	-	-
MD-11	D	IV	10	42	10	12	8	-	-	-	-	-
Total			1,248	1,129	1,398	1,690	1,590	1,158	1,647	1,272	1,372	998

KEY: AAC-Aircraft Approach Category; ADG-Airplane Design Group
Source: Traffic Flow Management System Counts (TFMSC) - FAA activity database.

The future military design aircraft is forecast to remain unchanged and continue to be described as C-IV-4 and be represented by the KC-135 air tanker. Representatives of the Kansas Air National Guard indicated that they do not anticipate any significant change in their mission over the next 20 years. They did indicate that they could accommodate up to 12 additional KC-135 based aircraft, but this would not have an impact on the military design aircraft.

RUNWAY DESIGN CODE

Each runway is assigned an RDC. The RDC relates to specific FAA design standards that should be met in relation to each runway. The RDC takes into consideration the AAC, ADG, and the RVR. In most cases, the critical design aircraft will also be the RDC for the primary runway.

Runway 13-31 RDC

The RDC for Runway 13-31 is:

- ***C-III-2400 for civilian operations.***
- ***C-IV-2400 for military operations.***

Runway 13-31 is the longer of the two runways and is designed to accommodate the critical design aircraft. This runway is 12,803 feet long and 200 feet wide (to be reduced to 150 feet wide in 2017). This runway has a CAT-I instrument approach providing for visibility minimums as low as ½-mile. **Therefore, the civilian RDC for Runway 13-31 is C-III-2400**. **The military RDC for Runway 13-31 is C-IV-2400.**

Runway 3-21 RDC

Runway 3-21 is the crosswind runway at the Airport. Crosswind runways are made available when the orientation of the primary runway does not provide for at least 95 percent wind coverage for certain wind speeds and directions. Based on wind coverage, Runway 3-21 need only be designed to meet the needs of aircraft in ARC A/B-I.

The RDC for Runway 3-21 is A/B-I-4000 for both military and civilian operations.

The approach procedure to Runway 3 provides a GPS (LPV) instrument approach with visibility minimums of ¾-mile and cloud ceiling minimum of 250 feet. **Therefore, the current and future RDC for Runway 3-21 is A/B-I-4000.** This RDC determination applies for both civilian and military operations.

CRITICAL AIRCRAFT SUMMARY

Several classification systems combine to form the nomenclature which identifies the various airport design standards. As noted previously, the AAC is represented by the letters A-E and it relates to the aircraft approach speed. The ADG is represented by the Roman numerals I-VI and it represents the aircraft wing span or tail height, whichever is more restrictive. The TDG is represented by a number 1-7

and it relates to certain taxiway design standards. The RVR is a representation of the lowest instrument approach visibility minimum at an airport and it is represented by an approximate measurement in feet.

Table 2V presents a summary of the design standards to be applied at the Airport. The overall airport reference code for the Airport is C-IV, which is best represented by the KC-135 military air tanker aircraft. Annual KC-135 operations (excluding touch-and-go training operations) account for more than 500, thus exceeding the threshold for critical aircraft determination. Because federal law permits the FAA to fund only civilian airport capital needs, a second civilian airport reference code was also determined.

TABLE 2V
Design Aircraft
Topeka Regional Airport

Aircraft Category	Airport Reference Code	Airport Design Aircraft	Representative Aircraft
Military	C-IV	C-IV-4	KC-135 Air Tanker
Civilian	C-III	C-III-3	Boeing 737-800/CRJ-900

Runway Design Parameters	Runway Design Code	Approach Reference Code	Departure Reference Code	Representative Aircraft
Runway 13-31				
Military	C-IV-2400	D-VI-2400	D-VI	KC-135 Air Tanker
Civilian	C-III-2400	D-VI-2400	D-VI	Boeing 737-800/CRJ-900
Runway 3-21				
Military and Civilian	A/B-I-4000	D-VI-2400	D-VI	Beechjet 400

Source: Coffman Associates analysis utilizing FAA AC 150/5300-13A, Airport Design.

The civilian airport reference code is formulated as a combination of business jet and commercial service aircraft utilized in a charter capacity. The applicable ARC is C-III and is best represented by a Boeing 737-800/CRJ-900 aircraft.

The design aircraft additionally includes the TDG. The military TDG is 4 and the civilian TDG is 3, both of which are based on the undercarriage wheel base width of the representative aircraft.

For airports with multiple runways, such as Topeka Regional Airport, it is necessary to identify an RDC for each runway. The RDC is comprised of the AAC, ADG, and the RVR. The military RDC for the primary runway is C-IV-2400 and the civilian RDC is C-III-2400. The RVR in this case indicates an instrument approach visibility minimum of ½-mile.

The RDC of crosswind Runway 3-21 is a function of wind coverage of the primary runway. Because the primary runway does not provide for 95 percent wind coverage at 10.5 knots but does exceed this threshold at 13 knots, the runway must, at a minimum, be designed to accommodate smaller aircraft in A/B-I. Since Runway 3 has an instrument approach with ¾-mile visibility minimums, the RDC is described as A/B-I-4000. This classification applies to both military and civilian operations.

The approach and departure reference codes describe the operational capabilities of a runway and adjacent taxiways where no special operating procedures are necessary. Because runway-to-taxiway separation standards are a direct function of the critical design aircraft and the instrument approach visibility minimums, the APRC and DPRC represent the most restrictive RDC that could be implemented based on these criteria. The taxiways (or portions thereof) parallel to both runways are greater than 550 feet (the maximum separation distance considered by FAA) from the runways. Therefore, the APRC is D-VI-2400 and the DPRC is D-VI for both runways. For the Airport, this means that aircraft in ARC D-VI can operate at the same time on the runway and the taxiway based on existing taxiway separation. Other factors could limit this activity, such as runway length and pavement strength; however, the APRD and DPRC do not consider these variables. The future APRD and DPRC may change if the runway to parallel taxiway separation distance is planned to change.

SUMMARY

This chapter has outlined the various activity levels by demand indicators that might reasonably be anticipated over the planning period. Civilian based aircraft are forecast to increase from 18 in 2015 to 24 in 2035, for an average annual growth rate of 1.45 percent. Military based aircraft are forecast to remain the same with 12 KC-135 air tankers and 12 Black Hawk helicopters. The civilian fleet mix is anticipated in see increases in turbine aircraft over the planning period. Total annual operations are forecast to grow from 25,989 in 2015 to 28,530 in 2035 for a growth rate of 0.47 percent.

Enplanements are important because current federal law provides an entitlement grant of at least $1 million when airports enplane more than 10,000 passengers in a calendar year. Currently, passenger enplanements at the Airport are generated exclusively by charter activity because the Airport does not have regularly scheduled commercial service. Historically the charter activity alone has exceeded the 10,000 annual enplanement threshold approximately half the time.

Three different forecasts of passenger enplanements have been developed. The first reflects the FAA Terminal Area Forecast and it represents the official forecast. The second considers only charter enplanements and the third considers a return to commercial passenger service. The last two forecasts are for the benefit of airport administration should enplanements increase beyond that reflected in the TAF.

Many factors, including reliability of service, potential subsidies to the airline(s), flight schedule, destinations, competition from other transportation modes (highways), the community economic base, and the higher propensity for a Midwest traveler to drive to a more distant airport, among others, all impact enplanement potential.

The current and future civilian critical design aircraft is those business jets with similar characteristics falling in C-III-3 and is best represented by the Boeing 737-800/CRJ-900. The military critical design aircraft is expressed as C-IV-4 and is represented by regular operations by the KC-135 air tanker. The runway design code for Runway 13-31 is C-III-2400 for civilian aircraft and C-IV-2400 for military aircraft. The RDC for Runway 3-21 is A/B-I-4000 for all operators.

The next step in the planning process is to assess the capabilities of the existing facilities to determine what upgrades may be necessary to meet future demands. The range of forecasts developed here will be taken forward in the next chapter as planning horizon activity levels that will serve as milestones or activity benchmarks in evaluating facility requirements.

Topeka Regional Airport

CHAPTER THREE
Airport Facility Requirements







CHAPTER THREE
Airport Facility Requirements

To properly plan for the future of Topeka Regional Airport, it is necessary to translate forecast avia. on demand into the specific types and quantities of facilities that can adequately serve the identified demand. This chapter uses the results of the forecasts presented in Chapter Two, as well as established planning criteria, to determine the airside (i.e., runways, taxiways, navigational aids, marking and lighting) and landside (i.e., hangars, aircraft parking apron, and automobile parking) facility requirements.

The objective of this effort is to identify the adequacy of existing airport facilities and outline what new facilities may be needed, and when these may be needed, to accommodate forecast demands. Having established these facility requirements, alternatives for providing these facilities will be evaluated in the next chapter.

PLANNING HORIZONS

An updated set of aviation demand forecasts for the Airport has been established, with a summary of the primary forecasting elements presented previously on Exhibit 2E. These activity forecasts include annual operations, based aircraft, fleet mix, and enplanements. With this information, specific components of the airfield and landside systems can be evaluated to determine their capacity to accommodate future demand.





Cost-effective, efficient, and orderly development of an airport should rely more upon actual demand at an airport than on a time-based forecast figure. In order to develop a master plan that is demand-based rather than time-based, a series of planning horizon milestones have been established that take into consideration the reasonable range of aviation demand projections. The planning horizons presented in **Table 3A** are segmented as the Short Term (approximately years 1-5), the Intermediate Term (approximately years 6-10), and the Long Term (years 11-20 and possible beyond).

TABLE 3A
Planning Horizon Activity Levels
Topeka Regional Airport

		PLANNING HORIZON		
	Base Year 2015	Short Term	Intermediate Term	Long Term
Based Aircraft				
Civilian	18	19	20	24
Military	24	24	24	24
Total Based Aircraft	42	43	44	48
Annual Operations				
Air Carrier	200	200	210	230
General Aviation	6,720	6,900	7,150	8,100
Air Taxi	462	500	600	800
Military	18,607	19,400	19,400	19,400
Total Annual Operations	25,898	27,000	27,360	28,530
Enplanements				
Enplaned Passengers	4,959	3,506	3,531	3,581

It is important to consider that actual activity at the airport may be higher or lower than what the annualized forecast portrays. By planning according to activity milestones, the resultant plan can accommodate unexpected shifts or changes in the area's aviation demand. It is important for the plan to accommodate these changes so that airport officials can respond to unexpected changes in a timely fashion.

The most important reason for utilizing milestones is it allows airport management the flexibility to make decisions and develop facilities according to needs generated by actual demand levels. The demand-based schedule provides flexibility in development, as development schedules can be slowed or expedited according to demand at any given time over the planning period. The resultant plan provides airport officials with a financially responsible and needs-based program.

AIRFIELD CAPACITY

Airfield capacity is measured in a variety of different ways. The **hourly capacity** measures the maximum number of aircraft operations that can take place in an hour. The **annual service volume (ASV)** is an approximate annual operations figure that is used to define airfield capacity needs. The ASV is a common

matrix used to define the overall annual capacity of a runway system. **Aircraft delay** is the total delay incurred by aircraft using the airfield during a given timeframe. FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay*, provides a methodology for examining the operational capacity of an airfield for planning purposes. This analysis takes into account specific factors about the airfield. These various factors are depicted in **Exhibit 3A**. The following describes the input factors as they relate to Topeka Regional Airport:

- **Runway Configuration** – The Airport has two runways configured with the primary Runway 13-31 and crosswind Runway 3-21. Runway 31 is equipped with an instrument landing system (ILS) providing visibility minimum down to 200 feet and ½-mile. The other three runway ends have non-precision GPS-based instrument approaches.

- **Runway Use** – Runway usage is affected by several factors. Safe operations are the highest priority, so the runway's ability to accommodate a variety of aircraft is first and foremost. For example, at 7,001 feet in length, Runway 3-21 will not be as capable of accommodating the full variety of aircraft that operate at the Airport. Wind direction is another operational factor for runway selection. The location of the runway in proximity to users and the ability to use runways simultaneously can also be a factor to runway use. During active periods when delay may be a factor, air traffic control will operate runway combinations that can safely provide adequate capacity to minimize delays.

- **Exit Taxiways**– Based upon the aircraft mix using the Airport, taxiways located between 5,500 and 7,500 feet from the landing threshold count in the exit rating for the airfield. Runway 31 has one runway exit within the range. Each of the other runways has an exit rating of zero which typically indicates a somewhat longer runway occupancy time for landing aircraft.

- **Weather Conditions** – Visual meteorological conditions (VMC) are defined as conditions when cloud ceilings are 1,000 feet or above and/or visibility is at least three statute miles (also referred to as visual flight rules). Instrument meteorological conditions (IMC) occur when cloud ceilings are between 500 and 1,000 feet and visibility is between one and three statute miles (also referred to as instrument flight rules). Poor visibility conditions (PVC) apply for minimums below 500 feet and one mile.

  As shown in **Table 3B**, weather data indicates that the Airport is in VMC approximately 86.2 percent of the year, IMC approximately 8.8 percent of the year, and PVC 5.0 percent of the year.

- **Aircraft Mix** - Descriptions of the classifications and the percentage mix for 2015 and long term planning horizon are presented in **Table 3C**. This classification system is based on aircraft weight and not the aircraft approach speed as used in the critical aircraft determination. Very little change is forecast in the fleet mix at the Airport. The D category of aircraft is heavily represented by the KC-135 air tanker activity.

AIRFIELD LAYOUT

Runway Configuration



Runway Use



Number of Exits



WEATHER CONDITIONS

VMC
Visual Meteorological Conditions



IMC
Instrument Meteorological Conditions



PVC
Poor Visibility Conditions



AIRCRAFT MIX

Category A & B Aircraft



Category C Aircraft



Category D Aircraft



OPERATIONS

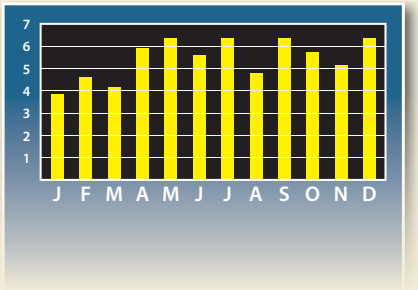
Arrivals



Departures



Total Annual Operations



Touch-and-Go Operations



TABLE 3B
Annual Weather Conditions
Topeka Regional Airport

Condition	Cloud Ceiling	Visibility	Observations	Percent
Visual (VMC)	>1,000'	> 3 mi.	92,000	86.2%
Instrument (IMC)	≤ 1,000' and > 500'	≤ 3 mi. and Vis > 1 mi.	9,373	8.8%
Poor Visibility (PVC)	≤ 500'	≤ 1 mi.	5,389	5.0%
		TOTAL	**106,762**	**100.00%**

Source: National Oceanic and Atmospheric Administration (NOAA). Ten years of data from the on-airport ASOS from 2005-2014.

TABLE 3C
Fleet Mix Operations by Classification
Topeka Regional Airport

Aircraft	2015	%	Short	%	Inter	%	Long	%
A&B	10,704	41.2%	11,099	41.1%	11,272	41.2%	11,891	41.7%
C	4,121	15.9%	4,261	15.8%	4,449	16.3%	4,999	17.5%
D	11,164	43.0%	11,640	43.1%	11,640	42.5%	11,640	40.8%
Totals	**25,989**	**100.0%**	**27,000**	**100.0%**	**27,360**	**100.0%**	**28,530**	**100.0%**

Class A: Small single-engine aircraft with gross weight of 12,500 pounds or less.
Class B: Small twin-engine aircraft with gross weight of 12,500 pounds or less.
Class C: Large aircraft with gross weights over 12,500 pounds up to 300,000 pounds.
Class D: Large aircraft with gross weights over 300,000 pounds.
Note: For capacity analysis helicopters are in Class A
Source: Derived utilizing FAA AC 150/5060, Airport Capacity and Delay.

- **Percent Arrivals** - Generally follows the typical 50-50 percent split.

- **Touch-and-Go Activity** – This activity percentage is derived by dividing total military and general aviation local operations by total military and general aviation operations (those activity categories that perform touch-and-go operations). The result is that approximately 40 percent of total military and general aviation operations are touch-and-go in nature. This factor will influence overall capacity as runway dwell times are reduced for touch-and-go operations.

- **Operational Levels** – Operations and peaking characteristics are taken into consideration for the capacity model. Peak month operations average approximately 10.66 percent of the year. The design hour averages approximately 19.05 percent of the design day operations.

HOURLY RUNWAY CAPACITY

Based upon the input factors, current and future hourly capacities for the various operational scenarios at the Airport were determined. The base year and planning horizon capacities are depicted in **Table**

3D. The base year weighted hourly capacity was 79 operations which is forecast to remain constant over time. Hourly demand is forecast to be approximately 23 to 24 percent of weighted hourly capacity through the long term planning horizon.

TABLE 3D
Airfield Demand/Capacity Summary
Topeka Regional Airport

	PLANNING HORIZON			
	2015	Short Term	Intermediate Term	Long Term
Operational Demand				
Annual	25,989	27,000	27,360	28,530
Design Hour	18	18	18	19
Capacity				
Annual Service Volume (rounded)	114,000	119,000	120,000	119,000
Percent Capacity	22.74%	22.77%	22.76%	24.06%
Weighted Hourly Capacity	79	79	79	79
Delay				
Per Operation (Minutes)	0.20	0.20	0.20	0.25
Total Annual (Hours)	87	90	91	119

Source: FAA AC 150/5060-5, Airport Capacity and Delay

ANNUAL SERVICE VOLUME

The weighted hourly capacity is utilized to determine the annual service volume in the following equation:

Annual Service Volume (ASV) = C x D x H
C = weighted hourly capacity
D = ratio of annual demand to the average daily demand during the peak month
H = ratio of average daily demand to the design hour demand during the peak month

Following this formula, the current and future annual service volume for Topeka Regional Airport has been calculated between 114,000 and 119,000 operations through the long term planning horizon. By the long term planning horizon, total operations are forecast to represent 24 percent of the ASV. The ASV is the point at which delay grows exponentially significant thereby constraining capacity.

According to FAA guidance, when operations reach 60-75 percent of the ASV, consideration should be given to projects specifically designed to increase airfield capacity. A typical project may include additional taxiway exits or parallel runways. No projects are needed to specifically improve airfield capacity for Topeka Regional Airport.

By the long term planning horizon total operations are forecast to represent 24 percent of the ASV.

AIRCRAFT DELAY

As the number of annual aircraft operations approaches the airfield's capacity, increasing amounts of delay to aircraft operations begin to occur. Delays occur to arriving and departing aircraft in all weather conditions. Arriving aircraft delays result in aircraft holding outside of the airport traffic area. Departing aircraft delays result in aircraft holding at the runway end until released by air traffic control.

Annual delay at the Airport is currently and forecast to be negligible. Over the course of a year, it is estimated that a total of 87 hours of delay are experienced. This equates to approximately 12 seconds per operation. Some individual operations may experience a significant delay but overall potential delay is a minor factor at the Airport.

CAPACITY ANALYSIS CONCLUSIONS

According to FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems* (NPIAS), consideration should be given to projects specifically designed to increase airfield capacity when operations reach 60-75 percent of the ASV. Since this range is not anticipated to be reached at the Airport, projects specifically designed to improve capacity, such as additional taxiway exits and new runways, are not necessary over the course of the planning horizons.

AIRFIELD REQUIREMENTS

As indicated earlier, airport facilities include both airfield and landside components. Airfield facilities are those related to the arrival, departure, and ground movement of aircraft. The FAA has established various dimensional design standards related to the airfield to ensure the safe operations of aircraft.

The FAA design standards impact the design of each of the airfield components to be analyzed. The following airfield components are analyzed for compliance to FAA design standards in detail:

- Runway Configuration
- Runway Design Standards
- Runways
- Taxiways
- Navigational and Weather Aids
- Instrument Approaches

RUNWAY CONFIGURATION

The Airport's airfield system has two runways. Primary Runway 13-31 is oriented in a northwest to southeast manner. Crosswind Runway 3-21 is oriented in a southwest to northeast manner. The two runways intersect approximately 1,700 feet from the Runway 21 end and 5,800 feet from the Runway 31 end. Runway 13-31 is 12,803 feet long and 200 feet wide, which is planned to be reduced to 150 feet in width by 2017. Runway 3-21 is 7,001 feet long and 150 feet wide.

A crosswind runway configuration is very common in locations with variable wind patterns such as the Midwest. A crosswind configuration is generally required to meet local wind conditions as detailed below. For the operational safety and efficiency of an airport, it is desirable for the primary runway to be oriented as close as possible to the direction of the prevailing wind. This reduces the impact of wind components perpendicular to the direction of travel of an aircraft that is landing or taking off.

FAA AC 150/5300-13A, *Airport Design,* recommends that a crosswind runway be made available when the primary runway orientation provides for less than 95 percent wind coverage for specific crosswind components. The 95 percent wind coverage is computed on the basis of not exceeding a 10.5-knot (12 mph) component for runway design code (RDC) A-I and B-I, 13-knot (15 mph) component for RDC A-II and B-II, 16-knot (18 mph) component for RDC A-III, B-III, C-I through C-III, and D-I through D-III, and 20 knots for larger wingspans.

Exhibit 3B presents both an all-weather and IFR wind rose. A wind rose is a graphic tool that gives a succinct view of how wind speed and direction are historically distributed at a particular location. The table at the top of the windroses indicates the percent of wind coverage for each runway at specific wind intensity.

As can be seen, neither runway provides sufficient wind coverage at 10.5 knots. Therefore, a crosswind runway is justified by FAA standards. The combination of the two runways does provide for greater than 95 percent coverage for each wind intensity interval. Primary Runway 13-31 does provide 95 percent wind coverage at 13 knots and above.

RUNWAY DESIGN STANDARDS

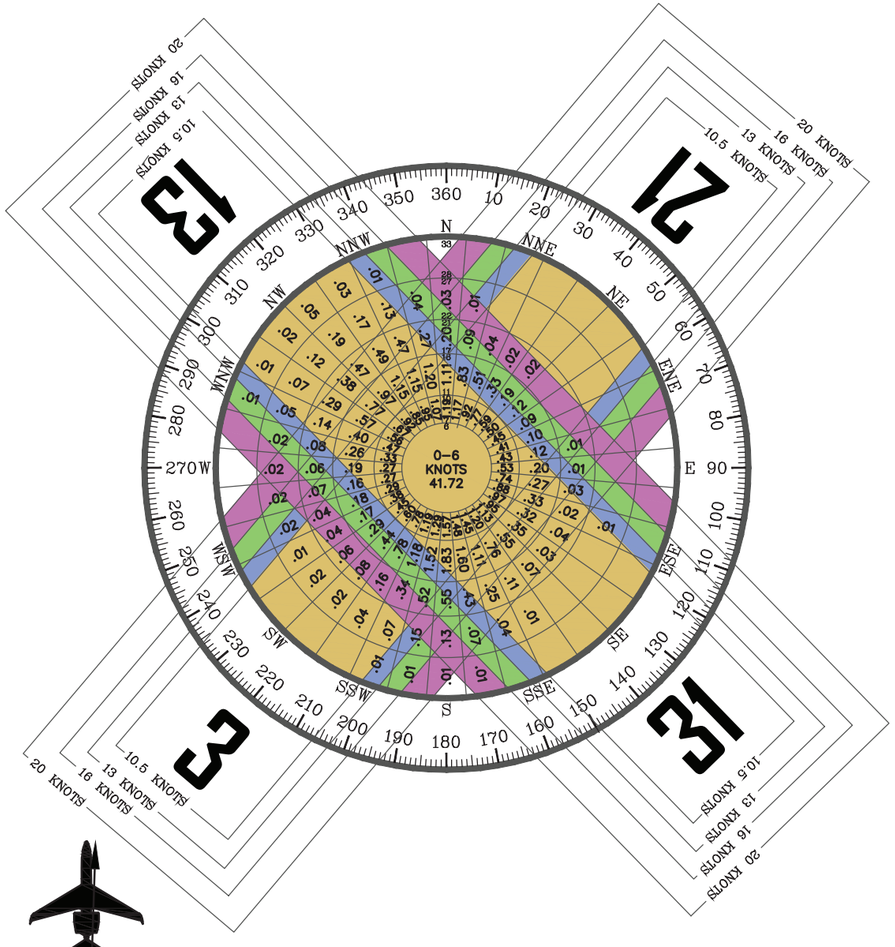
The FAA has established several design standards to protect aircraft operational areas and keep them free from obstructions that could affect their safe operation. These include the runway safety area (RSA), runway object free area (ROFA), runway obstacle free zone (ROFZ), and runway protection zone (RPZ).

The FAA has established several design standards to protect aircraft operational areas and keep them free from obstructions that could affect their safe operation.

The entire RSA, ROFA, and ROFZ must be under the direct ownership of the airport sponsor to ensure these areas remain free of obstacles and can be readily accessed by maintenance and emergency personnel. The RPZ for each runway end should also be under airport ownership. An alternative to outright ownership of the RPZ is the purchase of avigation easements (acquiring control of designated airspace within the RPZ) or having sufficient land use control measures in place which ensure the RPZ remains free of incompatible development. Dimensional standards for the various safety areas associated with the runways are a function of the type of aircraft expected to use the runways as well as the instrument approach capability. **Exhibit 3C** presents the dimensional standards.

ALL WEATHER WIND COVERAGE

Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 13–31	***90.07%***	***95.00%***	***98.42%***	***99.61%***
Runway 3–21	***84.05%***	***90.55%***	***96.00%***	***98.65%***
All Runways	***97.71%***	***99.38%***	***99.88%***	***99.99%***

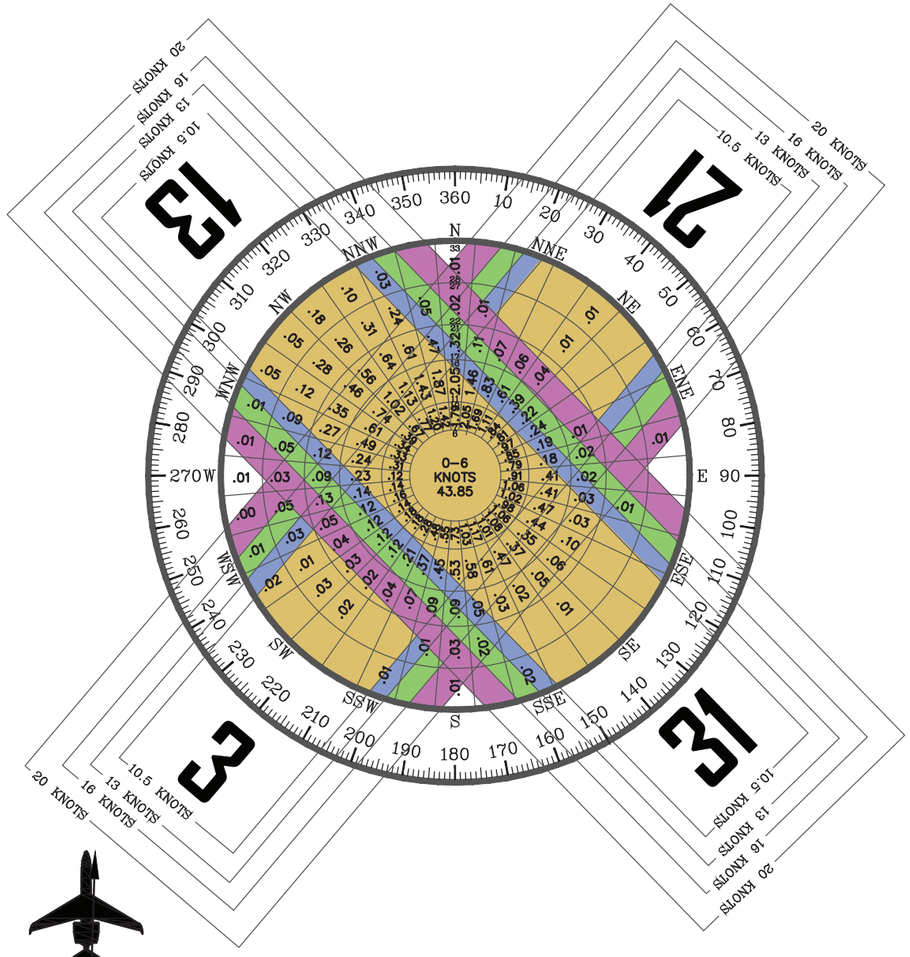


Magnetic Declination
2° 41' East (Aug. 2015)
Annual Rate of Change
00° 6' West (Aug. 2015)

SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Topeka Regional Airport
Topeka, KS
OBSERVATIONS:
106,762 All Weather Observations
2005–2014

IFR WIND COVERAGE

Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 13–31	***92.29%***	***96.51%***	***99.07%***	***99.74%***
Runway 3–21	***83.63%***	***89.63%***	***94.74%***	***99.72%***
All Runways	***98.05%***	***99.45%***	***99.87%***	***99.98%***



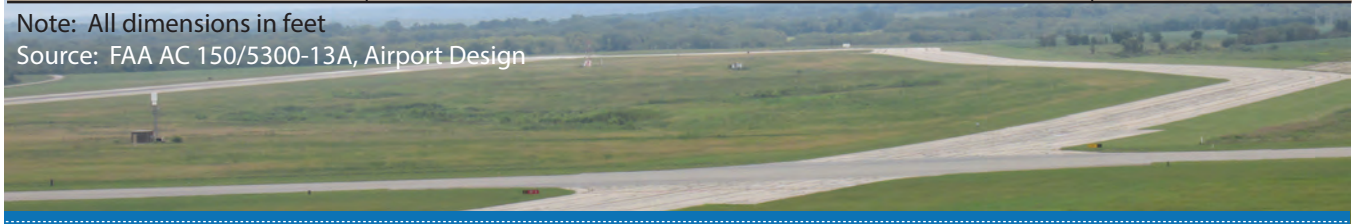
Magnetic Declination
2° 41' East (Aug. 2015)
Annual Rate of Change
00° 6.0' West (Aug. 2015)

SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Topeka Regional Airport
Topeka, KS
OBSERVATIONS:
14,762 IFR Observations
2005–2014

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	CURRENT AIRPORT DATA		
	Runway 13-31 (Civilian)	**Runway 13-31 (Military)**	**Runway 3-21**
DESIGN AIRCRAFT	C-III-3	C-IV-4	C-II-3
Runway Design Code	C-III-2400	C-IV-2400	C-II-4000
Visibility Minimums	½-Mile (31)/¾-Mile(13)		¾-mile
DESIGN STANDARDS			
RUNWAY DESIGN			
Runway Width	150	150	100
Runway Shoulder Width	25	25	10
RUNWAY PROTECTION			
Runway Safety Area (RSA)			
Width	500		500
Length Beyond Departure End	1,000		1,000
Length Prior to Threshold	600		600
Runway Object Free Area (ROFA)			
Width	800		800
Length Beyond Departure End	1,000		1000
Length Prior to Threshold	600		600
Runway Obstacle Free Zone (ROFZ)			
Width	400		400
Length Beyond End	200		200
Precision Obstacle Free Zone (POFZ)			
Width	800 (31)		NA
Length	200 (31)		NA
Approach Runway Protection Zone (RPZ)			
Length	1,700 (13) / 2,500 (31)		1,700
Inner Width	1,000		1,000
Outer Width	1,510 (13) / 1,750 (31)		1,510
Departure Runway Protection Zone (RPZ)			
Length	1,700		1,700
Inner Width	500		500
Outer Width	1,010		1,010
RUNWAY SEPARATION			
Runway Centerline to:			
Holding Position	250		250
Parallel Taxiway	400		300
Aircraft Parking Area	500		400

Note: All dimensions in feet
Source: FAA AC 150/5300-13A, Airport Design



Runway 13-31 should be planned to meet design standards associated with RDC C-III-2400 for civilian operations. For military operations the applicable RDC is C-IV-2400. FAA funding consideration for the runway is based only upon meeting the civilian RDC.

Crosswind Runway 3-21 should, at a minimum, meet design standards associated with A/B-I aircraft based on predominant winds. Historically, the runway has been maintained to ARC C-II design standards. In addition, Runway 3-21 serves an important role as a back-up runway for those times when the primary runway is closed, such as for maintenance/repair. In fact, the primary runway is scheduled to be closed for most of 2016, 2017 and 2018 as it is being reconstructed. In addition, the current ALP for the Airport indicates a current and future ARC of C-II for Runway 3-21. Future consideration will be given to maintaining the application of C-II design standards for the crosswind runway.

Maintaining RDC C-II design standards for the crosswind runway is a planning level consideration that is consistent with previous planning documents. Maintaining this design standard will allow for airspace and other safety standards to be maintained at their current level. However, if a project arises that is based on meeting or maintaining RDC C-II design standards, then that project will have to be reevaluated for eligibility for FAA funding.

Runway Safety Area (RSA)

The RSA is defined in FAA Advisory Circular (AC) 150/5300-13A, *Airport Design,* as a "surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of undershoot, overshoot, or excursion from the runway." The RSA is centered on the runway and dimensioned in accordance to the approach speed of the critical design aircraft using the runway. The FAA requires the RSA to be cleared and graded, drained by grading or storm sewers, capable of accommodating the design aircraft and fire and rescue vehicles, and free of obstacles not fixed by navigational purpose, such as runway edge lights or approach lights.

The RSA for both runways meets current design standards.

Runway Object Free Area (ROFA)

The ROFA is "a two-dimensional ground area surrounding runways, taxiways, and taxilanes, which is clear of objects except for objects whose location is fixed by function (i.e., airfield lighting)." The ROFA does not have to be graded and level like the RSA; instead, the primary requirement for the ROFA is that no object in the ROFA penetrates the lateral elevation of the RSA. The ROFA is centered on the runway, extending out in accordance to the critical design aircraft utilizing the runway.

The ROFA for both runways meets current design standards.

Runway Obstacle Free Zone (ROFZ)

The ROFZ is an imaginary volume of airspace which precludes object penetrations, including taxiing and parked aircraft. The only allowance for ROFZ obstructions is navigational aids mounted on frangible bases which are fixed in their location by function, such as airfield signs. The ROFZ is established to ensure the safety of aircraft operations. If the ROFZ is obstructed, the airport's approaches could be removed or approach minimums could be increased.

The ROFZ for both runways meets current design standards.

Precision Obstacle Free Zone (POFZ)

A precision obstacle free zone (POFZ) is defined for runway ends with a precision approach, such as the ILS approaches to Runway 31. The POFZ is 800 feet wide, centered on the runway, and extends from the runway threshold to a distance of 200 feet. The POFZ is in effect when the following conditions are met:

a) The runway supports a vertically guided approach.
b) Reported ceiling is below 250 feet and/or visibility is less than ¾-mile.
c) An aircraft is on final approach within two miles of the runway threshold.

When the POFZ is in effect, a wing of an aircraft holding on a taxiway may penetrate the POFZ; however, neither the fuselage nor the tail may infringe on the POFZ. POFZ standards are met for Runway 31.

Runway Protection Zones (RPZ)

The RPZ is a trapezoidal area centered on the runway, typically beginning 200 feet beyond the runway end. The RPZ has been established by the FAA to provide an area clear of obstructions and incompatible land uses, in order to enhance the protection of people and property on the ground. The RPZ is comprised of the central portion of the RPZ and the controlled activity area. The central portion of the RPZ extends from the beginning to the end of the RPZ, is centered on the runway, and is the width of the ROFA. The controlled activity area is any remaining portions of the RPZ. The dimensions of the RPZ vary according to the visibility minimums serving the runway and the type of aircraft (design aircraft) operating on the runway.

While the RPZ is intended to be clear of incompatible objects or land uses, some uses are permitted with conditions and other land uses are prohibited. According to AC 150/5300-13A, *Airport Design*, the following land uses are permissible within the RPZ:

- Farming that meets the minimum buffer requirements;
- Irrigation channels as long as they do not attract birds;

- Airport service roads, as long as they are not public roads and are directly controlled by the airport operator;
- Underground facilities, as long as they meet other design criteria, such as RSA requirements, as applicable; and
- Unstaffed navigational aids (NAVAIDs) and facilities, such as required for airport facilities that are fixed by function in regard to the RPZ.

Any other land uses considered within RPZ land owned by the airport sponsor must be evaluated and approved by the FAA Office of Airports. The FAA has published *Interim Guidance on Land Uses within a Runway Protection Zone* (9.27.2012), which identifies several potential land uses that must be evaluated and approved prior to implementation. The specific land uses requiring FAA evaluation and approval include:

- Buildings and structures (examples include, but are not limited to: residences, schools, churches, hospitals or other medical care facilities, commercial/industrial buildings, etc.)
- Recreational land use (examples include, but are not limited to: golf courses, sports fields, amusement parks, other places of public assembly, etc.)
- Transportation facilities. Examples include, but are not limited to:
  - Rail facilities - light or heavy, passenger or freight
  - Public roads/highways
  - Vehicular parking facilities
- Fuel storage facilities (above and below ground)
- Hazardous material storage (above and below ground)
- Wastewater treatment facilities
- Above-ground utility infrastructure (i.e., electrical substations), including any type of solar panel installations.

The *Interim Guidance* states, "RPZ land use compatibility also is often complicated by ownership considerations. Airport owner control over the RPZ land is emphasized to achieve the desired protection of people and property on the ground. Although the FAA recognizes that in certain situations the airport sponsor may not fully control land within the RPZ, the FAA expects airport sponsors to take all possible measures to protect against and remove or mitigate incompatible land uses."

Currently, the RPZ review standards are applicable to any new or modified RPZ. The following actions or events could alter the size of an RPZ, potentially introducing an incompatibility:

- An airfield project (e.g., runway extension, runway shift),
- A change in the critical design aircraft that increases the RPZ dimensions,
- A new or revised instrument approach procedure that increases the size of the RPZ, and/or
- A local development proposal in the RPZ (either new or reconfigured).

Since the *Interim Guidance* only addresses the new or modified RPZ, existing incompatibilities are generally (but not always) grandfathered. While it is still necessary for the airport sponsor to take all reasonable actions to meet the RPZ design standard, FAA funding priority for certain actions, such as relocating existing roads in the RPZ, will be determined on a case-by-case basis.

The approach RPZ for Runway 13 extends beyond airport property and over all or part of three industrial warehouse buildings. The Airport owns an avigation easement over the RPZ land that extends beyond Airport property. Options for removing the incompatible buildings will be discussed in the Alternatives chapter.
The approach RPZ for Runway 31 extends beyond Airport property. There are no incompatibilities in the RPZ and the Airport owns an avigation easement for the RPZ land outside Airport property.

The Approach RPZ for Runway 21 extends beyond Airport property. There is a small farm equipment storage shed within the RPZ. The RPZ also extends over two lightly traveled roads, SE 61st Street and SE California Ave. The Airport owns an avigation easement for the RPZ lands that extend beyond Airport property in this area.

The approach RPZ for Runway 3 extends beyond Airport property slightly. The Airport owns an avigation easement in this area.

Runway/Taxiway Separation

The design standards for the separation between runways and parallel taxiways are a function of the critical design aircraft and the instrument approach visibility minimum. The taxiway geometry at Topeka Regional Airport does not provide for a uniform separation distance between the runways and taxiways.

For Runway 13-31, the combination of the northern portion of Taxiway A and Taxiway C provides for the functional equivalent of a parallel taxiway system. The northern portion of Taxiway A is 750 feet from the Runway 13-31 centerline. The southern portion of Taxiway C is approximately 750 feet from the runway centerline as well.

Runway 3-21 does not have a parallel taxiway system. A small portion of Taxiway A is parallel to the runway near the Runway 3 end and it is separated from the runway by approximately 800 feet.

By design standard, the parallel taxiway segments for Runway 13-31 should be at least 400 feet, centerline to centerline. For Runway 3-21, the parallel taxiway segments should be at least 300 feet.

The separation distance for the parallel taxiway segments exceeds the design standards.

Hold Line Separation

The distance from the hold position markings to the runway centerline vary at the Airport. All hold line markings leading to Runway 13-31 are 300 feet from the runway centerline. The hold lines on Taxiway

A at the Runway 3 threshold are 380 feet from the runway centerline. On Taxiway D, the hold lines are 300 feet from the runway centerline. The hold lines on Taxiway C are 250 feet from the Runway 3-21 centerline. And the hold line on Taxiway B prior to the Runway 21 threshold is 275 feet from the runway centerline. The hold lines at the Airport meet design standard and should be maintained.

Aircraft Parking Area Separation

Aircraft parking areas should be at least 500 from the runway centerline. All aircraft parking areas meet this standard.

RUNWAYS

The adequacy of the existing runway system at Topeka Regional Airport has been analyzed from a number of perspectives, including runway orientation and adherence to safety area standards. From this information, requirements for runway improvements were determined for the airport. Runway elements, such as length, width, and strength, are now presented.

Runway Length

At Topeka Regional Airport, separate runway length requirements must be determined for the civilian critical design aircraft (C-III represented by medium commercial passenger and large business jets) and for the military critical design aircraft (C-IV represented by the KC-135 air tanker). The FAA will only provide ongoing rehabilitation and reconstruction funding for those elements justified by civilian aircraft activity.

There is not a direct relationship between the classification of the design aircraft (e.g., C-III, C-IV) and runway length as airplanes operate on a wide variety of available runway lengths. The suitability of the runway length is governed by many factors, including elevation, temperature, wind, aircraft weight, wing flap settings, runway condition (wet or dry), runway gradient, vicinity airspace obstructions, useful load, and any special operating procedures.

Airport sponsors can pursue policies that can maximize the suitability of the runway length. Policies, such as area zoning and height and hazard restricting, can protect an airport's runway length. Airport ownership (fee simple or easement) of land leading to the runway ends can reduce the possibility of natural growth or man-made obstructions. Planning of runways should include an evaluation of aircraft types expected to use the airport, or a particular runway now and in the future. Future plans should be realistic and supported by the FAA-approved forecasts and should be based on the critical design aircraft (or family of aircraft).

FAA Advisory Circular (AC) 150/5325-4B, *Runway Length Requirements for Airport Design*, provides guidance for determining runway length needs. The AC provides a general formula for determining runway

length needs for general aviation aircraft weighing up to 60,000 pounds. Individual aircraft flight planning manuals are to be utilized for aircraft weighing more than 60,000 pounds.

The determination of runway length requirements for the Airport is based on five primary factors:

- Mean maximum temperature of the hottest month
- Airport elevation
- Runway gradient
- Critical aircraft type expected to use the runway
- Stage length of the longest nonstop destination (specific to larger aircraft)

Aircraft performance declines as elevation, temperature, and runway gradient factors increase. For the Airport, the mean maximum daily temperature of the hottest month is 90.0 degrees Fahrenheit (F), which occurs in July. The airport elevation is 1,078 feet above mean sea level (MSL). The runway end elevation difference is 27.1 feet for Runway 13-31 (0.2% gradient) and 34.6 feet for Runway 3-21 (0.5% gradient) both of which conform to FAA gradient standards. The civilian critical aircraft is C-III for Runway 13-31 and C-II for Runway 3-21. The Aircraft stage length can vary, but for planning purposes, it is common to utilize increments of 500 miles.

Table 3E presents the runway length recommendations for general aviation jet aircraft weighing between 12,500 pounds and 60,000 pounds because these are known to operate frequently at the Airport. Two categories of general aviation jet aircraft are identified; those making up 75 percent of the national fleet and those making up 100 percent of the national fleet. The 75 percent category includes most small- and some medium-sized business jets. Examples include Cessna Citation jets (models 500, 510, 525, 550, 560, 650), Lear jets (models 31, 35, 45), Beechjet 400, and Falcon jets (models 10, 20, 50). The 100 percent category includes the remaining medium and most larger business jets (those under 60,000 pounds). Examples include Cessna Citation jets (models 650, 680, X), Lear jets (models 55, 60), Hawker jets (models 800XP, 1000, 4000), and Challenger 600s.

TABLE 3E
Runway Length Requirements
Topeka Regional Airport

Airport Elevation	1,079 feet above mean sea level
Average High Monthly Temp.	90 degrees (July)
Runway Gradient	0.2% Runway 13-31/0.5% Runway 3-21

Fleet Mix Category	Raw Runway Length from FAA AC	Runway Length With Gradient Adjustment	Wet Surface Landing Length for Jets (+15%)*	Final Runway Length
75% of fleet at 60% useful load	4,826'	5,176'	5,500'	5,500'
100% of fleet at 60% useful load	5,745'	6,095'	5,500'	6,100'
75% of fleet at 90% useful load	6,690'	7,040'	7,000'	7,100'
100% of fleet at 90% useful load	8,741'	9,091'	7,000'	9,100'

*Max 5,500' for 60% useful load and max 7,000' for 90% useful load in wet conditions
Source: FAA AC 150/5325-4B, Runway Length Requirements for Airport Design.

As shown in **Table 3E**, to accommodate 75 percent of the general aviation jet fleet at 60 percent useful load, a runway length of 5,500 feet is recommended. To accommodate 100 percent at 60 percent useful load, a runway length of 6,100 feet is recommended. To accommodate 75 percent of the general aviation jet fleet at 90 percent useful load, a runway length of 7,100 feet is recommended, and for 100 percent at 90 percent useful load, a length of 9,100 feet is recommended. The FAA typically would only consider the 90 percent useful load categories if there was an identified specific need such as air cargo activity, or specific operators flying heavy loads long distances.

The previous master plan recommended a minimum civilian runway length of 7,300 feet. This length was based on the additional length beyond 7,100 feet that a large business jet (e.g. Gulfstream IV) may need under certain operational conditions, such as those times when the air temperature exceeds 90 degrees.

In addition to using the general runway length categories listed in **Table 3E**, an analysis of the flight planning manuals for both business jets and commercial type aircraft has been prepared. **Table 3F** presents the takeoff and landing length requirements for the most common business jets in the national fleet, all of which operate at the Airport. The calculations are based on a maximum takeoff and landing weight.

Those takeoff and landing lengths highlighted in red indicate a runway length requirement that exceeds 7,300 feet, which is the length was the recommended civilian length from the previous master plan. According to the planning manuals for the business jets, there are four aircraft (Challenger 600, Gulfstream II, Gulfstream V, and the Lear 35) that would be weight restricted (required to take on less fuel or passengers and cargo) on takeoff under dry operating conditions. On a wet runway, several additional aircraft would require a runway length beyond 7,300 feet.

Business jets may operate under different regulations depending on the type of flight being conducted. These regulations may impact the calculated runway length available for landing. An analysis of Code of Federal Regulations (CFR) Park 91k and Part 135 landing length restrictions was conducted. CFR Part 91k refers to operations conducted via fractional ownership, and Part 135 refers to commuter/on-demand (charter) operations. Both operation types are required to meet specific landing length standards for safety purposes. Fractional operations must be capable of landing within 80 percent of the landing distance available (LDA), and commuter/on-demand operations must be capable of landing within 60 percent of the LDA. Operations conducted under CFR Part 25 are general aviation operations conducted by private owners including companies.

These landing length requirements under both dry and wet conditions are presented in **Table 3F**. Nearly all the business jets considered are capable of landing within a 7,300-foot length except the Gulfstream IV which needs up to 7,600 feet. The analysis of landing length requirements for aircraft operating under CFR Part 91k and 135 shows that more runway length is necessary under these conditions. Generally, a runway length of 7,300 feet is considered reasonable to accommodate business jet activity.

TABLE 3F
Runway Length Requirements for Business Jets
Topeka Regional Airport

Airfield Parameters		
	Elevation:	1,079' MSL
	Temp:	90.0° F
	Gradient:	0.3% (27')

Runway Parameters	Take-off Length Required at MTOW		Landing Length Requirements					
			C.F.R. Part 25 (Unfactored)		C.F.R. Part 135 (60% factored)		C.F.R. Part 91k (80% factored)	
Runway Condition	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Beechjet 400A	5,100	6,400	3,400	5,100	5,700	8,500	4,300	6,400
Challenger 600	7,400	8,000	2,900	4,400	4,900	7,400	3,600	5,500
Citation Bravo	5,100	5,400	3,600	5,600	6,000	9,400	4,500	7,000
Citation CJ3	4,000	4,500	3,000	4,100	5,000	6,900	3,800	5,100
Citation Encore	4,600	5,100	3,000	4,600	5,000	7,700	3,800	5,800
Citation Excel	4,800	4,900	3,400	5,500	5,700	9,200	4,300	6,900
Citation Sovereign	3,800	4,700	2,900	3,600	4,900	6,000	3,600	4,500
Citation V	4,100	7,000	3,300	6,200	5,500	10,400	4,100	7,800
Citation VII	6,600	6,900	3,500	4,800	5,900	8,000	4,400	6,000
Citation X	6,900	7,700	3,800	5,400	6,400	9,000	4,800	6,800
Falcon 2000	7,300	7,400	3,500	4,000	5,900	6,700	4,400	5,000
Global Express	6,700	6,900	5,100	5,900	8,500	9,900	6,400	7,400
Gulfstream II	7,500	8,600	5,600	6,500	9,400	10,900	7,000	8,100
Gulfstream III	6,400	7,400	6,000	6,900	10,000	11,500	7,500	8,700
Gulfstream IV	6,700	7,700	4,000	7,600	6,700	12,700	5,000	9,500
Gulfstream V	7,700	7,900	4,700	4,900	7,900	8,200	5,900	6,200
Hawker 800XP	6,200	7,200	4,800	5,500	8,000	9,200	6,000	6,900
Lear 31A	6,000	7,200	3,400	4,700	5,700	7,900	4,300	5,900
Lear 35	7,400	8,900	3,800	5,300	6,400	8,900	4,800	6,600
Lear 45	5,800	5,900	3,100	4,000	6,200	6,700	3,900	5,000

KEY: MSL - Mean Sea Level; MTOW - Maximum takeoff weight; CFR - Code of Federal Regulations
CFR Part 25: Standard unfactored landing lengths.
CFR Part 135: 60% factored landing length as required by commuter/on-demand operators.
CFR Part 91k: 80 percent factored as required by fractional operators.
Red Numbers: Indicate the length exceeds 7,300 feet.
Values of X,X30 rounded up to nearest 100.
Source: Aircraft operating manuals.

Table 3G considers the runway length requirements for common commercial service aircraft that may utilize the Airport in the coming years. These takeoff lengths consider three scenarios, maximum certified takeoff weight, a 500-mile haul length, and a 1,000-mile haul length. Each of these is considered in wet and dry conditions with the wet condition being an increase of 15 percent.

TABLE 3G
Commercial Aircraft Runway Length Requirements
Topeka Regional Airport

ARC	Aircraft	MTOW		500 miles		1,000 miles	
		Dry	Wet	Dry	Wet	Dry	Wet
D-III	MD-88	9,214	10,596	5,574	6,410	6,614	7,606
C-III	737-700	11,190	12,869	6,171	7,097	6,889	7,922
C-III	737-500	11533	13,263	5,573	6,409	6,171	7,097
C-III	CRJ-900	8,174	9,400	5,574	6,410	6,198	7,128
C-III	ERJ-190	8,082	9,294	4,664	5,364	5,022	5,776
C-III	ERJ-170	5,782	6,649	3,702	4,257	3,910	4,497
C-II	ERJ-145	7,446	8,563	4,721	5,429	5,865	6,745
C-IV	757-200	8,828	10,152	5,468	6,288	5,940	6,831

ARC: Airport reference code
Source: Aircraft planning manuals

The 500-mile haul length would include commercial service destinations such as Denver, Dallas and Chicago. The 1,000-mile haul length would include destinations such as Phoenix, Orlando, and Las Vegas. The longer haul flights typically utilize a larger MD-88 or Boeing 757 aircraft. These flights occur currently at the Airport and are associated with casino and vacation flights. The MD-88 aircraft is considered the most representative aircraft for use in non-daily scheduled flights. This aircraft should have an available takeoff length of approximately 7,600 feet. The Boeing 737-700 is considered the most representative aircraft that could be utilized when scheduled commercial service returns. This aircraft requires a runway length of 7,900 feet.

The commercial aircraft listed in **Table 3G** are those most likely to be utilized in scheduled commercial service (or irregularly scheduled service such once a week) and therefore exceed the FAA operational threshold of 500 annual operations for runway length determination. In addition, the Airport continues to have charter activity by these and larger aircraft. In 2015, larger passenger type aircraft utilized as charters included Boeing 747 (26 operations), Boeing 757 (22 operations), Boeing 737-800/900 (42 operations), Boeing 767 (24 operations). While these larger aircraft alone do not currently provide justification for runway length, they do contribute civilian length justified.

Runway 13-31 Length

For planning purposes, the minimum civilian runway length should be between 7,300 and 7,900 feet. The 7,300-foot length would be able to accommodate most business jets and the 7,900-foot length would accommodate likely commercial service aircraft that may operate at the Airport. A length of 7,600 feet meets the needs of the Boeing 737-700 and CRJ-900 which are considered representative aircraft for regularly scheduled commercial service.

The Kansas Air National Guard bases and operates 12 KC-135 air tankers at the Airport. Representatives of the Guard units have indicated that they need at least 10,000 feet of runway length but prefer to

maintain the existing 12,803 feet. To this end, the National Guard is funding the reconstruction of Runway 13-31 beyond the length and width that is eligible for FAA funding.

For Runway 13-31, the civilian length requirement is between 7,300 and 7,900 feet and the military length requirement is 12,803 feet.

Runway 3-21 Length

At a minimum, the crosswind runway should meet design standards associated with A/B-I aircraft because of the prevailing winds. FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design* provides a methodology for determining runway length needs for these smaller aircraft. Factors considered are the mean maximum temperature of the hottest month (90°F), the airport elevation (1,079 MSL), and the runway elevation change (35 feet). Three different runway lengths result from this analysis as follows:

- 3,500 feet to accommodate 95% of the small aircraft fleet.
- 4,100 feet to accommodate 100% of the small aircraft fleet.
- 4,400 feet to accommodate small aircraft having 10 or more passenger seats.

At the time of the next major rehabilitation or reconstruction of this runway, a determination of what length is eligible for FAA grant funding will need to be made. Since this runway was recently rehabilitated, a major reconstruction is not anticipated during the term of this Master Plan and it should be maintained at its current dimensions.

Runway Length Summary

For Runway 13-31 the civilian length requirement is between 7,300 and 7,900 feet and the military length requirement is 12,803 feet.

Runway 13-31 is currently 12,803 feet long and 200 feet wide. These dimensions exceed what is needed to accommodate the critical design aircraft which is that family of aircraft in ARC C-III. Representative aircraft are the Boeing 737-700 and the CRJ-900 which may be utilized in commercial service in the future. The recommended runway length for this family of aircraft is 7,900 feet for a 1,000-mile haul length. The previous master plan indicated that approximately 7,300 feet of runway length is needed to accommodate the business jet fleet under certain operating conditions (i.e., heavy loading, hot days). Therefore, the civilian runway length requirements range between 7,300 feet and 7,900 feet.

The military aircraft based at the Airport have different runway length requirements. Military representatives have indicated that they need, at a minimum, 10,000 feet but prefer the current length of 12,803

feet. To this end, the National Guard has agreed to pay for runway improvements that are not eligible for FAA grant funding which will result in Runway 13-31 being 12,803 feet long and 150 feet wide.

The crosswind runway is currently 7,001 feet long. To accommodate small aircraft that will typically utilize a crosswind runway, a length of between 3,500 and 4,400 feet is recommended. At the time of the next major rehabilitation or reconstruction, additional analysis will need to be undertaken to determine what portion of the runway is eligible for FAA grant funding. The current dimensions should be maintained until that time.

Runway Width

Runway 13-31 is currently 200 feet wide. The design standard for ARC C-III (civilian) and ARC C-IV (military) is 150 feet. The runway is planned to be narrowed to 150 feet during the upcoming reconstruction project. The 150-foot width should be maintained once it is in place.

Runway 3-21 is currently 150 feet wide. The runway width design standard for C-II is 100 feet and for A/B-I it is 60 feet. Future consideration should be given to narrowing this runway to 100 feet at the time of the next major rehabilitation/reconstruction; however, that is not anticipated to be needed within the next 20-years. In the short term, the additional width will be a benefit when the primary runway is closed for reconstruction over the course of the next several years.

Runway Strength

An important feature of airfield pavement is its ability to withstand repeated use by aircraft. At the Airport, pavement must be able to support multiple operations of large commercial and military aircraft on a daily basis. As part of the Runway 13-31 reconstruction project, the National Guard is paying for additional strengthening of the pavement to support regular operations by the KC-135.

The crosswind runway has adequate strength to accommodate regular operations by the design aircraft in ARC A/B-I. The strength should be maintained.

TAXIWAYS

The design standards associated with taxiways are determined by the taxiway design group (TDG) or the ADG of the critical design aircraft. The taxiway design standard applicable to the civilian critical aircraft is ADG II and TDG 3. The taxiway design standard applicable to the military critical aircraft is ADG IV and TDG 4. **Table 3H** presents the taxiway design standards applicable to the Airport.

TABLE 3H
Taxiway Dimensions and Standards
Topeka Regional Airport

STANDARDS BASED ON WINGSPAN	ADG III (Civilian)	ADG IV (Military)	
Taxiway Protection			
Taxiway Safety Area (TSA) width	118'	171'	
Taxiway Object Free Area (TOFA) width	186'	259'	
Taxilane Object Free Area width	162'	225'	
Taxiway Separation			
Taxiway Centerline to:			
Fixed or Movable Object	93'	129.5'	
Parallel Taxiway/Taxilane	152'	215'	
Taxilane Centerline to:			
Fixed or Movable Object	81'	112.5'	
Parallel Taxilane	140'	198'	
Taxiway Centerline to:			
Runway 13-31 Centerline (½-mile)	400'	400'	
Runway 3-21 Centerline (¾-mile)	225'	400'	
Wingtip Clearance			
Taxiway Wingtip Clearance	26'	44'	
Taxilane Wingtip Clearance	18'	27'	
STANDARDS BASED ON TDG	**TDG 3**	**TDG 4**	**TDG 5**
Taxiway Width Standard	50'	50'	75'
Taxiway Edge Safety Margin	10'	10'	15'
Taxiway Shoulder Width	20'	20'	30'

ADG: Airplane Design Group
TDG: Taxiway Design Group
Source: FAA AC 150/5300-13A, Airport Design

All taxiways at the Airport are currently 75 feet wide, which is adequate to meet the needs of both civilian and military users now and into the future. The taxiways should be maintained at their current width. When the taxiways are required to be reconstructed, the Airport and the National Guard should continue to work together to determine the optimal taxiway width. If a width greater than 50 feet must be maintained for military operations, then both parties may need to contribute to the cost of reconstruction. The FAA cannot participate in project costs beyond the applicable design standards.

Taxiway Design Considerations

FAA AC 150/5300-13A, *Airport Design*, provides guidance on recommended taxiway and taxilane layouts to enhance safety by avoiding runway incursions. A runway incursion is defined as "any occurrence at an airport involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and takeoff of aircraft."

The taxiway system at the Airport generally provides for the efficient movement of aircraft; however, recently published AC 150/5300-13A, *Airport Design*, provides recommendations for taxiway design. The following is a list of the taxiway design guidelines and the basic rationale behind each recommendation:

1. **Taxi Method**: Taxiways are designed for "cockpit over centerline" taxiing with pavement being sufficiently wide to allow a certain amount of wander. On turns, sufficient pavement should be provided to maintain the edge safety margin from the landing gear. When constructing new taxiways, upgrading existing intersections should be undertaken to eliminate "judgmental over-steering," which is where the pilot must intentionally steer the cockpit outside the marked centerline in order to assure the aircraft remains on the taxiway pavement.
2. **Steering Angle**: Taxiways should be designed such that the nose gear steering angle is no more than 50 degrees, the generally accepted value to prevent excessive tire scrubbing.
3. **Three-Node Concept**: To maintain pilot situational awareness, taxiway intersections should provide a pilot a maximum of three choices of travel. Ideally, these are right- and left-angle turns and a continuation straight ahead.
4. **Intersection Angles**: Design turns to be 90 degrees wherever possible. For acute-angle intersections, standard angles of 30, 45, 60, 120, 135, and 150 degrees are preferred.
5. **Runway Incursions**: Design taxiways to reduce the probability of runway incursions.
   - *Increase Pilot Situational Awareness*: A pilot who knows where he/she is on the airport is less likely to enter a runway improperly. Complexity leads to confusion. Keep taxiway systems simple using the "three node" concept.
   - *Avoid Wide Expanses of Pavement*: Wide pavements require placement of signs far from a pilot's eye. This is especially critical at runway entrance points. Where a wide expanse of pavement is necessary, avoid direct access to a runway.
   - *Limit Runway Crossings*: The taxiway layout can reduce the opportunity for human error. The benefits are twofold – through simple reduction in the number of occurrences, and through a reduction in air traffic controller workload.
   - *Avoid "High-Energy" Intersections*: These are intersections in the middle third of runways. By limiting runway crossings to the first and last thirds of the runway, the portion of the runway where a pilot can least maneuver to avoid a collision is kept clear.
   - *Increase Visibility*: Right-angle intersections, both between taxiways and runways, provide the best visibility. Acute-angle runway exits provide for greater efficiency in runway usage, but should not be used as runway entrance or crossing points. A right-angle turn at the end of a parallel taxiway is a clear indication of approaching a runway.
   - *Avoid "Dual Purpose" Pavements*: Runways used as taxiways and taxiways used as runways can lead to confusion. A runway should always be clearly identified as a runway and only a runway.
   - *Indirect Access*: Do not design taxiways to lead directly from an apron to a runway. Such configurations can lead to confusion when a pilot typically expects to encounter a parallel taxiway.
   - *Hot Spots*: Confusing intersections near runways are more likely to contribute to runway incursions. These intersections must be redesigned when the associated runway is subject

to reconstruction or rehabilitation. Other "hot spots" should be corrected as soon as practicable.

6. **Runway/Taxiway Intersections**:
   - *Right-Angle*: Right-angle intersections are the standard for all runway/taxiway intersections, except where there is a need for a high-speed exit. Right-angle taxiways provide the best visual perspective to a pilot approaching an intersection with the runway to observe aircraft in both the left and right directions. They also provide optimal orientation of the runway holding position signs so they are visible to pilots.
   - *Acute-Angle*: Acute angles should not be larger than 45 degrees from the runway centerline. A 30-degree taxiway layout should be reserved for high-speed exits. The use of multiple intersecting taxiways with acute angles creates pilot confusion and improper positioning of taxiway signage.
   - *Large Expanses of Pavement*: Taxiways must never coincide with the intersection of two runways. Taxiway configurations with multiple taxiway and runway intersections in a single area create large expanses of pavement, making it difficult to provide proper signage, marking, and lighting.
7. **Taxiway/Runway/Apron Incursion Prevention**: Apron locations that allow direct access into a runway should be avoided. Increase pilot situational awareness by designing taxiways in such a manner that forces pilots to consciously make turns. Taxiways originating from aprons and forming a straight line across runways at mid-span should be avoided.
8. **Wide Throat Taxiways**: Wide throat taxiway entrances should be avoided. Such large expanses of pavement may cause pilot confusion and makes lighting and marking more difficult.
9. **Direct Access from Apron to a Runway**: Avoid taxiway connectors that cross over a parallel taxiway and directly onto a runway. Consider a staggered taxiway layout that forces pilots to make a conscious decision to turn.
10. **Apron to Parallel Taxiway End**: Avoid direct connection from an apron to a parallel taxiway at the end of a runway.

FAA AC 150/5300-13A, *Airport Design*, states that, "existing taxiway geometry should be improved whenever feasible, with emphasis on designated "hot spots." To the extent practicable, the removal of existing pavement may be necessary to correct confusing layouts. **Exhibit 3D** identifies all airfield areas of concern.

The FAA has identified the following three "hot spots" on the airfield as follows:

- HS 1: Southbound traffic on Taxiway A must remain alert so as to not miss the right turn on Taxiway A when taxiing to Runway 3. Taxiway D continues to an intersection with Runway 3. Taxiway A turns to the southwest.
- HS 2: Use caution because Taxiway A becomes Taxiway E just past access to the approach end of Runway 3. Taxiway A turns left, Taxiway E continues southwest-bound to the Kansas Army National Guard ramp. (A special directional pavement marking has been installed to alert pilots to the turn to the Runway 3 threshold.)

- HS 3: Taxiway E is not visible from the ATCT. Taxiway E also accesses the Kansas Army National Guard ramp and is not maintained by the Airport Authority.

In the Alternatives chapter, potential solutions to each of these "hot spots" will be presented.

Exhibit 3D also highlights the location of the "high-energy" portion of each runway (middle third). As noted above, FAA airfield geometry standards indicate that there should be no taxiways crossing a runway in the high-energy areas. There are two locations on the airfield where runway crossings are located within the "high-energy" portion of the runway. Taxiway B crosses Runway 13-31 in the middle third of the runway and Taxiway C crosses Runway 3-21 in the middle third of the runway.

Both of these taxiways are highly utilized as they are the only taxiways leading to runway thresholds, so pilots must be particularly aware of the runway crossing. In the Alternatives chapter, potential solutions to mitigating the high-energy runway crossings will be examined.

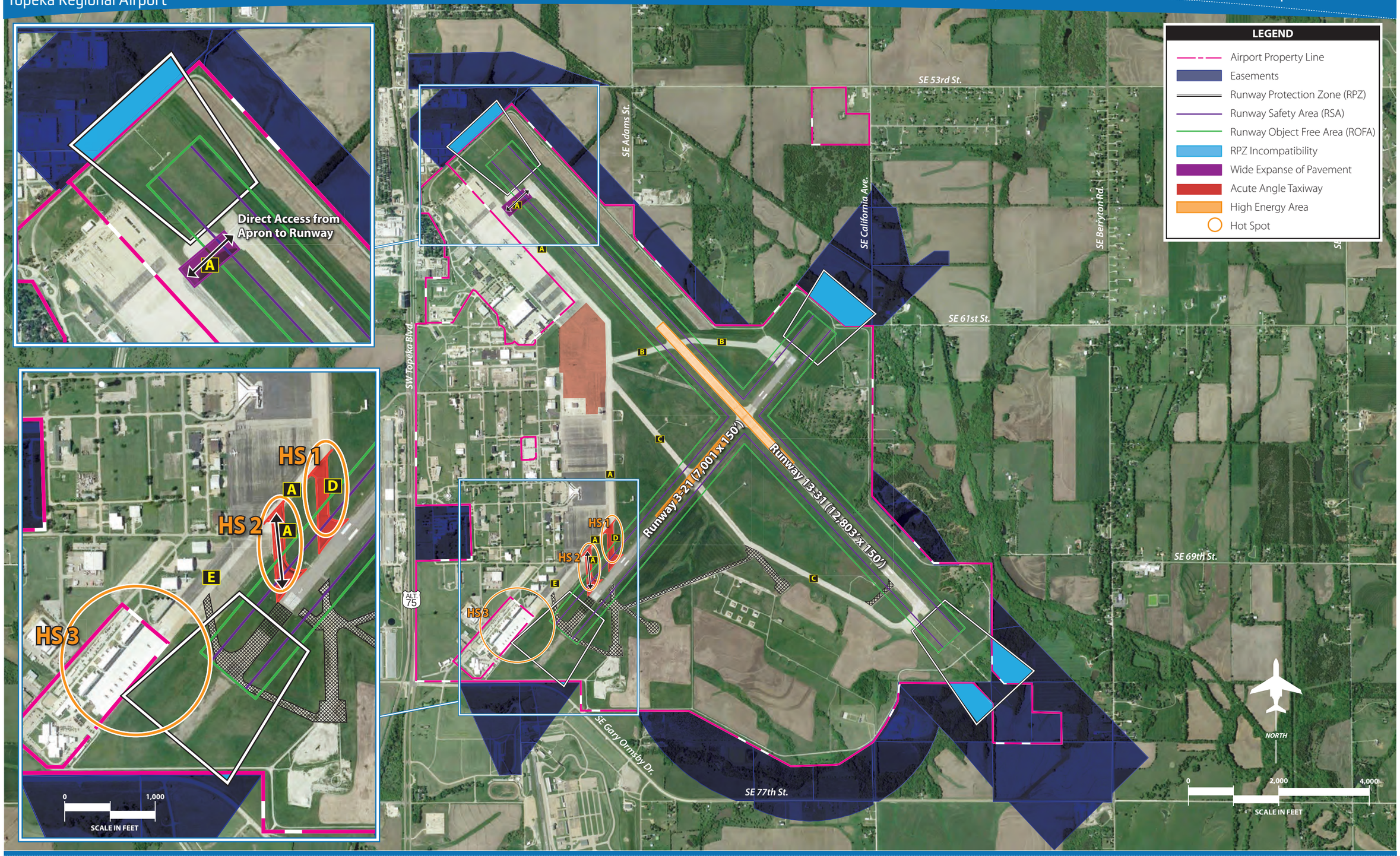
Wide expanses of pavement can be confusing to pilots. Taxiway A at the threshold to Runway 13 is 135 feet wide at one point, rather than the uniform 75-foot width at other locations. Consideration will be given to narrowing this threshold taxiway.

All entrance/exit taxiways should interface the runway to allow aircraft to hold at a 90-degree orientation with the runway centerline. This allows the pilot full operational view of the runway in both directions. Access to runways is preferred to be at a 90-degree angle, unless a high-speed exit is needed. Taxiway A at the Runway 3 threshold is at an angle. Taxiway D enters Runway 3-21 at an angle. Options will be considered in the Alternatives chapter to provide only 90-degree runway access points unless a high-speed exit is applicable.

The FAA recommends that all direct access linking a ramp with a runway be modified by relocating the taxiway or developing "no-taxi islands" on the ramp to prohibit direct access.

According to FAA airfield geometry standards, direct access from an aircraft ramp area to a runway should be avoided. FAA's Runway Safety Action Team (RSAT) study indicates that runway incursion risks increase when a pilot can traverse directly from a ramp or non-movement area to an active runway without having to make a turn. The FAA recommends that all direct access linking a ramp with a runway be modified by relocating the taxiway or developing "no-taxi islands" on the ramp to prohibit direct access. At the threshold to Runways 13 and 3, aircraft can proceed directly to the runway without making a turn onto the taxiway.

Analysis in the following chapter will outline options for correcting the nonstandard direct access taxiway alignments.


LEGEND
Airport Property Line
Easements
Runway Protection Zone (RPZ)
Runway Safety Area (RSA)
Runway Object Free Area (ROFA)
RPZ Incompatibility
Wide Expanse of Pavement
Acute Angle Taxiway
High Energy Area
Hot Spot
Direct Access from Apron to Runway
A
HS 1
HS 2
HS 3
D
E
B
C
Runway 3-21 (7,001 x 150')
Runway 13-31 (12,803 x 150')
SE 53rd St.
SE 61st St.
SE 69th St.
SE 77th St.
SE Adams St.
SE California Ave.
SE Berryton Rd.
SW Topeka Blvd
SE Gary Ormsby Dr.
ALT 75
0
1,000
SCALE IN FEET
NORTH
0
2,000
4,000
SCALE IN FEET

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INSTRUMENT NAVIGATIONAL AIDS

The Airport is outfitted with a wide range of instrument approaches. Runway 31 has an ILS precision instrument approach offering Category I (CAT-I) minimums that allow pilots the ability to land when visibility minimums are as low as ½-mile and cloud ceilings are as low as 200 feet. This is typically the most sophisticated instrument approach available to a general aviation airport. This instrument approach should be maintained in the future.

In addition, all runways have non-precision instrument approaches with varying minimums. The GPS approaches to the other three runway ends have visibility minimums of ¾-mile.

There are also numerous instrument approaches designed to utilize the TACAN located on the airfield. These approaches are reserved for military operations.

The FAA is making significant advances in its implementation of NextGen air navigation improvements. In the future, the Airport could be eligible for even lower minimums based in NextGen technology. For purposes of this Master Plan, the instrument approaches currently available are adequate through the long term planning period.

VISUAL NAVIGATION AIDS

The airport beacon is located on top of the water tower. The beacon provides for rapid identification of the airport with a rotating light that is green on one side and white on the opposite side. The beacon should be maintained through the planning period.

All runway ends are equipped with visual glideslope indicator light systems (VASI). Once these systems reach the end of their useful life, they should be replaced with the more modern four-box precision approach path indicators (PAPIs), PAPI-4L system.

Runway end identification lights (REIL) are strobe lights set to either side of the runway. These lights provide rapid identification of the runway threshold. REILs should be installed at runway ends not currently providing an approach lighting system but supporting instrument operations. REILs are available for Runways 13, 3 and 21 and they should be maintained.

Approach lighting systems are required for instrument approaches with lower than ¾-mile visibility minimums. Runway 31 has a medium intensity approach lighting system (MALSR) which should be maintained. Runway 13 has a sequencing approach lighting system (SALS) which should be maintained.

WEATHER AND COMMUNICATION AIDS

Topeka Regional Airport has five lighted windcones located in proximity to the approach ends of runways and central to the terminal area. This is the appropriate location for windcones and they should be maintained.

The airport traffic control tower (ATCT) provides an automated terminal information service (ATIS). ATIS broadcasts contain essential information, such as weather information, active runways, available approaches, and any other information required by the pilots, such as important NOTAMs. These broadcasts are updated hourly.

Topeka Regional Airport is equipped with an Automated Surface Observing System (ASOS). This is an important system that automatically records weather conditions, such as wind speed, wind gust, wind direction, temperature, dew point, altimeter setting, visibility, fog/haze condition, precipitation, and cloud height. This information can be accessed by pilots and individuals via an automated voice recording on a published telephone number. This system should be maintained through the planning period.

Many commercial service airports have runway visual range equipment providing visibility measuring and reporting equipment at specific locations adjacent to the runway. Runway 13-31 has RVR equipment which should be maintained. RVR equipment is not typically provided on a crosswind runway.

AIRSIDE SUMMARY

The Topeka Regional Airport is in excellent shape when it comes to the availability of airside facilities. At 12,803 feet in length, Runway 13-31 fully meets the needs of both civilian and military users. The National Guard and the Airport, and by extension the FAA, have developed a true partnership in which capital development costs are shared. The Airport is responsible for the required civilian runway length and the National Guard is responsible for the additional length and strength of the runway.

The FAA places a high priority on airports having control over land uses within RPZs. The Airport has that control via fee simple ownership or avigation easement. There are structures within the RPZs for Runways 13 and 21. The Airport should plan to acquire and remove these structures as funding becomes available.

The FAA is also placing a high priority on mitigating or eliminating through redesign, potentially confusing intersections at airports. There are three identified “hot spots,” all of which are located in the area where Taxiways A, D, E, and Runway 3-21 intersect. The Alternatives chapter will present several possible solutions.

The instrument approaches to the Airport are excellent and should be maintained. Some improvements to visibility minimums, particularly for larger/faster aircraft, could be available in the future. These improvements won’t change the applicable design standards but the Airport should be aware of any changes that may increase the availability of the Airport to more users.

A summary of the airside needs at Topeka Regional Airport is presented on **Exhibit 3E**.

	AVAILABLE	POTENTIAL IMPROVEMENT/CHANGE
RUNWAYS		
	RUNWAY 13-31	
	RDC C-III (Civilian)	Maintain
	RDC C-IV (Military)	Maintain
	12,803' x 200' (Military)	12,803' x 150' (Military)
	7,300'-7,900' x 150'	7,300'-7,900' x 150'
	75-S; 200-D; 280-DT; 760-DDT	Maintain (Civilian)/Strengthen (Military)
	Standard RSA, OFA, OFZ, POFZ	Maintain
	RPZs under partial ownership	Maintain easements of RPZ land not owned in fee simple. Acquire if feasible.
	Structures in Rwy 13 RPZ	Plan to remove structures.
	Precision marking	Maintain
	HIRL	Maintain
	RUNWAY 3-21	
	RDC C-II-3	Maintain
	7,001' x 150'	7,001' x 100'
	100-S; 210-D; 360-DT; 720-DDT	Maintain
	Standard RSA, OFA, OFZ	Maintain
	RPZ (Rwy 21) under partial ownership	Maintain easements of RPZ land not owned in fee simple. Acquire if feasible.
	Structures in Rwy 21 RPZ	Plan to remove structures.
	Non-precision marking	Maintain
	MIRL	Maintain
TAXIWAYS		
	TDG-3 (Civilian)/ TDG-4(Military)	Maintain
	Centerline marking	Maintain
	Width is 75 feet	Maintain
	MITL	Maintain
	Hot Spot and layout deficiencies	Redesign layout concerns
INSTRUMENT NAVIGATION AND WEATHER AIDS		
	ASOS, 5 windsock, beacon, ATCT	Maintain
	RUNWAY 13-31	
	½-mile Precision ILS Rwy 31	Maintain
	½-mile Non-Precision LPV Rwy 31	Maintain
	¾-mile Non-Precision GPS Rwy 13	Maintain
	RUNWAY 3-21	
	¾-mile Non-Precision LPV Rwy 3	Maintain
	¾-mile Non-Precision GPS Rwy 21	Maintain
VISUAL AIDS		
	RUNWAY 13-31	
	VASI-4L	Upgrade to PAPI-4L
	MALSR (31)	Maintain
	SALS (13)	Maintain
	REIL (Rwy 13)	Maintain
	RUNWAY 3-21	
	VASI-4L	Upgrade to PAPI-4L
	REIL	Maintain

RD C - Runway Design Code
RSA - Runway Safety Area
OFA - Object Free Area
OFZ/POFZ - Obstacle Free Zone/Presicion Obstacle Free Zone
RPZ - Runway Protection Zone
TDG - Taxiway Design Code
PAPI - Precision Approach Path Indicator
LPV - GPS with Localizer Performance and Vertical Guidance
VOR - Very-High Frequency Omni-Directional Radar
REIL - Runway End Identification Lights
MIRL/HIRL - Medium/High Intensity Runway Lighting
MITL - Medium Intensity Taxiway Lighting
ASOS - Automated Surface Observation System
MALSR - Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights
SALS - Short Approach Lighting System
##-S/D/DT - Runway Strength Rating in Thousands of Pounds for Single (S), Dual (D), Dual Tandem (DT), and Double Dual Tandem (DDT) Wheel Struts

LANDSIDE REQUIREMENTS

Landside facilities are those necessary for handling aircraft and passengers while on the ground. These facilities provide the essential interface between the air and ground transportation modes. The capacities of the various components of each area were examined in relation to projected demand to identify future landside facility needs. This analysis is heavily focused on the needs to support general aviation activity, which includes recreational flying, business aviation, charter, military, and some portions of air cargo and air ambulance activity. In addition, passenger terminal building requirements necessary to satisfy the long term potential for enplanements (approximately 85,000) will be assessed. The landside components include:

- Aircraft Hangars
- Aircraft Parking Apron
- Auto Parking and Access
- General Aviation Terminal Building Services
- Commercial Passenger Terminal Building Services

AIRCRAFT HANGARS

Owning an aircraft represents a significant financial investment. Most aircraft owners prefer to store their aircraft in an enclosed hangar space as opposed to utilizing outside aircraft tie-down positions. Enclosed hangar space provides protection from the elements and an increased level of security. In the Midwest, where weather conditions and temperatures can swing to extremes, most aircraft owners prefer enclosed hangar space. For planning purposes at Topeka Regional Airport, hangar space will be planned for all based aircraft.

There are three general types of aircraft storage hangars: T-hangars, box hangars, and conventional hangars. T-hangars are similar in size and will typically house a single engine piston-powered aircraft. Some multi-engine aircraft owners may elect to utilize these facilities as well. There are typically many T-hangar units "nested" within a single structure. Box hangars are larger open space hangars typically used to store somewhat larger personal/business aircraft and/or to house aviation businesses. Conventional hangars are the familiar large hangars with open floor plans that can store several aircraft.

There are no T-hangars at the Airport; instead the MTAA makes T-hangars available at Philip Billard Municipal Airport. The remaining hangars at the Airport are the larger conventional hangars. As noted in Chapter One – Inventory, it is estimated there is approximately 176,500 square feet of aircraft storage hangar space. For future hangar space requirements, a planning standard of 2,500 square feet per based aircraft is applied.

The existing hangars at the Airport meet the long term forecast need.

Table 3J presents aircraft storage needs based on the demand forecasts. Future needs indicate a long term need for 60,000 square feet to accommodate based aircraft. Therefore, the existing hangars at the Airport meet the long term forecast need. Additional hangars may be needed based on individual user

needs, such as an FBO that gets a high percent of transient operations that may require overnight storage.

TABLE 3J
General Aviation Requirements
Topeka Regional Airport

	Currently Supply	Short Term	Intermediate Term	Long Term
Based Aircraft	18	19	20	24
Hangar Positions	66	19	20	24
Hangar Area (sf)	176,500	48,000	50,000	60,000
Maintenance/Office Hangar Area (sf)	22,700	7,200	7,500	9,000
Total Hangar Area (sf)	199,200	55,200	57,500	69,000
GA Terminal Building (sf)	10,000	2,400	2,500	2,900
GA Vehicle Parking Spaces		55	58	69
GA Itinerant Apron Area (sy)		38,600	39,000	40,000
GA Local Apron Area (sy)		3,500	3,500	3,500
GA Total Apron (sy)	299,000	42,100	42,500	43,500

Source: Coffman Associates analysis

Hangar requirements are general in nature and are based on standard hangar size estimates and typical user preferences. If a private developer desires to construct or lease a large hangar to house one plane, any extra space in that hangar may not be available for other aircraft. The actual hangar area needs will be dependent on the usage within each hangar.

An estimate has been made for maintenance/office hangar space. Some hangars may be dedicated for an airport business and, therefore, are not used to store any aircraft. Portions of most conventional hangars have dedicated office space which is not counted in the aircraft storage capacity calculation. For planning purposes, it is estimated that 15 percent of the hangar space is needed for maintenance/office space uses.

GENERAL AVIATION AIRCRAFT APRON

Topeka Regional Airport has large expanses of aircraft apron area remaining from the Airport initial development as an Air Force Base. The main terminal area is approximately 60,000 square yards of pavement. The apron to the north is approximately 135,000 square yards. The Apron to the south is approximately 89,000 square yards and the apron adjacent to Taxiway E is approximately 15,000 square yards in size. In total, there is approximately 299,000 square yards of active pavement available. Due to the cost to maintain such large apron areas, a 218,000 square yard apron area north of the ATCT has been closed.

FAA AC 150/5300-13A, *Airport Design*, suggests a methodology by which transient apron requirements can be determined from knowledge of busy-day operations. At the Airport, the number of itinerant

spaces required is estimated at 25 percent of the busy-day itinerant general aviation/other air taxi operations.

A planning criterion of 800 square yards per aircraft was applied to determine current and future transient apron area requirements. This figure is estimated for an average aircraft space requirement and includes circulation apron. By the long term planning period, there is a need for 40,000 square yards of apron dedicated to itinerant aircraft parking.

Local tie-down positions are assumed to be utilized by owners of small single engine aircraft and, therefore, a planning criterion of 350 square yards per aircraft is utilized. While all based aircraft are planned to be stored in a hangar, periodically some will tie-down and additional spaces should be reserved in case of an influx. Therefore, future local tie-down apron needs are estimated at 10 aircraft and 3,500 square yards through the long term planning period.

The existing general aviation apron at the Airport is adequate through the long term planning period.

In total, there is a long term need for 43,000 square yards of aircraft apron area to accommodate itinerant and local aircraft parking needs. The existing terminal apron, encompassing approximately 60,000 square yards, is capable of accommodating this need. Thus, the existing general aviation apron at the Airport is adequate through the long term planning period. **Table 3J** summarizes the aircraft apron needs at the airport.

Airport management should prioritize the airport aprons because it will be difficult to justify FAA funding for all the apron areas; therefore, there may be a need to close other portions of the aprons. When prioritizing apron pavement, a taxilane should be made available to all active hangars. A suggested pavement priority index for the Airport will be presented in the Alternatives chapter.

GENERAL AVIATION TERMINAL SERVICES

Typically, certain services will be made available to general aviation users. This may include a pilot's lounge, flight planning station, line services, conference room, and restrooms. These facilities may be provided by a dedicated facility or shared with FBO facilities. At the Airport, the FBO leases space in the passenger terminal building in order to provide these services. It is estimated that at least 10,000 square feet of space is available for general aviation terminal needs.

Current general aviation terminal space requirements are met through the long term planning horizon.

General aviation terminal needs are a function of the average number of general aviation passengers that may use the facilities during the design hour. Assuming two people per design hour itinerant operations, it is estimated that there is a need to accommodate up to 20 people at any one time. Calculating 120 square feet of space per person results in the general aviation terminal building space requirements as shown in **Table 3J**. Current general aviation terminal space

requirements are met through the long term planning horizon. Ultimately, the FBO operator will determine their own business need for additional office/general aviation terminal space.

GENERAL AVIATION VEHICLE ACCESS AND PARKING

General aviation parking needs are attributable to transient airport users (visitors and employees), locally based users, and aviation businesses. Locally based users primarily include those attending to their based aircraft. Airport businesses need parking to accommodate employees and customers. (Airport business parking needs should be based on the needs of the individual business and are not specifically included in this discussion.)

A planning standard ratio of one vehicle parking space per 1,000 square feet of hangar space is utilized to determine parking needs. This airport has a large surplus of available parking. In fact, portions of the terminal building parking lot have been closed.

PASSENGER TERMINAL BUILDING

The 44,000-square-foot passenger terminal building was constructed in 1985. It has served the Airport well during those times when there was scheduled passenger service. Currently, it is used to process charter passengers and general aviation activity.

The layout of the building conforms to traditional terminal facility design standards. Passengers enter the south side of the building and encounter the ticketing counters first. Then they can utilize the public lobby or proceed to the gate area. A small restaurant is available. Deplaning passengers flow to the central lobby area and the baggage claim display. From there, rental car counters are available and the exit is adjacent.

A return of scheduled passenger service is always a possibility and the terminal building is capable of accommodating that demand. In the interim, the building can continue to accommodate charter passengers and general aviation users.

The Airport is forecast to continue to experience ongoing passenger enplanements which will require terminal building services. **Table 3K** presents the terminal building analysis based on the enplanement forecast for the short and long term planning periods. In addition, a high-range enplanement forecast is also studied for terminal building adequacy.

The terminal building area analysis is based on guidance provided in FAA AC 150/5360-13, *Planning and Design guidelines for Airport Terminal Facilities*. In addition, the Airport Cooperative Research Program (ACRP), Report 25, *Airport Passenger Terminal Planning and Design, Volume 1: Guidebook* was also consulted.

TABLE 3K
Passenger Terminal Building Requirements
Topeka Regional Airport

	Short Term	Long Term	High Range
Annual Enplanements	3,506	3,581	85,000
Peak Hour Enplanements	150	170	190
Ticketing/Check-In			
Ticketing Queue	1,675	1,898	2,122
Counter Area	670	759	849
Airline Ops/Makeup	2,500	2,700	3,900
Gate Facilities			
Secure Holdroom	3,300	3,740	4,180
Baggage Claim			
Claim Floor Area	900	1,020	1,140
Claim Lobby	4,504	5,615	6,847
Rental Car Counters			
Rental Queue	315	333	351
Counter/Office Area	1,050	1,110	1,170
Concessions			
Food and Beverage	3,100	3,542	3,990
Retail	475	567	665
Public Waiting Lobby			
Public Lobby	1,300	1,502	1,710
Greeting Lobby	360	510	684
Security Checkpoint	1,200	1,360	1,520
Restrooms	777	908	1,047
Administration	1,035	1,036	1,850
SUBTOTAL	**23,161**	**26,601**	**32,025**
Circulation Areas	4,632	5,320	6,405
HVAC Reserve	2,779	3,192	3,843
Gross Terminal Building Space	**30,572**	**35,113**	**42,274**

All figures in square feet

Source: Coffman Associates analysis referencing FAA AC 150/5360-13, Planning and Design Guidelines for Airport Terminal Facilities.

The terminal building elements are primarily a function of peak hour enplanements and aircraft seating capacity assumptions. For this analysis, an aircraft with a seating capacity of 150 passengers, such as an MD-83 that might be utilized by Allegiant Air, was assumed in the short term. In the long term, the possibility of 170 enplanements in the peak hour was assumed. In the high-range, a peak hour enplanement level of 190 passengers was assumed. Certain elements, such as the public lobby, consider additional visitors who may be picking up or dropping off passengers.

The current terminal building size is adequate to accommodate even the high-range enplanement scenario.

The results of the analysis show that the current terminal building size is adequate to accommodate even the high-range enplanement scenario. No additional terminal building space is recommended for this planning effort. As passenger needs change and usage times fluctuate, certain elements of the building may need to be reconfigured. Airport staff should monitor any needed changes.

LANDSIDE SUMMARY

The Airport has available adequate landside facilities and services. Hangar space for both based and itinerant aircraft storage is adequate through the planning period. One concern may be the age and condition of certain hangars. The Airport should be diligent in maintaining these revenue-producing facilities.

As a former military airfield, the Airport has large expanses of aircraft apron area. Apron area analysis indicates that the Airport needs approximately 43,000 square yards of apron area to accommodate current and forecast demand. With a total civilian apron area nearly 300,000 square yards of apron space, the Airport should prioritize the maintenance of the aprons.

The Airport has an adequate level of general aviation facilities, including a dedicated line service building and leased space in the terminal building. Vehicle parking and access is also adequate and should be maintained through the long term planning period.

An analysis of the size of the passenger terminal building was also undertaken. It was shown that the terminal building is the correct size to accommodate a significant level of growth in passengers should that service return. Until such time, the Airport should maintain the building to such a degree that makes financial sense. To that end, the Airport leases space to the FBO and it may be able to lease additional space.

Those landside facilities necessary to meet current and future demand should be to maintain a high standard. To this end, the Airport should prioritize ongoing maintenance needs and consider mothballing certain elements that may not be needed, such as portions of the apron areas. In the Alternatives chapter, a suggested maintenance priority list will be developed for consideration.

Exhibit 3F presents a summary of the landside requirements, as well as the support requirements that are discussed in the next section.

AIRPORT SUPPORT REQUIREMENTS

Various facilities that do not logically fall within classifications of airside or landside facilities have also been identified. These other areas provide certain support functions related to the overall operation of the airport.

	AVAILABLE	SHORT TERM	INTERMEDIATE TERM	LONG TERM
Based Aircraft (Civilian)	**18**	**19**	**20**	**24**
Hangar Positions				
Conventional Hangar Positions	66	19	20	24
Hangar Area				
Conventional Hangar (s.f.)	176,500	48,000	50,000	60,000
Maintenance Area (s.f.)	22,700	7,200	7,500	9,000
Total Hangar Area (s..f)	199,200	55,200	57,500	69,000
Aircraft Parking Apron				
GA Itinerant Apron Area (s.y.)		38,600	39,000	40,000
GA Local Apron Area (s.y.)		3,500	3,500	3,500
GA Total Apron (s.y.)	299,000	42,100	42,500	43,500
Auto Parking				
Total Spaces	300+	55	58	69
GA Terminal Building				
Area (s.f.)	10,000	2,400	2,500	2,900
Commercial Terminal Building				
Area (s.f.)	44,000	30,700	35,200	42,300
Aircraft Rescue and Firefighting				
Index	Index A	Maintain	Maintain	Maintain
Snow Removal Equipment				
Equipment	Maintain Existing Equipment	Maintain and Replace Older Equipment	Maintain and Replace Older Equipment	Maintain and Replace Older Equipment
Building	Hangar	Maintain	New Dedicated Structure	Maintain
Fuel Storage				
Storage Type	Older Below-Gound Fuel Farm	Maintain	New Above-Ground Fuel Farm	Maintain
Jet A Capacity (Static Tanks)	100,000 (gal.)	Maintain	200,000 (gal.)	Maintain
Jet A Capacity (Trucks)	25,000 (gal.)	Maintain	Maintain	Maintain
AvGas Capacity (Truck)	750 (gal.)	Maintain	Maintain	Maintain
Perimeter Fencing				
Linear Feet	52,000	Maintain and Replace As Needed	Maintain and Replace As Needed	Maintain and Replace As Needed



AIRCRAFT RESCUE AND FIREFIGHTING (ARFF) FACILITIES

Part 139 commercial service airports are required to provide Aircraft Rescue and Firefighting (ARFF) services during air carrier operations. While there is not currently scheduled commercial passenger service, the Airport maintains its operating certificate.

Each certificated airport is required to maintain equipment and personnel based on an ARFF Index established according to the length of aircraft and scheduled daily flight frequency. There are five indices, A through E, with A applicable to the smallest aircraft and E, the largest aircraft. The Airport falls within ARFF Index A currently. **Table 3L** presents the vehicle requirements and agent capacities for each index level.

TABLE 3L
ARFF Index Requirements

Index	Aircraft Length	Requirements
Index A	<90'	1. One ARFF vehicle with 500 lbs. of sodium-based dry chemical, or
		2. One vehicle with 450 lbs. of potassium-based dry chemical and 100 lbs. of water and AFFF for simultaneous water and foam application
Index B	90'-126'	1. One vehicle with 500 lbs. of sodium-based dry chemical and 1,500 gallons of water and AFFF, or
		2. Two vehicles, one with the requirements for Index A and the other with enough water and AFFF for a total quantity of 1,500 gallons
Index C	126'-159'	1. Three vehicles, one having Index A, and two with enough water and AFFF for all three vehicles to combine for at least 3,000 gallons of agent, or
		2. Two vehicles, one with Index B and one with enough water and AFFF for both vehicles to total 3,000 gallons
Index D	159'-200'	1. One vehicle carrying agents required for Index A, and
		2. Two vehicles carrying enough water and AFFF for a total quantity by the three vehicles of at least 4,000 gallons
Index E	>200'	1. One vehicle with Index A, and
		2. Two vehicles with enough water and AFFF for a total quantity of the three vehicles of 6,000 gallons

AFFF: Aqueous Film-Forming Foam
ARFF: Aircraft Rescue and Firefighting
Source: 14 CFR Part 139

As noted previously in Table 1G, the Airport has two ARFF crash trucks. The Airport can readily accommodate the requirements of ARFF Index B if that were to become necessary. Currently, no additional ARFF equipment is required.

MAINTENANCE AND SNOW REMOVAL EQUIPMENT

The Airport is located in an area where snow and ice conditions occur on an infrequent basis with an annual average of approximately 11 inches. The FAA Advisory Circular (AC) 5200-30A, *Airport Winter*

Safety and Operations, provides general guidance for snow clearance for commercial service airports. According to the AC, "commercial service airports should have sufficient equipment to clear one inch of snow weighing up to 25 pounds per cubic foot from the primary instrument runway, one or two principal taxiways to the ramp area, emergency or firefighter access roads, and sufficient ramp area to accommodate anticipated aircraft operations." The time that one inch of snow should be cleared is based on the number of annual operations for an airport. For airports with between 10,000 and 40,000 annual operations, the clearance time requirement is one hour. Airport staff is able to meet this requirement with the existing staff and equipment.

The current equipment inventory, previously presented on Exhibit 1S, is adequate for the Airport. Equipment should be replaced on a regular schedule.

The Airport does not have a dedicated SRE building. Instead, this equipment is stored in multiple buildings, including a hangar (building number 603) that is not currently used for aviation purposes. Consideration will be given to a location for a dedicated SRE building.

Consideration will be given to a location for a dedicated snow removal equipment building.

FUEL STORAGE

As discussed in Chapter One – Inventory, the FBO provides fuel sales at the Airport. They utilize two of the eight 50,000-gallon Jet A storage tanks located east of the control tower. They have three Jet A trucks with a total capacity of 25,000 gallons and an AvGas truck with a 750-gallon capacity.

Additional fuel storage capacity should be planned when the Airport is unable to maintain an adequate supply and reserve. While the fuel retailer determines their own desired reserve, a 14-day reserve is common. When additional capacity is needed, it should be planned in 10,000- to 12,000-gallon increments, which can accommodate common fuel tanker trucks that typically have an 8,000-gallon capacity. Fuel storage requirements can vary based upon individual supplier and distributor policies. For this reason, fuel storage requirements will be dependent upon the individual distributors.

Over last six years, annual fuel sales have averaged 1.9 million gallons of Jet A fuel and 16,000 gallons of AvGas. Projections of future fuel sales are shown in **Table 3M** and are based on the forecast growth in operations at the Airport.

The FBO has indicated a desire to have a total of 200,000 gallons of Jet A fuel storage capacity and to upgrade or replace the tanks with a more modern fuel farm that will reduce the potential buildup of sediment in the tanks. As noted in Chapter One, the FBO and Airport have already made an investment in the existing Jet A tanks in order to meet current safety standards.

TABLE 3M
Fuel Storage Requirements (gallons)
Topeka Regional Airport

	Current Capacity	Baseline Consumption*	Planning Horizon		
			Short Term	Intermediate Term	Long Term
Jet A Requirements	125,000				
Annual Usage (gal.)		1,900,000	1,930,000	1,960,000	2,021,000
Daily Usage (gal.)		5,205	5,288	5,370	5,537
14-Day Storage (gal.)		72,877	74,027	75,178	77,518
Avgas Requirements	750				
Annual Usage (gal.)		16,000	16,250	16,503	17,022
Daily Usage (gal.)		44	45	45	47
14-Day Storage (gal.)		614	623	633	653

*Reflects a six year average of fuel delivered to storage tanks and trucks.
Projected growth based on operations growth forecast.
Source: Airport fuel sales records; Coffman Associates analysis

As part of this Master Plan study, an analysis will be undertaken to identify an appropriate location for a modern above-ground fuel farm. Funding of a replacement fuel farm will be discussed in detail in later chapters but as a general rule, revenue-producing facilities, such as a fuel farm, are not eligible for FAA grant funding. If a new fuel farm is to be built, it will have to be funded by the Airport or by a private developer.

An analysis will be undertaken to identify a location for a modern above-ground fuel farm.

PERIMETER FENCING

Perimeter fencing is used at airports primarily to secure the aircraft operational area. The physical barrier of perimeter fencing has the following functions:

- Gives notice of the legal boundary of the outermost limits of a facility or security-sensitive area.
- Assists in controlling and screening authorized entries into a secured area by deterring entry elsewhere along the boundary.
- Supports surveillance, detection, assessment, and other security functions by providing a zone for installing intrusion-detection equipment and closed-circuit television (CCTV).
- Deters casual intruders from penetrating a secured area by presenting a barrier that requires an overt action to enter.
- Demonstrates the intent of an intruder by their overt action of gaining entry.
- Causes a delay to obtain access to a facility, thereby increasing the possibility of detection.
- Creates a psychological deterrent.
- Optimizes the use of security personnel while enhancing the capabilities for detection and apprehension of unauthorized individuals.

- Demonstrates a corporate concern for facility security.
- Limits inadvertent access to the aircraft operations area by wildlife.

The Airport is served by perimeter fencing that meets standards for Part 139 airports. The fencing serves to provide both operational security, as well as a deterrent to wildlife accessing the airfield movement areas. The current Airport Capital Improvement Program includes a line item for perimeter fencing improvement. This project will be carried over to the CIP of this Master Plan.

SUMMARY

This chapter has outlined the facilities required to meet potential aviation demands projected for the Airport for the next 20 years. The next chapter, Chapter Four - Alternatives, examines potential improvements to the airfield system and the landside area. Most of the discussion focuses on those capital improvements that would be eligible for federal grant funds. Other projects of local concern are also presented on a limited basis. Several facility layouts that meet the forecast demands over the next 20 years are presented and an overall ALP that presents a long term vision will ultimately be developed.

Topeka Regional Airport

CHAPTER FOUR
Alternatives







CHAPTER FOUR
Alternatives

In the previous chapter, airside and landside facilities required to satisfy aviation demand through the long range planning period were identified. In addiı on, the various FAA design standards were discussed as well as preferred taxiway geometries. The next step in the planning process is to evaluate reasonable ways these faciliı es can be provided and the design standards can be met. There can be numerous combinaı ons of design alternaı ves, but the alternaı ves presented here are those with the perceived greatest potenı al for implementaı on.

Any development proposed for a master plan is evolved from an analysis of projected needs for a set period of ı me. Though the needs were determined by uı lizing industry-accepted staı sı cal methodologies, unforeseen future events could impact the ı ming of the needs identified. The master planning process aı empts to develop a viable concept for meeı ng the needs caused by projected demands for the next 20 years. However, no plan of acı on should be developed which may be inconsistent with the future goals and objecı ves of the Metropolitan Topeka Airport Authority and the ciı zens of Topeka, who have a vested interest in the development and operaı on of the airport.

The development alternaı ves for Topeka Regional Airport can be categorized into two funcı onal areas: the **airside** (runways, navigaı onal aids, taxiways, etc.) and **landside** (hangars, apron, and terminal area). Within each of these areas, specific capabiliı es and faciliı es is required or desired. In addiı on, the uı lizaı on of airport property to provide revenue support for the airport and to benefit the economic development and well-being of the region must be considered.







Each functional area interrelates and affects the development potential of the others. Therefore, all areas are examined individually and then coordinated as a whole to ensure the final plan is functional, efficient, and cost-effective. The total impact of all these factors on the existing airport must be evaluated to determine if the investment in Topeka Regional Airport will meet the needs of the community, both during and beyond the 20-year planning period.

The alternatives considered are compared using environmental, economic, and aviation factors to determine which of the alternatives will best fulfill the local aviation needs. With this information, as well as input from various airport stakeholders, a final airport concept can evolve into a realistic development plan.

NON-DEVELOPMENT ALTERNATIVES

Prior to the presentation of development alternatives for Topeka Regional Airport, there are several non-development options that should be considered. Non-development alternatives include a "no-build" alternative, development of a new replacement airport at a new location, or closure of the existing airport and the transfer of services to another existing airport.

There are two airports serving the aviation needs of the citizens of Topeka and the surrounding region: Topeka Regional Airport and Philip Billard Municipal Airport. The airports are approximately ten driving miles apart. There is limited crossover of services provided by the two airports as Topeka Regional Airport is designed for commercial service, corporate business, and military activity, while Philip Billard Municipal Airport caters to smaller general aviation activity.

Philip Billard Municipal Airport serves the needs of the general aviation community. It has a fixed base operator and a dedicated aircraft maintenance business, as well as several other aviation and non-aviation businesses. The airport also supports Kansas Highway Patrol (KHP) operations, which includes operations of state-owned aircraft, with one utilized by the governor, and facilities. Philip Billard Municipal Airport is also closer to the central business district and the capital.

Topeka Regional Airport serves a larger component of the aviation industry and it has a significant role to play in national defense. Military service members from nearby Fort Riley use the airfield as a departure and arrival point for deployments. The 190th Air Refueling Wing of the Kansas Air National Guard bases 12 KC-135 aircraft at the airport and conducts daily training at the airport. Topeka Regional Airport shares access to the airfield with the Army National Guard and the Kansas Air National Guard.

Topeka Regional Airport is currently classified as a "Regional" general aviation airport in the *National Plan of Integrated Airport Systems* (NPIAS). It is forecast to return to a commercial service classification within the next five years. It is classified as a commercial service airport in the 2009 Kansas Airport System Plan (KASP).

The airports are independent economic engines for the Topeka region. The 2010 *Kansas Aviation Economic Impact Study* showed that both airports have a significant impact on the local economy. At the time, Philip Billard Municipal Airport was responsible for 199 jobs, $6.8 million in total payroll, and $14.3

million in total output. Topeka Regional Airport was responsible for 1,303 jobs, $54.1 million in total payroll, and $100 million in total output. In addition, the 190th Air Refueling Wing estimated that their community-wide economic impact in fiscal year 2015 was in excess of $119 million.

Both airports have benefited from various development grants over the years. Development grants come with certain grant assurances that the airport sponsor must meet to be in compliance with the award of the grant. One of the grant assurances is for the sponsor to maintain the improvement for its useful life, typically 20 years. Acceptance of development grants also obligates the airport sponsor to maintain the airport as an airport.

The following is a discussion of the three primary non-development alternatives and the impact of pursuing each.

NO-BUILD ALTERNATIVE

There is significant public and private investment at the Airport. Pursuit of a non-development alternative would slowly devalue these investments, lead to infrastructure deterioration, and potentially the loss of significant levels of federal funding for airport improvements. Ultimately, the safety of aircraft, pilots, and persons on the ground could be jeopardized. In addition, the Airport could begin to lose tenants and therefore revenue, including both Guard units. Therefore, the no-build alternative is not considered further.

RELOCATE AIRPORT ALTERNATIVE

This option considers constructing a new airport to replace the existing Topeka Regional Airport. Typically, this option may be considered if the existing airport has been encroached upon by surrounding incompatible land uses to such a degree that safety has been compromised. This is not the situation for Topeka Regional Airport. In addition, there is already a second airport in the region; therefore, replacing Topeka Regional Airport with a newly constructed airport is not reasonable. Constructing a replacement airport will not be considered further.

TRANSFER SERVICE TO ANOTHER AIRPORT ALTERNATIVE

Under this scenario, Topeka Regional Airport would be closed and all activity would be transferred to other airports. Without consideration of the consequences, obligations, or costs of closure, at the very least Philip Billard Municipal Airport would be unable to absorb the military, charter, or a large portion of the business jet activity currently utilizing Topeka Regional Airport.

The Metropolitan Topeka Airport Authority (MTAA) is the governing body in charge of operating and managing Topeka Regional Airport. As the airport sponsor, they would have to initiate and lead any effort to close the Airport. From an economic standpoint, the MTAA would have to refund to the FAA the prorated portion of any federal dollars invested at the Airport. The other option is to choose not to

request or accept any further federal grants and wait for current grant obligations to expire. Any land deeded from or acquired with Federal assistance would revert back to the Federal government.

MTAA would have to also develop a plan to accommodate existing tenants and lease holders (other than the military). This could be accomplished by buying out the remaining lease terms or allowing existing leases to expire. Any improvements made to existing hangars would also have to be reimbursed to the tenant. The Airport Authority would have to pay for the relocation of aircraft and other private property, and there are additional costs associated with the relocation of existing businesses.

In addition, MTAA would lose the investment they have made through the years to maintain and improve the Airport. In short, it would be very time-consuming and costly to close Topeka Regional Airport.

Closure of Topeka Regional Airport should only be considered under certain circumstances. One would be if the Airport is operating at a deficit to such a degree that the long term cost of closure would significantly outweigh the cost of maintaining the Airport. The other possibility would be if political pressure were brought to bear to force consideration of transferring services.

NON-DEVELOPMENT SUMMARY

Topeka Regional Airport plays a critical role in the economic development of the region and an important role in the continuity of the national aviation network. Pursuing a no-build alternative would directly lead to a deterioration of airport facilities, including the runways and taxiways. Ultimately, safety could be compromised.

Construction of a replacement airport is not necessary as the Airport is able to serve its defined role in the aviation system currently (that of regional general aviation with the potential to transition to commercial service). Since there is already another airport in the area, Philip Billard Municipal Airport, construction of a replacement airport does not address any perceived duplication of service that may exist today.

Closure of Topeka Regional Airport and transferring activity to another airport is not considered feasible primarily due to legal obligations and the substantial costs associated with closure. Federal grant assurances necessitate that the Airport remain in operation until grant assurances expire. Even if MTAA were to wait for the expiration of grant assurances, the cost to relocate the current tenants would be substantial.

Pursuit of non-development policies would ultimately negatively impact current and future tenants including the guard units. Therefore, it is recommended that MTAA continue to maintain the two-airport system to serve the aviation and economic development needs of the greater Topeka region. No further consideration will be given to the non-development alternatives.

AIRPORT DEVELOPMENT OBJECTIVES

It is the goal of this effort to produce a development plan to best serve forecast aviation demands and to meet FAA design standards to the greatest degree possible. However, before defining and evaluating specific alternatives, several airport development objectives should be considered. As owner and operator, the Metropolitan Topeka Airport Authority provides the overall guidance for the operation and development of the airport. It is of primary concern that the Airport is marketed, developed, and operated for the betterment of the community and its users. With this in mind, the following development objectives have been defined for this planning effort:

- To preserve and protect public and private investments in existing airport facilities.
- To develop a safe, attractive, and efficient aviation facility in accordance with applicable federal, state, and local regulations.
- To develop a facility that is responsive to the current and long term needs of all Airport users, including the military.
- To be reflective and supportive of the long term planning efforts currently applicable to the region.
- To develop a facility with a focus on self-sufficiency in both operational and developmental cost recovery.
- To ensure that future development is environmentally compatible.

REVIEW OF THE PREVIOUS AIRPORT PLAN

The last master plan was completed in 2003. A variety of projects were identified as part of that master plan. The following summarizes those projects.

- Acquisition of RPZ lands: 1) Runway 13 (10.3 acres); 2) Runway 31 (22.3 acres); and Runway 21 (14.0 acres).
- Acquire and/or relocate structures in Runway 13 RPZ.
- Rehabilitate all existing taxiways.
- Replace Runway 13-31 lighting (Part of current project)
- Slurry seal/crack seal/mark general aviation and commercial service aprons (Completed)
- Replace ARFF vehicle (Completed).
- Slurry seal/mark Runway 3-21 (Completed).
- Construct and light parallel taxiway to Runway 3-21.
- Expand general aviation terminal building (1,030 sf).
- Expand general aviation auto parking (12,400 sf/68 total parking spaces).
- Construct two 16,000 sf corporate hangars.
- Install 25,000 gallon AvGas storage tank.

- Overlay/mark Runway 13-31 (Project since converted to reconstruction).
- Overlay south general aviation terminal apron (14,700 sy) (Completed).
- Slurry seal remaining south general aviation apron (104,700 sy).
- Slurry seal/crack seal north civilian apron (671,000 sy)

The Airport Layout Plan for the Airport, which is largely based on the previous master plan, has been updated with minor changes over the years. **Exhibit 4A** presents the Airport Layout Plan as of June 2015 as a point of reference. The analysis to follow in this alternatives chapter will revisit the recommendations presented in the previous master plan. Some elements may be carried over to this master plan and others may be removed from future consideration.

AIRSIDE PLANNING CONSIDERATIONS

Generally, airside issues relate to those airport elements that contribute to the safe and efficient transition of aircraft and passengers from air transportation to the landside facilities at an airport. This includes consideration of the established design standard for an airport, the instrument approach capability, the capacity of the airfield, the length and strength of the runways, and the layout of the taxiways. Each of these elements was introduced in previous chapters. This chapter will examine airside issues specific to the Airport which will then be applied to several development alternatives. **Exhibit 4B** presents a summary of the major airside and landside considerations.

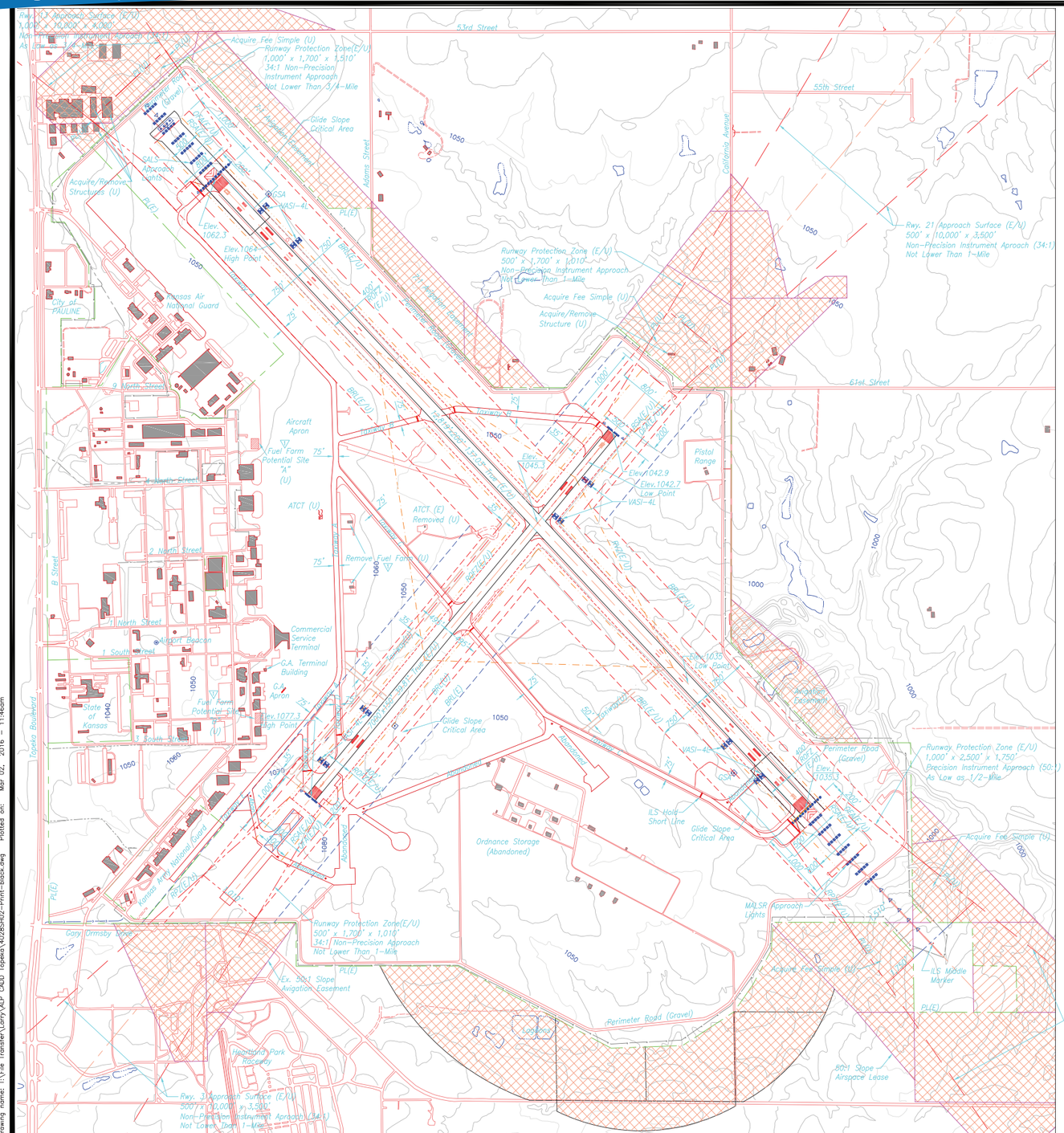
Not all airside or landside elements will require a detailed alternatives analysis. The alternatives analysis is reserved for presenting viable solutions to specific problems or challenges. For those airside or landside elements where only one solution is reasonable or where no alternative is necessary, an explanatory narrative is provided.

RUNWAY 13-31

Runway 13-31 is currently 12,803 feet long and 200 feet wide. The Airport and the National Guard are currently planning to reconstruct the runway under a cost sharing plan. When the runway reconstruction is complete, it will be 12,803 feet long and 150 feet wide, and the entirety will be strength-rated to accommodate the needs of the National Guard (which is stronger than the civilian needs). Assuming that the reconstruction project will move forward as planned, the runway dimensions are not planned to change based upon the finding in this Master Plan.

Runway 13-31 Alternative 1

The taxiways primarily associated with Runway 13-31 (Taxiways B and C) currently have non-standard geometries. Taxiway C is not a true parallel taxiway in that it is not parallel to the runway, and it crosses Runway 3-21 in the “high-energy” area.

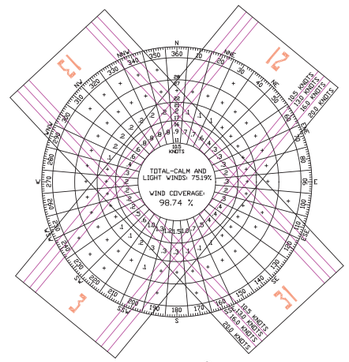


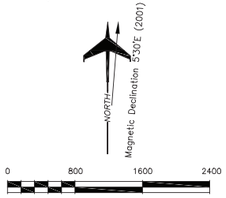
Drawing name: T:\The Transfer\Larry\ALP CADD Topeka\4028SH02-Print-block.dwg Plotted on: Mar 02, 2016 - 11:46am

ALL WEATHER WIND ROSE

Runway	Wind Coverage			
	10.5 Knots	13.0 Knots	16.0 Knots	20.0 Knots
13–31	89.64%	94.58%	98.45%	99.63%
3–21	89.49%	94.27%	98.22%	99.34%
Combined 13–31 & 3–21	98.74%	99.73%	99.96%	100.0%

Source: National Oceanic & Atmospheric Administration (NOAA)/ Federal Aviation Administration (FAA); First-Order Wind Observing Station – Topeka, Kansas, 1988 to 1997 (10 year period); 87,501 All-Weather Observations/ 605 IMC Observations.





0 800 1600 2400

SCALE IN FEET

RUNWAY APPROACH END COORDINATES (NAD 83)

RUNWAY	EXISTING		ULTIMATE	
	LATITUDE	LONGITUDE	LATITUDE	LONGITUDE
3	N 38°56'25.37"	W 95°40'22.35"	N 38°56'25.37"	W 95°40'22.35"
21	N 38°57'18.52"	W 95°39'25.62"	N 38°57'18.52"	W 95°39'25.62"
13	N 38°57'56.07"	W 95°40'41.07"	N 38°57'56.07"	W 95°40'41.07"
31	N 38°56'23.34"	W 95°38'50.50"	N 38°56'23.34"	W 95°38'50.50"

RUNWAY END COORDINATES AND BEARINGS REFLECT FAA AIRWAY FACILITY DATA BASE IN NORTH AMERICAN DATUM (NAD) 83

DECLARED DISTANCES

RUNWAY	EXISTING				ULTIMATE			
	TORA	TODA	ASDA	LDA	TORA	TODA	ASDA	LDA
3	7,000'	7,000'	7,000'	7,000'	7,000'	7,000'	7,000'	7,000'
21	7,000'	7,000'	7,000'	7,000'	7,000'	7,000'	7,000'	7,000'
13	12,819'	12,819'	12,819'	12,819'	12,819'	12,819'	12,819'	12,819'
31	12,819'	12,819'	12,819'	12,819'	12,819'	12,819'	12,819'	12,819'

Based on FAA Advisory Circular 150/5300-13, Airport Design, Appendix 14.

General Notes:
1. There are no OFZ object penetrations and no threshold siting surface penetrations.
2. See TERMINAL AREA DRAWING for details and development schedule of terminal area.
3. Elevations and clearances at roads and utility poles located within RPZ are illustrated on the Inner-portion of the Approach Surface Drawings (Sheet 6, 7, 8 & 9)
4. See LAND USE DRAWING for details concerning recommended land use within the airport environs.

AIRPORT DATA

		EXISTING	ULTIMATE
AIRPORT REFERENCE CODE		D–II (CIVILIAN) C–IV (MILITARY)	C–III (CIVILIAN) D–IV (MILITARY)
AIRPORT ELEVATION (AMSL)		1079'	1079'
AIRPORT REFERENCE POINT (ARP) COORDINATES	Latitude	38°57'03.42"	38°57'03.42"
	Longitude	95°39'48.08"	95°39'48.08"
AIRPORT and TERMINAL NAVIGATION AIDS		ILS, NDB, GPS LOC, TACAN, VOR/DME	GPS/ILS VOR/DME
MEAN DAILY MAXIMUM TEMPERATURE of HOTTEST MONTH		89.3° F	89.3° F
AIRPORT ROLE		FAR PART 139 COMMERCIAL SERVICE	FAR PART 139 COMMERCIAL SERVICE
CRITICAL AIRCRAFT		GULFSTREAM G–IV–SP	GULFSTREAM G–V

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
		AIRPORT REFERENCE POINT (ARP)
		ROTATING BEACON
		BUILDING RESTRICTION LINE (BRL)
		CREEK / INTERMITTENT DRAINAGE
		FENCING
		RUNWAY END INDICATOR LIGHTS (REIL)
		RUNWAY THRESHOLD LIGHTS
5 10		GROUND CONTOUR (USGS MAP)
		VERTICAL APPROACH SLOPE INDICATORS (VASI)
		PRECISION APPROACH PATH INDICATOR (PAPI)
		WIND CONE & SEGMENTED CIRCLE
		RUNWAY PROTECTION ZONE (RPZ)
		RUNWAY VISIBILITY ZONE (RVZ)
		RUNWAY OBSTACLE FREE ZONE (ROFZ)
		RUNWAY SAFETY AREA (RSA)
		OBSTACLE FREE ZONE (OFZ)
		TOPEKA CITY LIMITS
		LOCALIZER ANTENNA
		OBJECT FREE AREA (OFA)
		APPROACH LIGHTING SYSTEM
		AUTO PARKING
		ACCESS CONTROL FOR K–4 HIGHWAY
		AREA LINE / BOUNDARY
		PROPERTY PURCHASED WITH FEDERAL FUNDS
		EASEMENTS
		GLIDE SLOPE ANTENNA
COMMERCIAL		EXISTING ZONING
INDUSTRIAL–E	INDUSTRIAL–U	LAND USE BOUNDARY
		AUTOMATED WEATHER OBSERVATION SYSTEM (AWOS)
		BUILDINGS/STRUCTURES
		FUEL FARM POTENTIAL SITE

RUNWAY DATA TABLE

RUNWAY	RUNWAY 13 – 31		RUNWAY 3 – 21	
	EXISTING	ULTIMATE	EXISTING	ULTIMATE
RUNWAY DIMENSIONS	12,819' x 200'	12,819' x 200'	7,000' x 150'	7,000' x 150'
RUNWAY BEARING	137.03	137.03	39.81	39.81
APPROACH CATEGORY/ DESIGN GROUP	D – II	C – III	C – II	C – II
RUNWAY TYPE/MARKINGS	PRECISION	PRECISION	NON–PRECISION	NON–PRECISION
RUNWAY SAFETY AREA	500' x 14,819'	500' x 14,819'	500' x 9,000'	500' x 9,000'
OBJECT FREE AREA	800' x 14,819'	800' x 14,819'	800' x 9,000'	800' x 9,000'
OBSTACLE FREE ZONE	400' x 13,219'	400' x 13,219'	400' x 7,400'	400' x 7,400'
PAVEMENT MATERIAL	PCC/ASPHALT	PCC/ASPHALT	PCC/ASPHALT	PCC/ASPHALT
PAVEMENT STRENGTH (in LBS)	280,000–DTW	220,000–DWG	140,000–DWG	60,000–DWG
RUNWAY LIGHTING	HIRL	HIRL	MIRL	MIRL
TAXIWAY LIGHTING	MITL	MITL	MITL / REFLECTORS	MITL / REFLECTORS
EFFECTIVE RUNWAY GRADIENT	0.2%	0.2%	0.5%	0.5%
NAVIGATIONAL AIDS	ILS(31), NDB TACAN, RNAV VOR/DME LOC, GPS	GPS ILS(31)	VOR/DME TACAN GPS	VOR/DME GPS
VISUAL AIDS	MALSR(31) SALS(13) VASI–4L REIL(13)	MALSR(31) SALS(13) VASI–4L REIL(13)	REIL VASI–4L	REIL VASI–4L
HOLDING POSITION	280'	280'	250'	250'
TAXIWAY WIDTH	75'	75'	75'	35'
RUNWAY END	RWY13	RWY31	RWY13	RWY31	RWY3	RWY21	RWY3	RWY21
RUNWAY APPROACH SURFACE	34:1	50:1	34:1	50:1	34:1	34:1	34:1	34:1
APPROACH VISIBILITY MINIMUMS	¾ MI.	½ MI.	¾ MI.	½ MI.	1 MI.	1 MI.	1 MI.	1 MI.
TOUCHDOWN ZONE ELEV. (TZE)	1065.0	1037.0	1065.0	1037.0	1077.3	1047.4	1077.3	1047.4

Source: BWR, Airport Facility Requirement Summary, December 2000; FAA Advisory Circular 150/5300–13, Change #5, Airport Design, 1997.

MODIFICATION TO AIRPORT DESIGN STANDARDS TABLE

THERE ARE NO MODIFICATIONS OF AIRPORT DESIGN STANDARDS

OBSTACLE FREE ZONE (OFZ) OBJECT PENETRATIONS TABLE

NONE

THRESHOLD SITING SURFACE OBJECT PENETRATIONS TABLE

NONE

SUBMITTED BY: PARSONS BRINCKERHOFF — ON THE DATE OF: 06–09–2015

MTAA METROPOLITAN TOPEKA AIRPORT AUTHORITY
TOPEKA REGIONAL | BILLARD AIRPORT
AIRPORT & BUSINESS CENTER

METROPOLITAN TOPEKA AIRPORT AUTHORITY

ERIC M. JOHNSON, PRESIDENT & DIRECTOR OF AIRPORTS
ON THE DATE OF:

NO.	REVISIONS	BY	CHK'D	DATE
V	FUEL FARM POTENTIAL SITES (U)	JEB	JEB	12–19–08
V	DELETION OF RWY 3–21 SURFACED SHOULDERS & MODS TO APPROACH RSA'S	JEB	JEB	06–09–15

METROPOLITAN TOPEKA AIRPORT AUTHORITY (MTAA)
TOPEKA REGIONAL AIRPORT
AIRPORT LAYOUT DRAWING
TOPEKA, KANSAS

Poe & Associates, Inc.
715 SW Harrison Street
Topeka, Kansas 66603
TEL: 785-267-1414
CONSULTING ENGINEERS

BUCHER, WILLIS & RATLIFF CORPORATION
7920 WARD PARKWAY KANSAS CITY, MISSOURI 64114–2021

DESIGN: J.B.
DRAWN BY: MLM
CHECKED BY: J.B. & M.A.W.
CAD FILE: 4028SH02.DWG
DWG. SCALE: 1"=800'
DATE: 10–01–2002
JOB NO: 98032/4028
SHEET 2 OF 14

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AIRSIDE PLANNING ISSUES

- Airport Reference Code (ARC): Maintain ARC C-III for civilian activity and C-IV for military activity.
- Runway Design Code: Runway 13-31 maintain C-IV; Runway 3-21 maintain C-II.
- Runways: Maintain current length of both runways.
- Taxiway Geometry: Present alternatives to meet FAA's taxiway geometry standards.
- Hot Spots: Present alternatives for mitigation of FAA identified Hot Spots.
- Design Standards: Assure that planned future development is compliant with FAA's airport design standards.
- Navigational Aids: Plan for replacement/upgraded navigational aids as necessary.
- Instrument Capability: Consider improvements as feasible.
- Runway Protection Zones: Present alternatives to meet FAA's RPZ design standards.

LANDSIDE PLANNING ISSUES

- Facility Layout: Maximize Airport property for aviation related development.
- Strategic Property Acquisition: Identify any potential land acquisition needs.
- Future Hangars: Identify location for future hangar construction.
- Aircraft Apron: Identify and prioritize aircraft apron areas.
- Long Term Vision: Provide a long-term facility layout plan that preserves and enhances the economic viability of the Airport.



Exhibit 4C presents the first alternative to address the non-standard taxiway geometries for Runway 13-31. Taxiway C is shown to be replaced with a standard parallel taxiway segment. The parallel taxiway segment extends from an intersection with Taxiway A to the Runway 31 threshold. A connecting taxiway located approximately 3,000 feet from the Runway 31 threshold is also planned.

The existing hold apron at the end of Taxiway C is considered non-standard because it extends beyond the runway end, placing it in the precision obstacle free area. If an aircraft were on this hold apron during a time when the POFZ is in effect (aircraft on approach in instrument conditions), then the aircraft would be a penetration of the POFZ. Following current standards, hold aprons should not extend beyond the lateral edge of the runway. Therefore, a replacement hold apron is planned at the end of Taxiway C.

The planned parallel taxiway is situated 400 feet from the runway centerline to meet design standards. This taxiway will require relocation of the glide-slope antenna serving the approach to Runway 13. As shown on the exhibit, it is planned to be shifted to the northeast side of the runway.

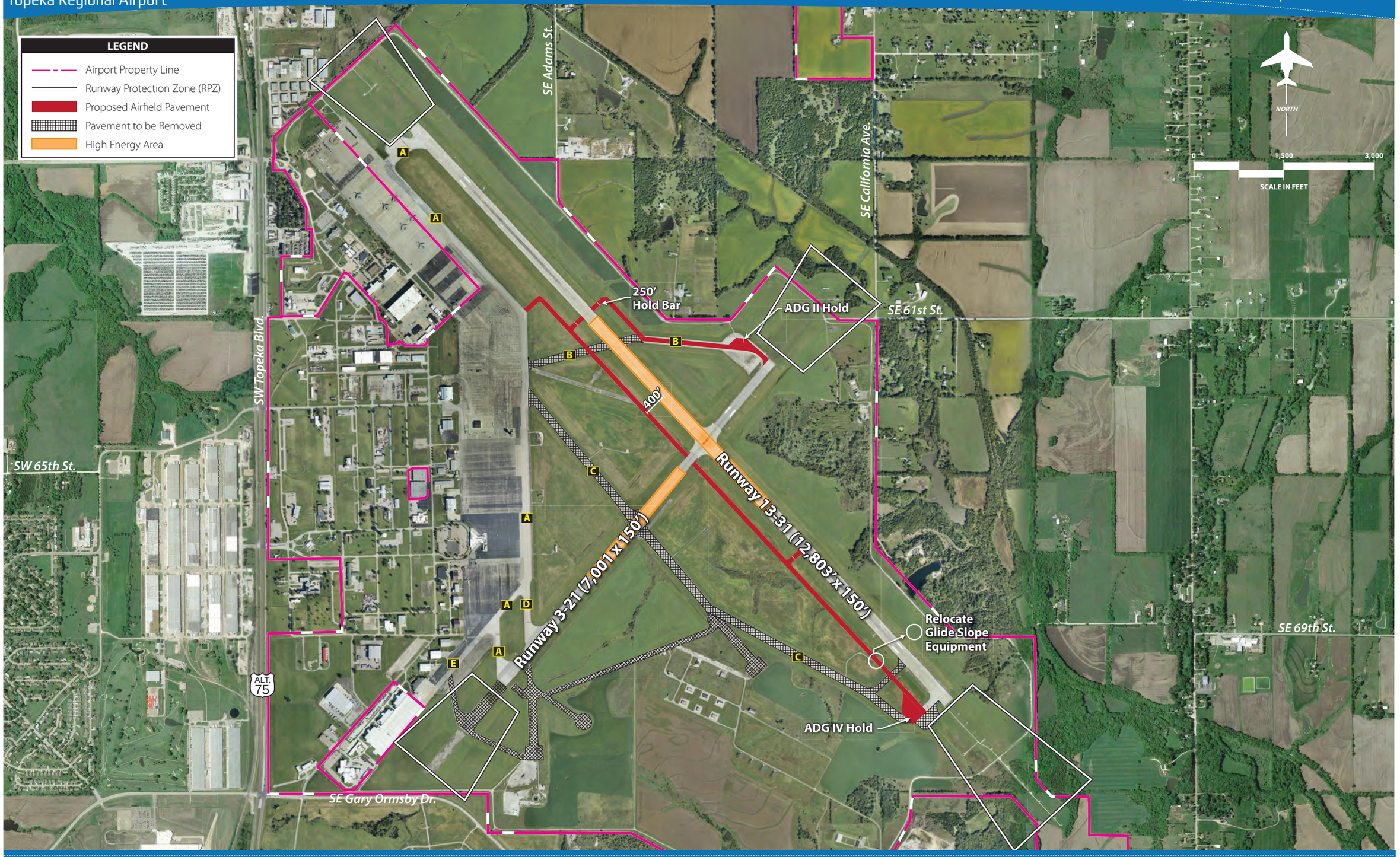
Taxiway B currently crosses Runway 13-31 in the "high-energy" portion of the runway. As discussed in Chapter Three – Facility Requirements, current taxiway design standards discourage crossing taxiways in the "high-energy" (middle third) portion of a runway. To remedy this situation, a new crossing taxiway is planned outside the "high-energy" portion of the runway. A short parallel taxiway segment on the north side of Runway 13-31 then connects back with the existing Taxiway B. At the end of Taxiway B, the aircraft hold apron is planned to be reconstructed and dimensioned to accommodate airplane design group IV.

Runway 13-31 Alternative 2

A second alternative for the taxiways associated with Runway 13-31 is presented on **Exhibit 4D.** Taxiway C is once again planned to be replaced with a parallel segment that more closely meets current design standards. The parallel segment extends directly from Taxiway A and gradually angles back to a separation distance of 400 feet. This option is considered in order to increase ground movement efficiency by eliminating turning movements.

At the south end near the Runway 31 threshold, the planned taxiway shifts away from the runway to a distance of 800 feet in order to avoid the glideslope critical area. A new aircraft hold apron is then planned to ADG IV standards. Two connecting taxiways are planned to extend from the relocated Taxiway C to the runway in order to provide greater runway exit efficiency.

The terrain to the west of Runway 13-31 begins to slope, outside the RSA. At a distance of 400 feet, where the parallel taxiway would be situated, the elevation is approximately 10 feet below the runway centerline. This location also encompasses natural drainage channels. Attention will need to be paid to these issues during design of a parallel taxiway.


LEGEND
Airport Property Line
Runway Protection Zone (RPZ)
Proposed Airfield Pavement
Pavement to be Removed
High Energy Area
NORTH
0
1,500
3,000
SCALE IN FEET
SE Adams St.
SE California Ave.
SE 61st St.
SW Topeka Blvd.
SW 65th St.
SE 69th St.
SE Gary Ormsby Dr.
ALT. 75
250' Hold Bar
ADG II Hold
ADG IV Hold
Relocate Glide Slope Equipment
400'
Runway 13-31 (12,803' x 150')
Runway 3-21 (7,001 x 150')
A
B
C
D
E

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LEGEND

- Airport Property Line
- Runway Protection Zone (RPZ)
- Proposed Airfield Pavement
- Pavement to be Removed
- High Energy Area
- Glide Slope Critical Area
- Taxiway Object Free Area (TOFA)

250′ Hold Bar

Runway 13-31 (12,803′ x 150′)

Runway 3-21 (7,001 x 150′)

Glide Slope Equipment

SE Adams St.

SE California Ave.

SE 61st St.

SE 69th St.

SW Topeka Blvd.

SW 65th St.

SE Gary Ormsby Dr.

ALT. 75

NORTH

0 1,500 3,000

SCALE IN FEET

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Taxiway Exit Location Analysis

Both of the Runway 13-31 alternatives considered adding additional taxiway exits from the runway. One factor to be considered when locating such exits is the potential utilization rate of the exit. FAA AC 150/5300-13A, *Airport Design*, presents a methodology to assess the utilization percentages for taxiway exits based on location. The methodology considers both right-angled and acute-angled exits (which typically have a higher utilization rate for larger aircraft) and presents an approximate percentage of the large aircraft and heavy aircraft fleet that would be capable of utilizing the exit under both wet and dry conditions. The exit distances have been adjusted by seven percent to account for the Airport elevation (1,079 feet). **Table 4A** shows the exit percentages in table format.

TABLE 4A
Optimal Taxiway Exit Locations
Topeka Regional Airport

Distance from Threshold to Exit (No Elevation Adjustment)	Distance from Threshold to Exit (7% Elevation Adjustment at FOE)	Exit Taxiway Cumulative Utilization Percentages					
		Wet Runways		Dry Runways			
		Right & Acute Angled Exits		Right Angled Exit		Acute Angled Exit	
		Large	Heavy	Large	Heavy	Large	Heavy
3,000	3,210	0	0	0	0	0	0
3,500	3,745	0	0	2	0	9	0
4,000	4,280	1	0	8	0	26	3
4,500	4,815	4	0	24	2	51	19
5,000	5,350	12	0	49	9	76	55
5,500	5,885	27	0	75	24	92	81
6,000	6,420	48	10	92	71	98	95
6,500	6,955	71	35	98	90	100	99
7,000	7,490	88	64	100	98	100	100
7,500	8,025	97	84	100	100	100	100
8,000	8,560	100	93	100	100	100	100
8,500	9,095	100	99	100	100	100	100
9,000	9,630	100	100	100	100	100	100

Large Aircraft: 12,500 lbs - 300,000 lbs.
Heavy Aircraft: >300,000lbs.
Source: FAA AC 150/5300-13A, Airport Design (Table 4-21). Elevation adjustment from Coffman Associates analysis.

When planning exit locations, it is optimal to capture approximately 75 percent or more of operations. Under the most common dry runway condition, an exit located 5,885 feet from the threshold will capture 75 percent of large aircraft and 24 percent of heavy aircraft. An exit located 6,420 feet from the landing threshold captures 92 percent of large aircraft and 71 percent of heavy aircraft. An exit located 6,955 feet from the landing threshold captures 98 percent of large aircraft and 92 percent of heavy aircraft. The KC-135 is classified as a heavy aircraft with a maximum landing weight of 300,000 pounds. Therefore, the optimal location for a taxiway exit would be between 6,500 and 7,000 feet from the landing threshold. The taxiway exits considered in the Runway 13-31 alternatives provide for these exits.

RUNWAY 3 -21

Runway 3-21 is 7,001 feet long and 150 feet wide. The applicable runway design code is C-II-4000. As discussed in Chapter Three – Facility Requirements, a crosswind runway is needed at the airport to accommodate aircraft in ARC A/B-I, which is represented by mostly piston-powered aircraft and some smaller turboprops and business jets. The current dimensions of this runway exceed the needs for A/B-I aircraft. Therefore, to maintained the runway at its current dimensions, a funding partnership among the Airport, FAA, and the National Guard, such as the one formulated for Runway 13-31, would be needed for Runway 3-21.

The applicable FAA design standards would limit Airport/FAA funding to that portion of the runway that is justified by civilian operations. Following guidance in FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*, the civilian runway dimensions needed are estimated at 4,400 feet in length and 100 feet in width. Therefore, at the next major reconstruction/rehabilitation, a formal determination should be made to determine participation levels between FAA and the National Guard Bureau.

It should be noted that in 2013, the Airport, FAA, and NGB participated in a project to mill and overlay the full length of Runway 3-21 (except the intersection with Runway 13-31). In addition, a full depth reconstruction on several small portions of the runway was completed in order to relieve pavement heaving. Because of this recent work on Runway 3-21, a major rehabilitation/reconstruction project is not anticipated for at least the next 20 years.

Runway 3 Alternatives

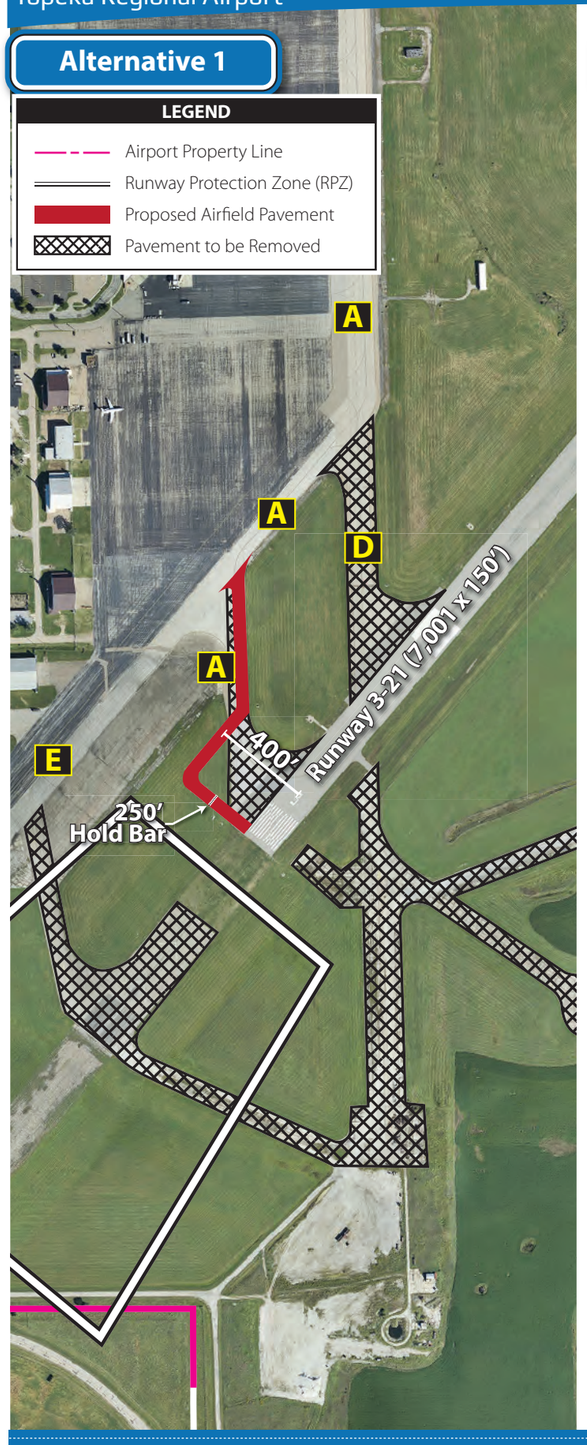
Taxiways A and D leading to Runway 3 do not meet geometry standards. Both are acute angle taxiways leading to a runway, where the preferred geometry is a 90-degree angle. Both are also considered hot spots by the FAA. **Exhibit 4E** presents four different alternatives for redesigning the taxiways in this location.

Option 1: The first option considers closing Taxiway D and altering Taxiway A to be a 90-degree threshold entrance to Runway 3. Closing Taxiway D will eliminate the non-standard angled taxiway leading to the runway. It will also eliminate the possibility of a pilot inadvertently taking Taxiway D when they intended to proceed on Taxiway A to the runway end.

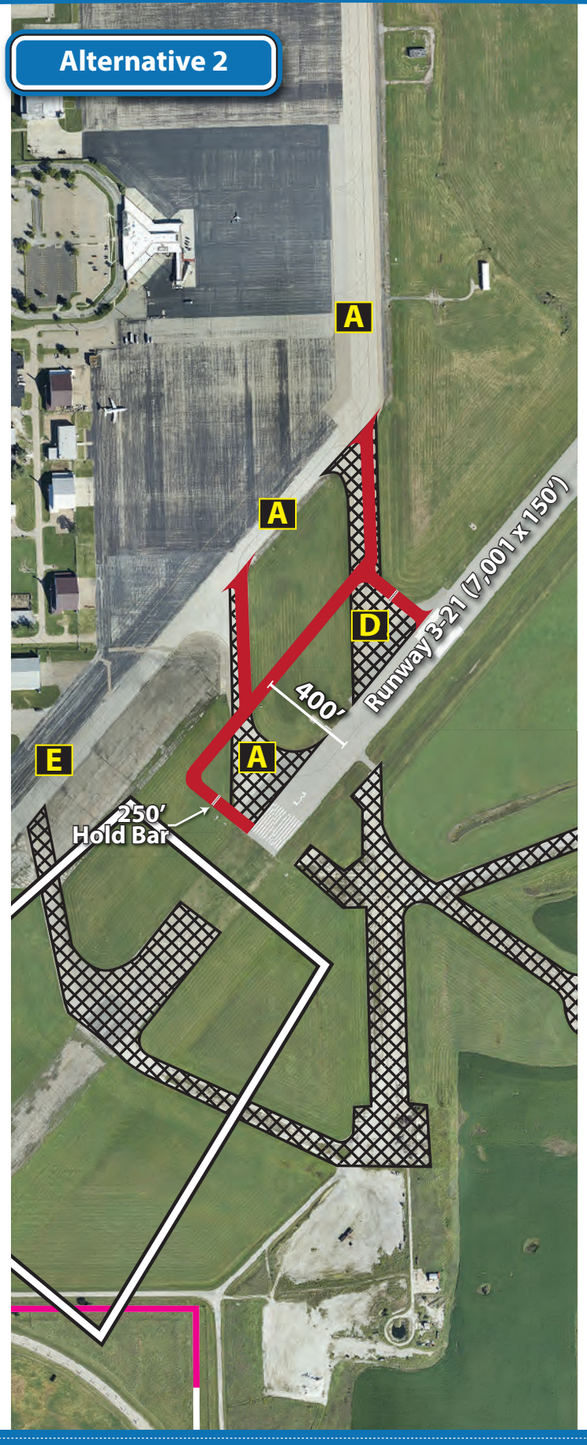
The geometry of Taxiway A is planned to be changed so that pilots desiring to access the runway end will proceed on Taxiway A and then turn onto a short taxiway segment that is parallel to the runway. Pilots then make a 90-degree turn toward the runway threshold. A hold bar is located on the new threshold taxiway 250 feet from the runway centerline. The parallel segment and the 90-degree threshold taxiway follow taxiway geometry standards. This is a more common and familiar layout.

Pilots will still have to be aware that to access the threshold taxiway they will have to follow the slight jog of Taxiway A. If pilots miss the jog in Taxiway A, then they end up on Taxiway E, which leads to the

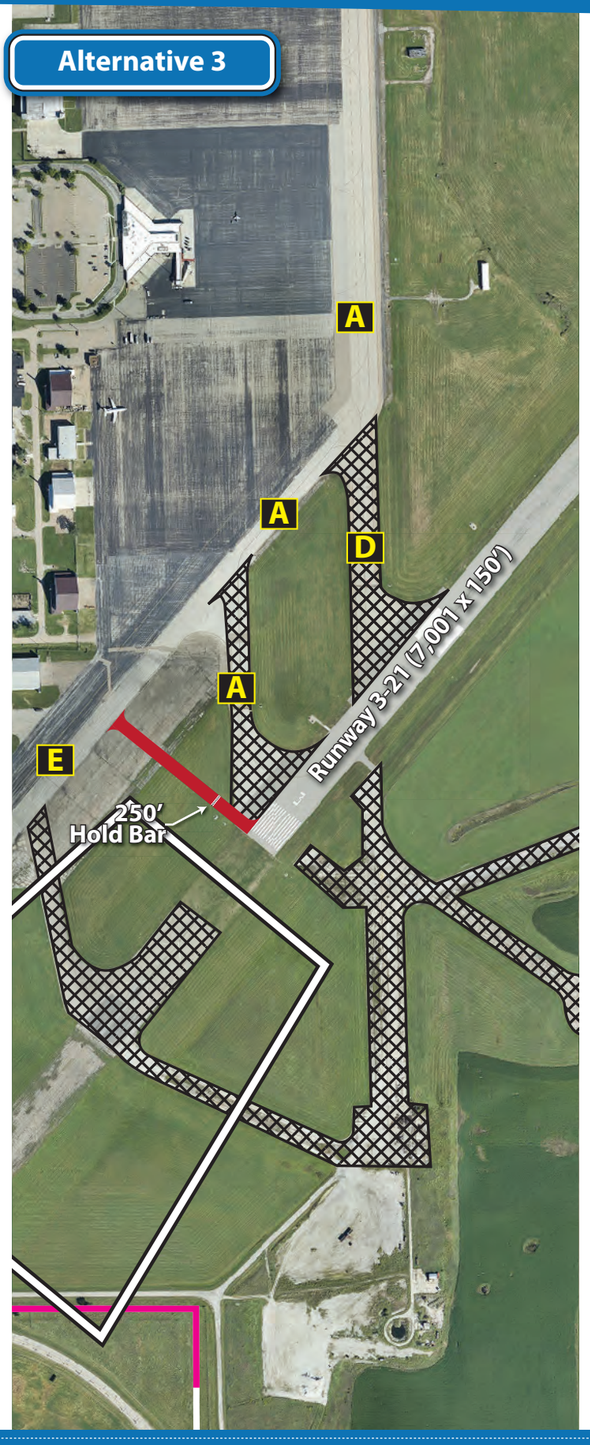
Alternative 1



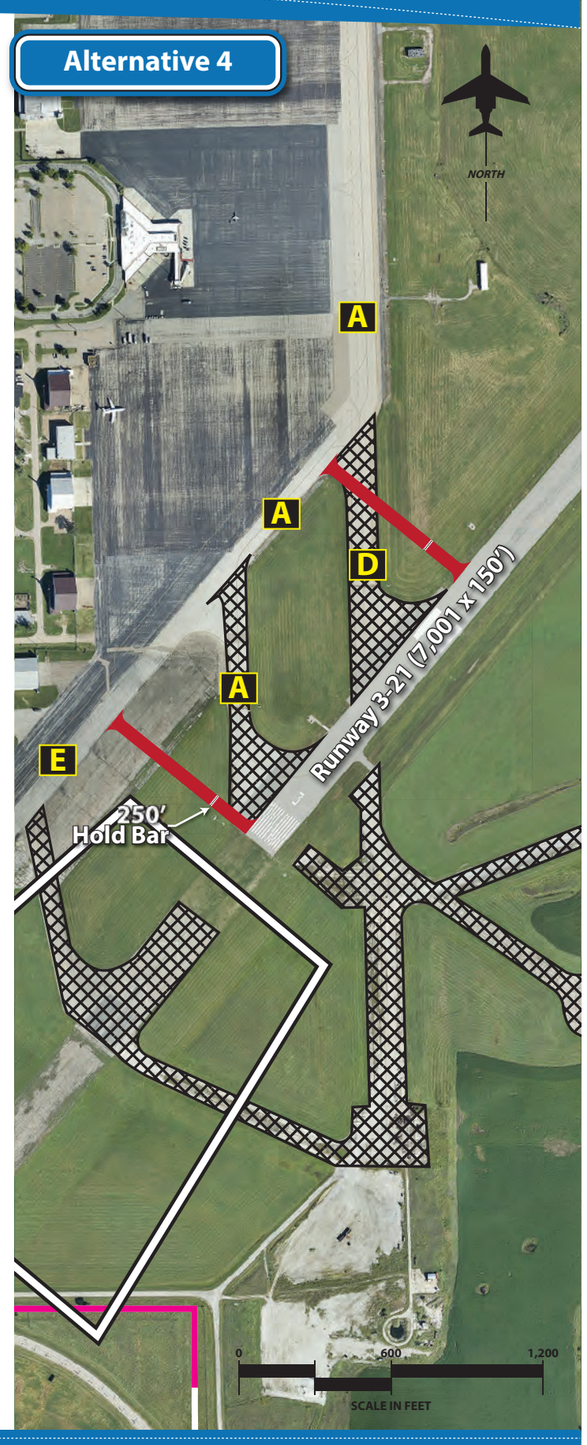
Alternative 2



Alternative 3



Alternative 4



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Army National Guard apron, which is closed to civilian traffic. In this case, the pilot would be forced to turn around to access the Runway 3 threshold taxiway.

The taxiway is planned to be constructed at a width of 50 feet in order to meet the civilian design standard for the Airport. To meet KANG requirements, taxiways must be at least 75 feet wide.

Option 2: The second option considers developing a longer parallel taxiway segment that can be accessed by both Taxiways A and D. Runway access is then available for Taxiways A and D, both of which are planned at the standard 90-degree angle to the runway. Hold bars are located at the standard distance of 250 feet from the runway centerline.

The angled portions of Taxiways A and D which lead to the new parallel taxiway segment would still require specific pilot awareness and a missed turn could put the aircraft on Taxiway E, which is a dead end. The primary benefit is that the direct line to the runway is eliminated and replaced with a more familiar 90-degree access taxiway layout.

Option 3: The next option considers removing Taxiway D and the threshold access portion of Taxiway A and replacing both with a single threshold taxiway constructed at a 90-degree angle to the runway end. This option eliminates the potentially confusing angled taxiways leading to the runway. The hold bar is located at the standard distance of 250 feet from the runway centerline. In this option, there is no parallel taxiway element.

Option 4: The last option considers replacing both Taxiway D and the threshold portion of Taxiway A with standard 90-degree taxiways. The potential for pilot confusion when approaching the existing taxiways is reduced because the replacement taxiways are planned at the more common 90-degree interface with the runway.

HOT SPOT MITIGATION

There are three FAA identified “Hot Spots” on the Airport (see Exhibit 3D). Where feasible, mitigation measures, including planning for redesign of pavements, should be considered. It is not always feasible to alter the pavement geometry to remedy a Hot Spot. Other measures, such as additional marking and signage, can also be considered.

Hot Spot #1 is located at the intersection of Taxiway D and Taxiway A. Pilots taxiing south on Taxiway A must remain alert so as not to miss the right turn on Taxiway A when they are heading to the Runway 3 threshold.

Hot Spot #2 alerts pilots of the turn of Taxiway A to the Runway 3 threshold. If they miss the turn on Taxiway A, then pilots end up on Taxiway E which leads to the Army National Guard unit, which is a restricted area of the Airport. It should be noted that special directional pavement markings have been installed to alert pilots to the turn to the Runway 3 threshold. The centerline for Taxiway A also continues to the Runway 3 threshold, while there is no centerline on Taxiway E.

Hot Spot #3 alerts pilots that Taxiway E is not fully visible from the tower and that it leads to the restricted Army National Guard apron.

Alternatives to mitigate Hot Spots #1 and #2 were previously presented. Hot Spot #3 should remain as an alert to pilots because the tower is unlikely to be relocated or raised and a taxiway must remain to provide access to the Army National Guard.

RUNWAY 13 THRESHOLD TAXIWAY

The portion of Taxiway A serving as the threshold to Runway 13 is a wide expanse of pavement, which is a non-standard geometry. The hold apron extends beyond the lateral edge of the runway end. This layout for hold aprons is discouraged; however, it is not non-standard. If a CAT-I precision approach were introduced to Runway 13, then a precision obstacle free zone (POFZ) would be required. The POFZ is an area measuring 800 feet by 200 feet beginning at the landing threshold and centered on the runway. In this case, the POFZ would be penetrated by aircraft on the hold apron. **Exhibit 4F** presents two different options to eliminate the wide expanse of pavement.

Option 1*:* The first option considers narrowing the wide expanse of pavement to the 75-foot standard. The existing hold apron is planned to be replaced in a new location on the inside of Taxiway A. This is an acceptable location because of the existing runway/taxiway separation of 780 feet. This option would allow for the opportunity to improve the instrument approach visibility minimums from ¾-mile down to ½-mile.

Option 2*:* The second option shown on the exhibit considers narrowing the taxiway to the 75-foot standard. A bypass taxiway is ultimately considered as a replacement for the hold apron if capacity becomes an issue in this area of the airfield.

INSTRUMENT APPROACHES AND RPZ COMPATIBILITY

Instrument approach procedures, as previously described in the Inventory chapter, are critical to extending the usefulness of an airport in times of poor weather. Instrument approaches are particularly important for airports serving jet operations.

As documented in Chapter One – Inventory, the Airport has a full array of instrument approach procedures with excellent visibility minimums. The lowest visibility minimums available by runway are ½-mile for Runway 31, ¾-mile for Runways 13 and 3, and 1-mile for Runway 21. Visibility minimums lower than ½-mile are typically only implemented at the busiest commercial service airports. The feasibility and necessity of acquiring lower visibility minimums has been analyzed.

As discussed in Chapter Three – Facility Requirements, when the size or location of an RPZ changes, then the entirety of the RPZ is subject to the standards outlined in FAA Memo: *Interim Guidance on Land Uses Within a Runway Protection Zones.* Specifically, if any incompatible land uses are introduced to the RPZ,

LEGEND

- Airport Property Line
- Runway Protection Zone (RPZ)
- Proposed Airfield Pavement
- Pavement to be Removed

NORTH

0 300 600

SCALE IN FEET

A

Runway 13-31 (12,803′ x 150′)

780′

A

A

Bypass Taxiway

Runway 13-31 (12,803′ x 150′)

A

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then an extensive alternatives analysis must be completed and reviewed by the National Airport Planning and Environmental Division (APP-400) at FAA headquarters. **Exhibit 4G** identifies any new incompatible land uses that would be introduced to the RPZ for each runway end if the instrument approach visibility minimums were lowered.

Runway 13-31

The current RPZ is sized based on the existing ¾-mile visibility minimum. There are currently incompatible land uses in the Runway 13 RPZ which include all or part of three commercial buildings. These existing incompatible land uses are not subject to the Interim Guidance; however, the Airport is still responsible for protecting the RPZ.

If the visibility minimums were lowered to ½-mile, then a total of five commercial buildings would be in the RPZ, as well as SE 53rd Street. For the ½-mile RPZ to be fully compatible, the commercial buildings would have to be removed and the road would have to be rerouted outside the RPZ.



There are additional costs associated with a ½-mile visibility minimum, such as a required Medium Intensity Approach Lighting system with Runway Alignment Indicator Lights (MALSR) and potentially ILS equipment.

To justify such expenditures, there would need to be a significant level of activity that needed to occur when visibility minimums are between ½- and ¾-mile. While the number of pilots desiring to operate in such condition is unknown, we can determine what percent of the time, over the last ten years on average, that such condition existed through analysis of the wind data for the Airport.

As presented in Chapter Three – Facility Requirements, ten consecutive years of wind data was collected from the on-airport automated surface observing system (ASOS). This data was analyzed to determine what percent of the time winds were favorable for using Runway 13 and when visibility minimums were between ½-and ¾-mile. A total of 106,762 observations were made between 2005 and 2014. Of these, 476 or 0.45 percent met the specified conditions.

This low percentage should not be considered a significant level especially because of the other options available to pilots when such conditions exist. One option is for a pilot to hold in the air (i.e., circle) and wait for the visibility conditions to improve. This is not unusual, especially in Kansas where a thunderstorm can pop up, lower visibility minimums, and then move out within a few minutes. Pilots can also use the Runway 31 end, if the winds are acceptable. Ultimately, pilots could divert to another airport.

The following alternatives, shown on **Exhibit 4H**, may be considered to mitigate the existing land use incompatibilities in the Runway 13 RPZ:

1) The first option considers acquiring approximately 11 acres of land and three commercial/industrial buildings. Such an acquisition would require a fair market valuation and relocation assistance for any businesses impacted.
2) The next option is to physically shorten the runway by approximately 400 feet. The total runway length would now be 12,403 feet which would be adequate for all users. A new threshold taxiway would be required and a replacement hold apron is planned.
3) The third option is to implement the concept of declared distances which would have the effect of declaring the runway 400 feet shorter in certain operational directions.

FAA AC 150/5300-13A, *Airport Design*, addressed the concept of declared distances. With FAA approval, the runway length can be declared (published) to be shorter for certain operations in order to provide the necessary safety areas and/or RPZ land use compatibility. The AC describes declared distances as follows: "Declared distances represent the maximum length available and suitable for meeting takeoff, rejected takeoff, and landing distance performance requirements for turbine-powered aircraft." The declared distances are defined by the FAA as:

- *Takeoff run available (TORA)* - The distance to accelerate from brake release to lift-off, plus safety factors.

- *Takeoff distance available (TODA)* - The distance from brake release past lift-off to start of takeoff climb, plus safety factors.

- *Accelerate-stop distance available (ASDA)* - The distance to accelerate from brake release to take-off decision speed (V_1), and then decelerate to a stop, plus safety factors.

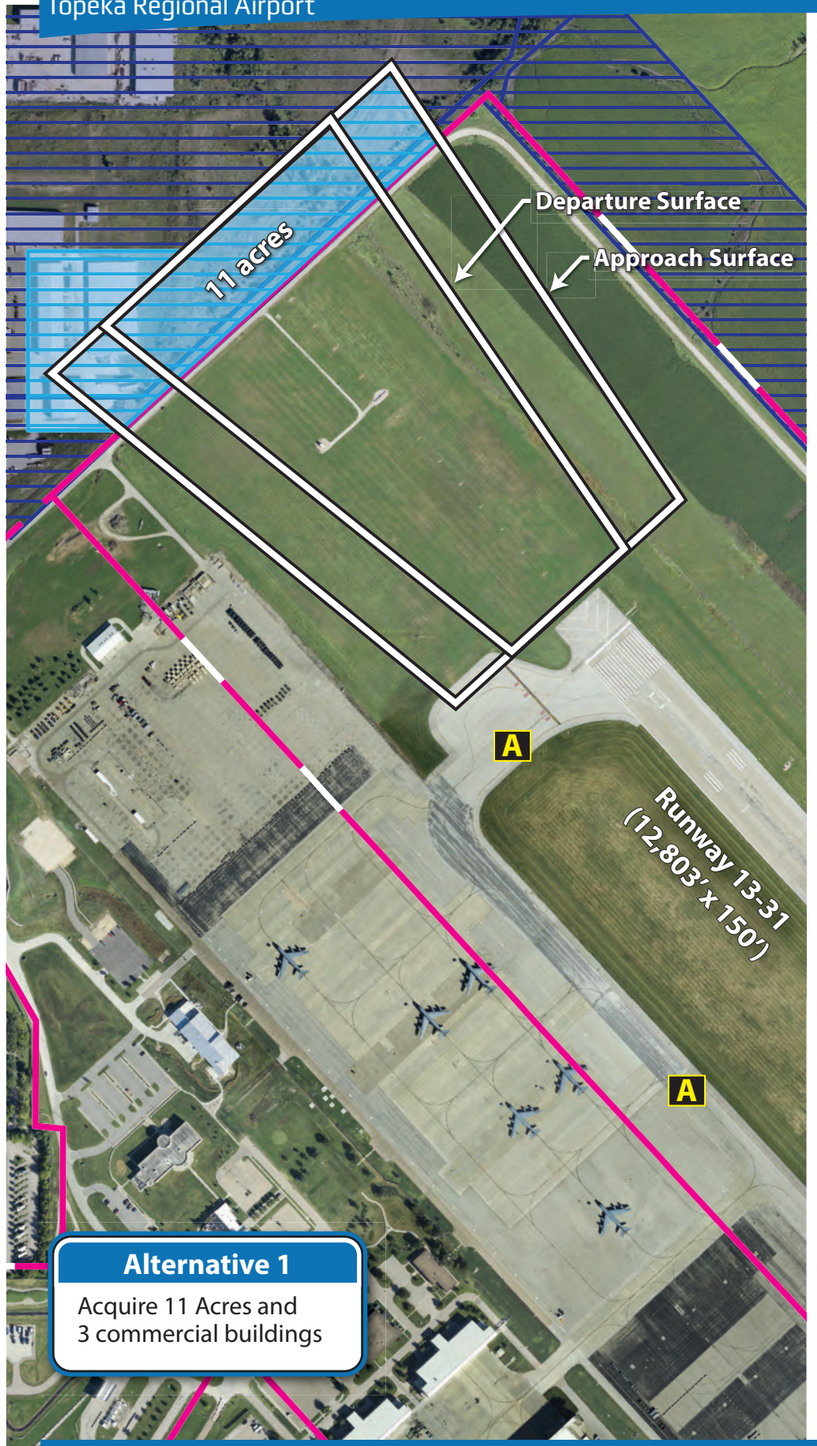
- *Landing distance available (LDA)* - The distance from the threshold to complete the approach, touchdown, and decelerate to a stop, plus safety factors.

The approach RPZ is set 200 feet from the landing threshold and the departure RPZ is set 200 feet from the end of the TORA. The landing threshold for Runway 13 would be located 400 feet down the runway, leaving 12,403 feet of runway length available for landing. Aircraft taking off on Runway 13 would still have the full 12,803 feet would be available. All operations utilizing Runway 31 would be shortened by 400 feet making 12,403 feet available. **Table 4B** summarizes the declared distances alternative for meeting Runway 13 RPZ land use compatibility standards.

Runway 31 is outfitted with a CAT-I precision instrument approach with ½-mile visibility minimums. The Airport owns most of this RPZ property and has easement rights over the rest. This is acceptable; however, the most effective means to control land uses in an RPZ is to own the entirety of the RPZ. A total of 23.3 acres of Runway 31 RPZ lands may be considered for acquisition.

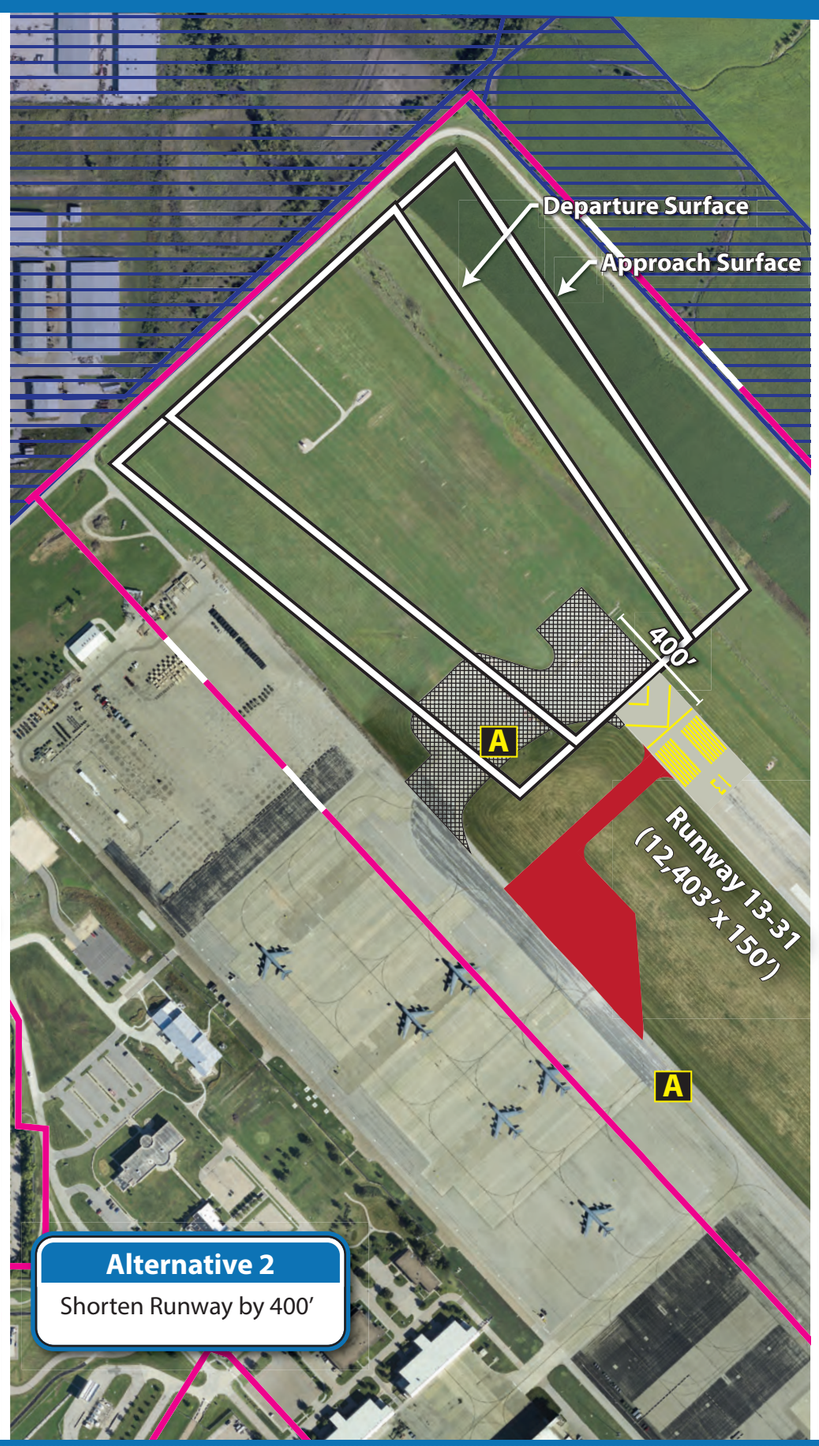

LEGEND
Airport Property Line
Runway Protection Zone (RPZ)
Potential RPZ
Landon Nature Trail
CONSIDERATIONS
New RPZ Incompatible Land Uses with Improved Instrument Approach
• 5 Commercial Buildings
• Public Road
CONSIDERATIONS
New RPZ Incompatible Land Uses with Improved Instrument Approach
• Public Roads
• Landon Nature Trail
• One Home
CONSIDERATIONS
New RPZ Incompatible Land Uses with Improved Instrument Approach
• Public Roads
• ARNG Building
1/2 Mile
3/4 Mile
SW 57th St.
SW 65th St.
SW Topeka Blvd.
SE California Ave.
SE 53rd St.
SE 61st St.
SE Berryton Rd.
SE 69th St.
SE Gary Ormsby Dr.
Runway 13-31 (12,803' x 150')
Runway 3-21 (7,001 x 150')
ALT 75
NORTH
0
1,500
3,000
SCALE IN FEET

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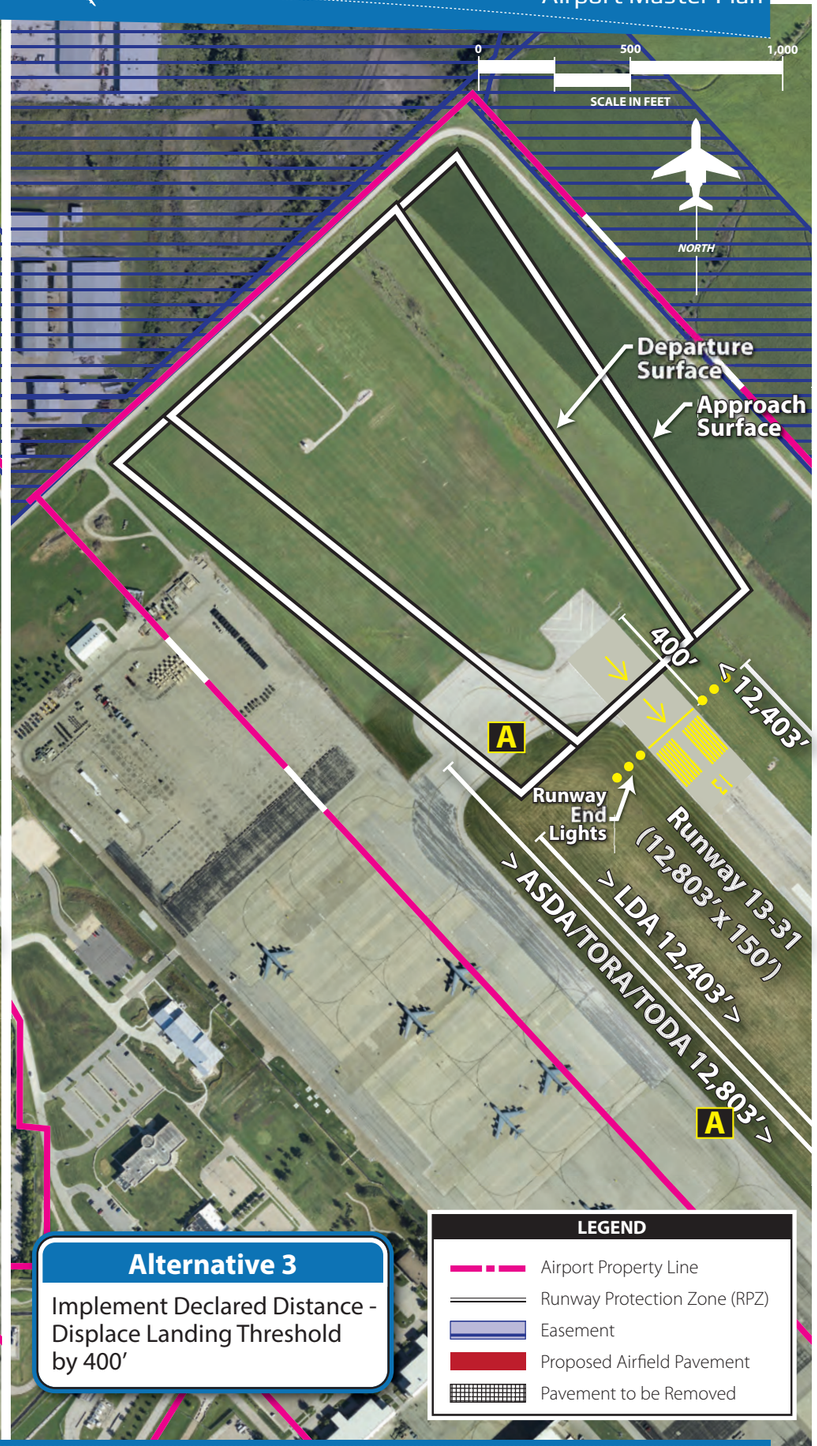
Alternative 1

Acquire 11 Acres and 3 commercial buildings



Alternative 2

Shorten Runway by 400'



Alternative 3

Implement Declared Distance - Displace Landing Threshold by 400'

LEGEND

- Airport Property Line
- Runway Protection Zone (RPZ)
- Easement
- Proposed Airfield Pavement
- Pavement to be Removed

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TABLE 4B
Potential Declared Distances Runway 13-31
Topeka Regional Airport

	Runway 13	Runway 31
Takeoff Run Available (TORA)[1]	12,803'	12,403'
Takeoff Distance Available (TODA)[2]	12,803'	12,403'
Accelerate Stop Distance Available (ASDA)[3]	12,803'	12,403'
Landing Distance Available (LDA)[3]	12,403'	12,403'

[1] Departure RPZ begins 200 feet from the end of the TORA.
[2] TORA cannot be longer than TODA. Departure surface is set on TODA. TODA can be shortened to mitigate departure surface penetrations; if so, TORA is shortened, too.
[3] Available runway length plus RSA.
Source: FAA AC 150/5300-13A, Airport Design

Runway 3-21



The Runway 3 end currently supports an instrument approach with ¾-mile visibility minimums. If the visibility minimums were lowered to ½-mile, then the RPZ would be larger and new incompatible land uses would be introduced. The new incompatibilities include a portion of the main Army National Guard building, various paved equipment storage areas, and two public roads.

To provide a compatible ½-mile RPZ, the ARNG building would have to be removed from the RPOZ and the roads would have to be rerouted. In addition, an approach lighting system would have to be installed.

The southeast corner of the existing Runway 3 RPZ extends beyond Airport property. The Airport owns an easement covering this area currently and there are no incompatible land uses in the RPZ. No action is necessary; however, the Airport could acquire the 0.2 acres in order to have complete control of the RPZ.

The Runway 21 end currently supports a 1-mile instrument approach. A ¾-mile RPZ would introduce public roads and a ½-mile RPZ would introduce a home. To provide compatible land uses, the roads and homes would have to be removed from the RPZ.

The current Runway 21 RPZ extends beyond Airport property and there is a small farm equipment storage shed in the RPZ. The Airport owns an easement covering this area. The Airport could acquire the 12.8 acres of the Runway 21 RPZ to have full ownership control.

LANDSIDE PLANNING CONSIDERATIONS

Generally, landside issues relate to those airport facilities necessary, or desired, for the safe and efficient parking and storage of aircraft, movement of passengers and pilots to and from aircraft, airport land use, and overall revenue support functions. In addition, elements such as fueling capability, availability of services, and emergency response are also considered in the landside functions.

Landside planning issues, summarized on **Exhibit 4B**, will focus on facility locating strategies following a strategy of separating activity levels. To maximize airport efficiency, it is important to locate facilities intended to serve similar functions close together. For example, larger hangars supporting airport businesses should be centrally located, while smaller box and T-hangars should be set further to the sides. Allowing new facilities to be constructed haphazardly on the next available spot at the airport may preclude the highest and best use of limited and valuable airport land. It is also important to plan for facilities that airport users desire and to group those facilities together, whether they are T-hangars, box hangars, or larger conventional hangars.

The orderly development of the airport terminal area (those areas parallel to the runway and along the flight line) can be the most critical, and probably the most difficult development to control on the airport. A development approach of "taking the path of least resistance" can have a significant effect on the long term viability of an airport. Allowing development without regard to a functional plan can result in a haphazard array of buildings and small ramp areas, which will eventually preclude the most efficient use of valuable space along the flight line.

Activity in the terminal area should be divided into three categories at an airport. The high-activity area should be planned and developed as the area providing aviation services on the airport. An example of a high-activity area is the aircraft parking apron, which provides outside storage and circulation of aircraft. Large conventional hangars housing fixed base operators (FBOs), other airport businesses, or those used for bulk aircraft storage would be considered high-activity uses. A conventional hangar structure in the high-activity area should be a minimum of 6,400 square feet (80 feet by 80 feet). If space is available, it is more common to plan these hangars for up to 200 feet by 200 feet. The best location for high-activity areas is along the flight line near midfield, for ease of access to all areas of the airfield.

The medium-activity category defines the next level of airport use and primarily includes corporate aircraft operators that may desire their own box or conventional hangar storage on the airport. A hangar in the medium-activity use area should be at least 50 feet by 50 feet, or a minimum of 2,500 square feet. The best location for medium-activity use is off the immediate flight line, but still with ready access to the runway/taxiway system. Typically, these areas will be adjacent to the high-activity areas. Parking and utilities, such as water and sewer, should also be provided in this area.

The low-activity use category defines the area for storage of smaller single and twin-engine aircraft. Low-activity users are personal or small business aircraft owners who prefer individual space in T-hangars or small box hangars. Low-activity areas should be located in less conspicuous areas or to the ends of the flight line. This use category will require electricity, but may not require water or sewer utilities.

In addition to the functional compatibility of the terminal area, the proposed development concept should provide a first-class appearance for Topeka Regional Airport. Consideration to aesthetics should be given high priority in all public areas, as many times the airport can serve as the first impression a visitor may have of the community.

Generally, the existing development at the Airport has followed the strategy of separating activity levels. Larger conventional hangars are located centrally to the main apron areas. Somewhat smaller hangars are located farther from the center. Future development along the active aprons should be restricted to larger hangars intended to support aviation-related businesses.

Planning for future hangar development should take into consideration typical local weather conditions, especially potential winter snowfall. Winter weather patterns typically bring snow from the north and west, which can build up on hangar doors. Future planning should consider locating hangars such that they open to the south or east.

It should be noted that the hangar options presented only consider larger conventional hangars or medium-sized box hangars. Locations for small T-hangars are not identified in the plan. This is because Topeka Regional Airport has historically been developed to accommodate a wide variety of aviation businesses that typically desire larger hangars. This is the demand that still exists. MTAA has planned Philip Billard Municipal Airport to accommodate growth in this user class. In fact, the Master Plan for Billard includes the addition of multiple T-hangar facilities.

The historic development pattern does not exclude the possibility of adding T-hangars to the aircraft storage mix; however, there is not a current demand at the Airport. If someone were to approach MTAA about constructing T-hangars at Topeka Regional Airport, this could possibly be accommodated.

LANDSIDE LAYOUT ALTERNATIVES

The number of potential landside alternatives can be infinite. The following alternatives are those that best meet design standards, while maximizing the efficiency of aircraft storage and movement. The landside element of the recommended master plan concept, to be presented in the next chapter, may be one of these alternatives or, more likely, is a combination of elements from each of them. Input from the planning advisory committee (PAC) is integral to determining the landside vision for the airport.

Substantially developed as a military airfield, Topeka Regional Airport has very large aircraft apron areas. Maintenance of these aprons can be very costly and the FAA will only participate in maintaining those apron areas that are justified by existing civilian activity. As discussed previously, a large (218,000-square-yard) apron area immediately north of the ATCT has been closed. In this analysis, each apron area will be prioritized for federal grant funding as it is in the interest of both the Airport and the FAA to invest in infrastructure that is most needed. In some cases, closing additional apron pavement should be considered.

NORTH TERMINAL APRON

The aircraft apron immediately north of the terminal building apron area serves an important role at the Airport as it is the primary enplaning and deplaning location for very large charter aircraft that utilize the Airport. Most of these charters are hired by the military for troop deployment. Therefore, these are not military operations (just military passengers) and the enplanements count toward the annual total at the Airport.

The charter aircraft used to transport the troops are some of the largest passenger type aircraft in the fleet. Example charter airlines operating at the airport and using the north terminal apron include Omni Air International (Boeing 767 and 777), Atlas Air (Boeing 747 and 767), and Delta (Airbus 330, Boeing 757, 767, and 777). These are large aircraft that take up a lot of space on the apron. There has, at times, been multiple large charter aircraft utilizing the apron at the same time. In the recent past, Airport staff noted that there were five large aircraft parked on the north apron, including a Boeing 747.



Charter aircraft at the Airport

One challenge the Airport faces is when multiple large charter aircraft utilize the apron at the same time. Currently, the apron is not properly marked to provide adequate separation between aircraft. **Exhibit 4J** presents one potential layout for marking the apron to accommodate charter aircraft.

On the north end of the north apron, located are three apron spaces sized to accommodate a Boeing 747. South of that, closer to the terminal building, the apron is marked for up to four Boeing 767s. The taxilanes identified would also provide access for the existing activity into and out of the hangars.

The north terminal apron is currently in fair condition and it is showing its age. Prior to marking the north terminal apron, the entire area should have a slurry seal/seal coat application to extend its useful life.


NORTH
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SCALE IN FEET
Service Road
747-400
767-300
LEGEND
TOFA
Centerlines

CLOSED APRON OPTIONS

There may be hangar development options on or adjacent to the closed apron north of the ATCT. Discussion with airport staff and engineers indicated there may be future opportunity to reclaim portions of the closed apron for hangar development. Two alternatives for future hangar development in this area are presented on **Exhibit 4K**.

Option 1: This option considers rehabilitating a portion of the closed apron and installing a taxilane leading to Taxiway A. Four large conventional hangars are depicted facing south to the taxilane. A critical consideration for this layout is vehicular access to the planned hangars. A new road is planned to the immediate north of hangar #647 (6330 SE Forbes Ave.) which would provide public road access to the new hangars. A possible negative to this layout is that the public road would cut off additional access to the remaining portions of the closed apron. Therefore, any additional hangar development to the north would require a dedicated taxilane leading to Taxiway A.

Option 2: The second option considers the addition of two new large conventional type hangars to fill in the undeveloped area facing the closed apron. The taxilane on the west edge of the apron would be extended north to provide airside access for these hangars. This option considers utilizing the existing taxilane in order to reduce the cost of pavement rehabilitation of that portion of the closed apron.

Since there is not currently taxilane access to the vacant land at the northwest end of the closed apron, another consideration may be to make this property available for a non-aviation use. In the past, the Airport has been approached about the possibility of leasing or selling approximately 3.5 of the 6.7 acres of the vacant parcel for development of an office building. The FAA would have to be consulted and grant approval would be needed to change the status of this land from aviation to non-aviation.

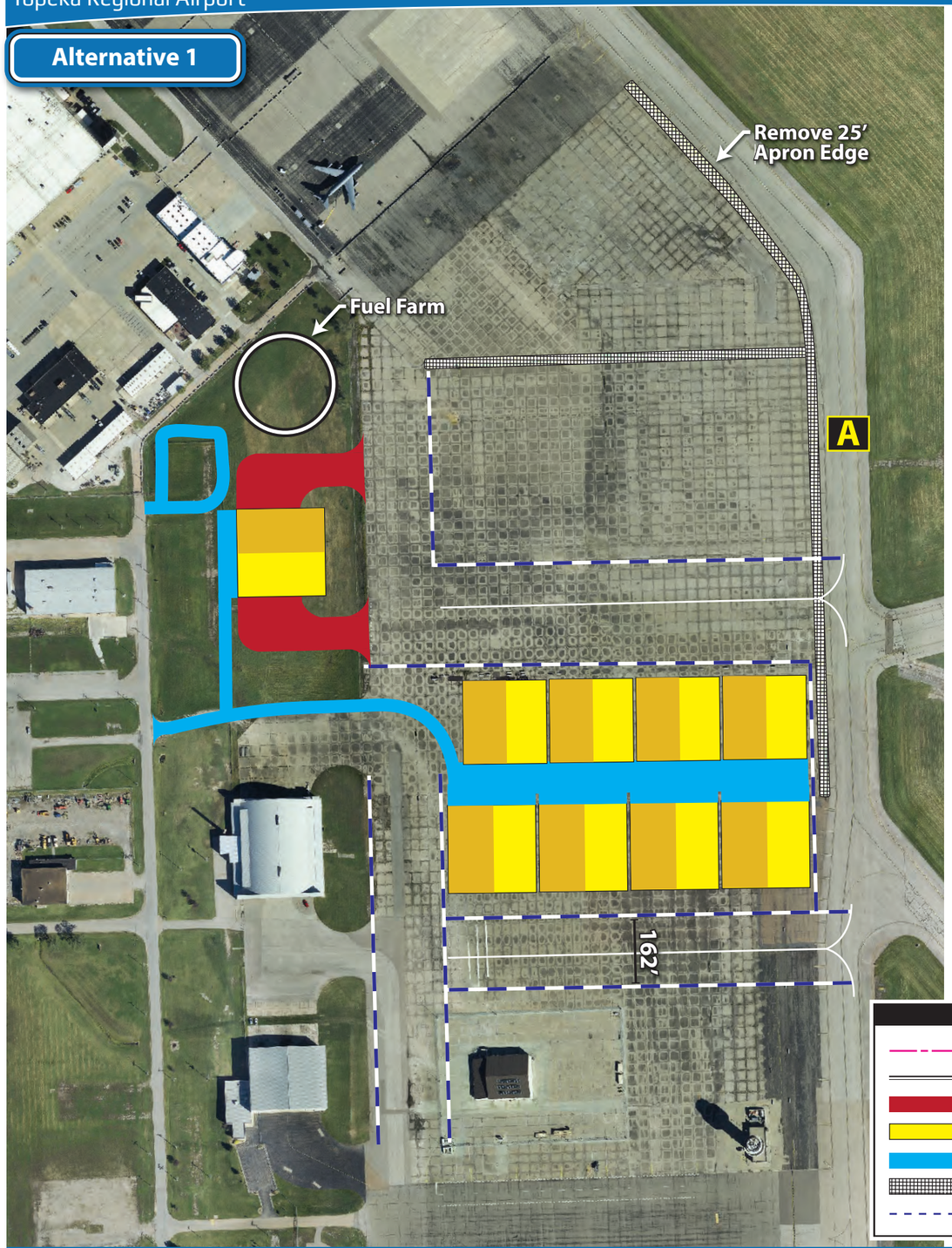
The closed apron is very poor and has not had any preservation maintenance in years. As a result, the concrete is cracking and heaving. The movement of the heaving and cracking concrete is potentially damaging to adjacent Taxiway A. To remedy this concern, the edge of the closed apron is considered for removal to a depth of ten feet. This solution would relieve the pressure and it would also serve as a barrier to foreign object debris (FOD) blowing onto the taxiway.

SOUTH GENERAL AVIATION OPTION

The south general aviation apron encompasses approximately 89,000 square yards of pavement, which exceeds that which is necessary based on the demand forecasts. **Exhibit 4L** presents an option to remove from service approximately 26,000 square yards of the apron. The remaining portions would serve the existing taxilane leading to the terminal building jet bridge, and the taxilane and pullout apron serving the existing hangars.

Potentially removing this portion of the general aviation apron from service would allow the Airport and FAA to focus future pavement investment in areas that are more highly utilized. At the same time, the

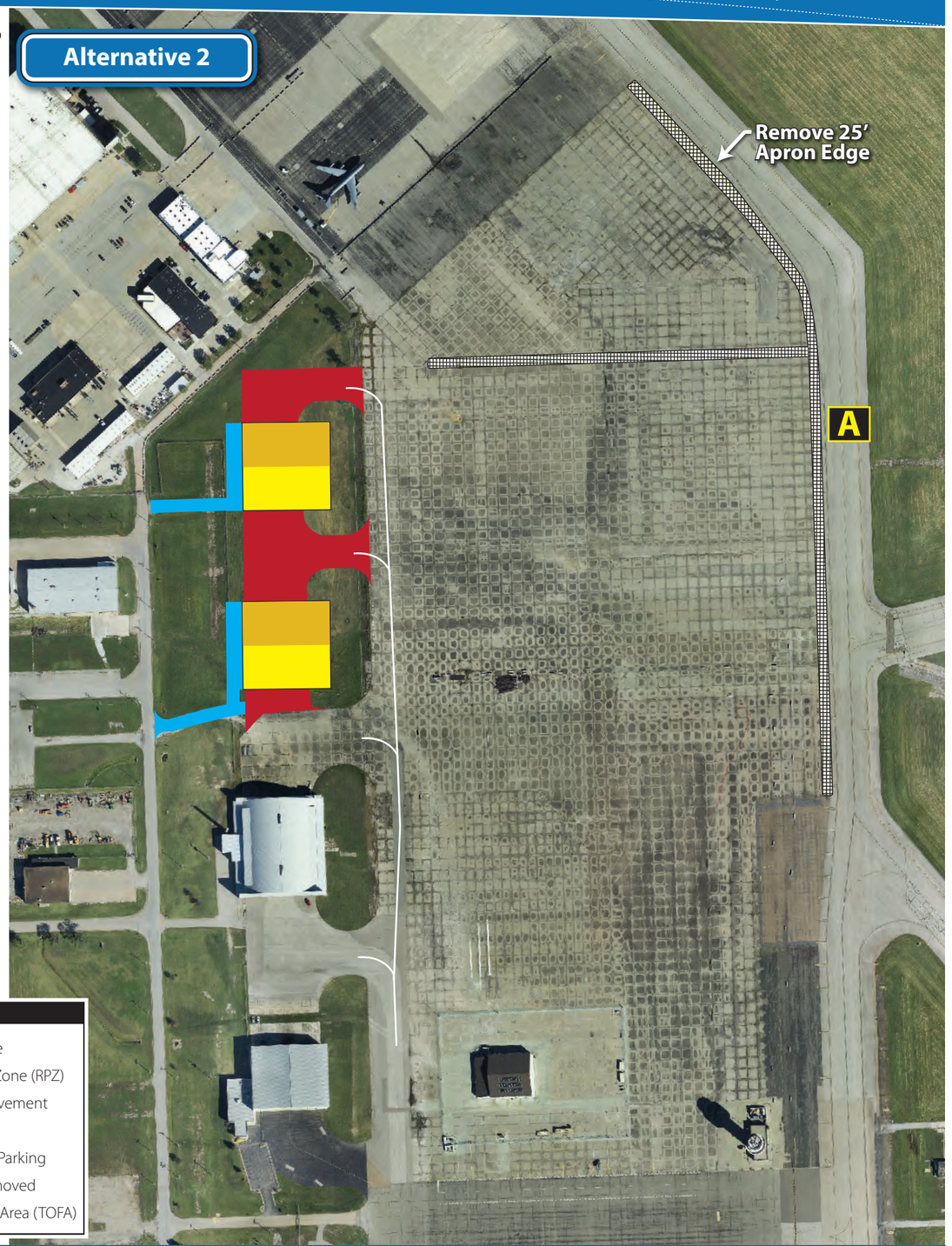
Alternative 1



0 300
SCALE IN FEET

NORTH

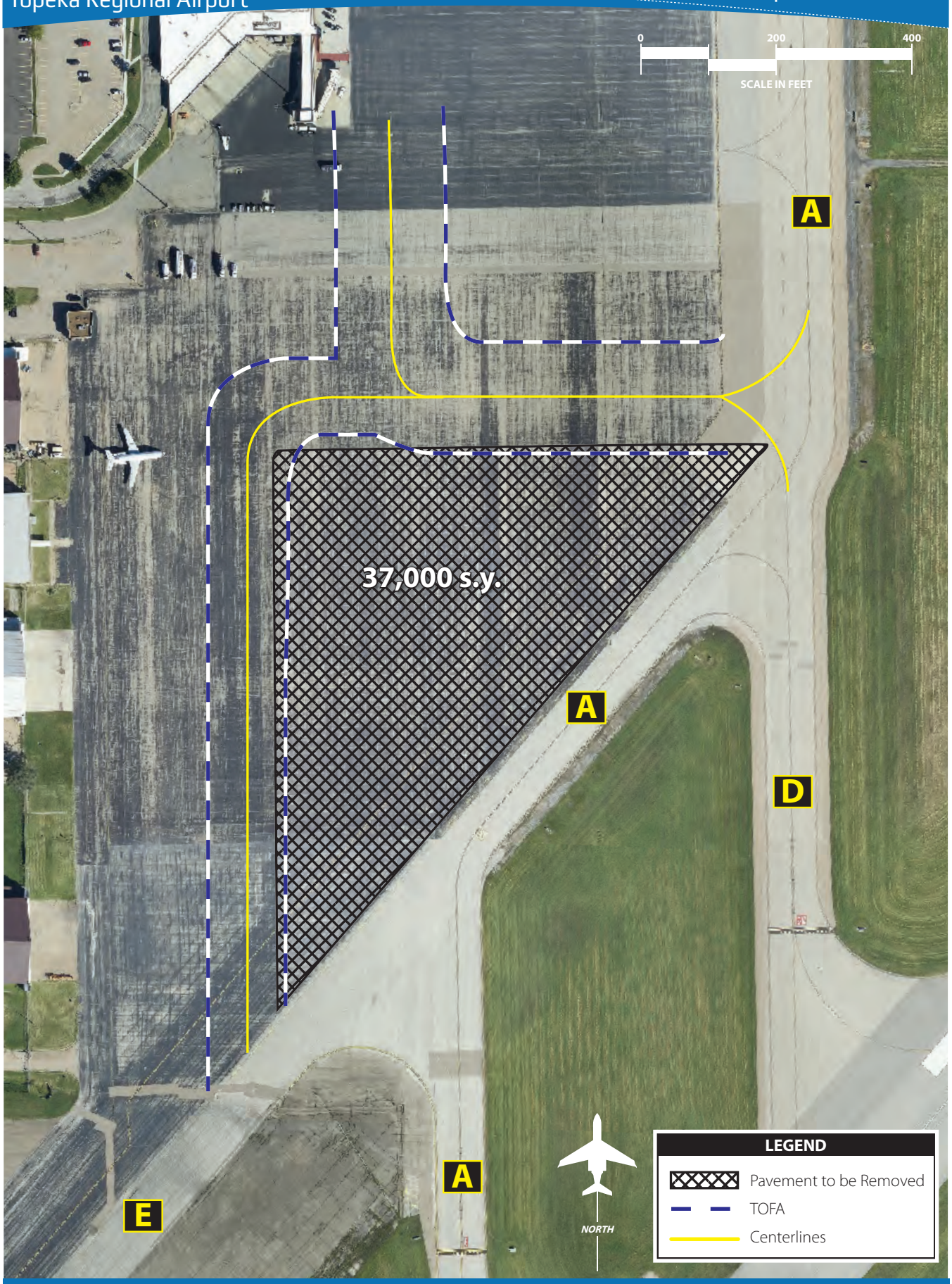
Alternative 2



LEGEND

- Airport Property Line
- Runway Protection Zone (RPZ)
- Proposed Airfield Pavement
- Proposed Building
- Proposed Roadway/Parking
- Pavement to be Removed
- Taxiway Object Free Area (TOFA)

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SCALE IN FEET
A
37,000 s.y.
A
D
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E
NORTH
LEGEND
Pavement to be Removed
TOFA
Centerlines

Airport should monitor the condition of the pavement to ensure that FOD buildup is minimized to the greatest extent practicable.

AGING PAVEMENT REMOVAL OPTIONS

Topeka Regional Airport was originally constructed to military standards for the purposes of training operations. As is common to military fields of its day, the airfield pavements were much wider, and, in some cases, longer than current civilian requirements. Most of the airfield pavements have been modified from original construction to be narrower or shorter. The pavement no longer used is deteriorating and could present safety issues in the future. Deteriorating pavements generally become loose gravel which can be ingested into an aircraft engine and cause significant damage or cause damage to aircraft propellers.

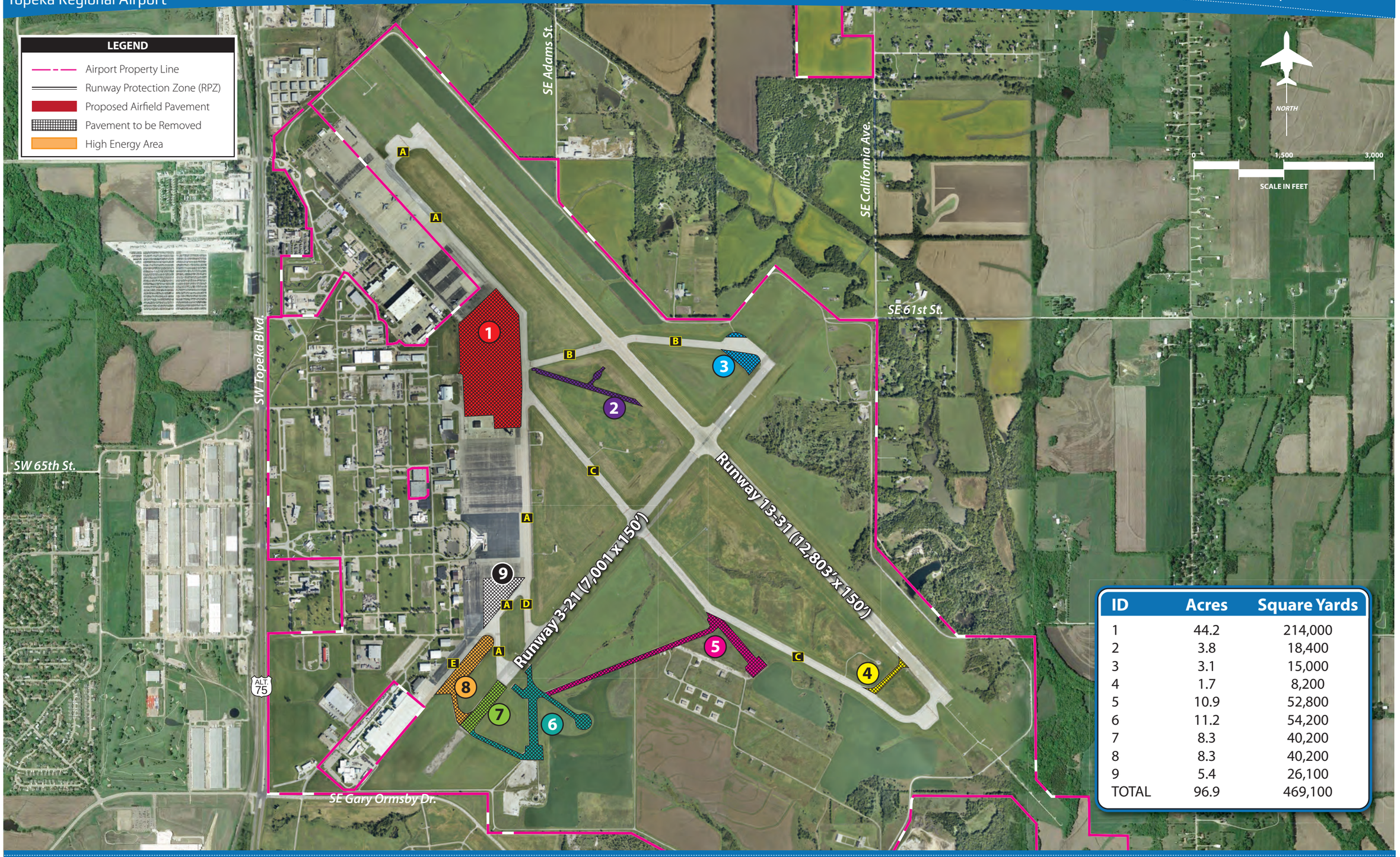
These unused airfield pavements also present an abundance of impervious surfaces which may create airfield drainage issues. Reduction of impervious surfaces at the Airport would serve to decrease water runoff. From an environmental perspective, increased runoff can damage streamside vegetation and aquatic habitat when the water transitions from a stormwater culvert system to a natural streambed downstream. Runoff can also increase peak stream flows and can alter in-stream hydraulics. Alternatively, non-impervious areas of native grassland, including regularly maintained areas, trap rainwater or snowmelt and filter out pollutants, such as oil, dirt, and chemicals, and enhance surface water quality. Finally, current environmental regulations adopted by most local, regional, and national agencies require the addition of detention areas when creating new impervious surfaces.

In an effort to aid in improving airport drainage and safety, this planning effort includes plans to remove aging pavements wherever possible and/or practical. The effort must first begin with identifying and targeting pavements to be removed.

Exhibit 4M outlines airfield pavement areas which are aging and could be removed. Of the nine areas outlined, only the south general aviation apron is currently in service. In total, approximately 96.9 acres of aging pavement have been identified for potential removal. It is unlikely that all of these pavements will be removed, as the costs of removal may not be practical. In some cases, however, pavements can be “harvested” by a contractor to be re-used as aggregate or basic materials for new pavement projects.

FUEL FARM OPTIONS

The current fuel farm is located east of Taxiway A. Two of the eight 50,000 gallon tanks are in service. This facility was inherited from the military when the Airport was deeded to the city. To access the fuel farm, tanker trucks must traverse the north aircraft apron and cross Taxiway A. Currently, an escort is provided to assure an additional safety measure because tanker truck drivers may not be familiar with proper vehicular airfield movement and markings.



ID	Acres	Square Yards
1	44.2	214,000
2	3.8	18,400
3	3.1	15,000
4	1.7	8,200
5	10.9	52,800
6	11.2	54,200
7	8.3	40,200
8	8.3	40,200
9	5.4	26,100
TOTAL	96.9	469,100

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Recognizing that the fuel farm should be relocated and replaced, three potential sites have been identified on **Exhibit 4N.** Each option prioritizes a location adjacent to the perimeter fence so that tankers can offload fuel without having to pass through a security gate. Since it is the FBO that does aircraft fueling, additional consideration could be given to a location closer to the general aviation terminal facilities.

Option 1: This location would utilize a vacant parcel adjacent to the closed north apron. One of the development options does consider this location for future hangar development. Therefore, if this site were to be utilized for a fuel farm, that would also limit potential hangar construction in this location. This site is the farthest from where most aircraft refueling would take place on the terminal and north aprons. This site was included in previous planning efforts for the Airport.

Option 2: In an effort to minimize travel distances to aircraft, a site between the terminal building and the general aviation line service building is considered. Currently, FBO fuel tanker trucks utilize this space for parking. Analysis indicated there is adequate space to accommodate both an above-ground fuel farm and refueling truck parking. This is a new site for a fuel farm that has not been considered previously.

Option 3: The third option utilizes a vacant lot at the south end of the general aviation apron. This site is in close proximity to the terminal area, thereby reducing refueling truck travel distances and servicing times. This location was considered in previous planning documents for the Airport.

TERMINAL BUILDING AND PARKING

The terminal building was constructed in 1985 and it encompasses approximately 44,000 square feet. It has been maintained in excellent condition over the years. The forecasts of aviation demand indicate that the current facility is fully capable of accommodating a return of commercial service. Previous analysis in Chapter Three – Facility Requirements indicated that the terminal building could service at least 85,000 annual enplanements without a need for major addition.

The availability of a terminal building is an important feature for airlines considering additional routes. While no major addition is needed through the 20-year planning horizon, if the Airport is to remain well-positioned to accommodate a return of scheduled commercial service in any capacity (daily or weekly), the terminal building should be maintained. If possible, building elements, such as the HVAC, should be maintained and improved as necessary.

Terminal buildings serve as a central entrance to the community for air travelers. The aesthetics of design should be considered. A welcoming entrance to the city may positively influence economic activity in the city.

The vehicle parking lot serving the terminal building is adequately sized to accommodate a return of commercial service. It, too, should be well-maintained, including necessary crack sealing and overlays as necessary.


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1,000
SCALE IN FEET
Option 1
Option 2
Option 3
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A
A
D
NORTH

General Aviation Terminal Building

Currently, the FBO at the Airport provides most services through leased facilities in the passenger terminal building. The smaller general aviation terminal, located just to the south, is primarily used to provide line services. By utilizing the larger passenger terminal building, visitors arriving/departing via the FBO have the benefit of using a more spacious and updated facility. This has the benefit of presenting an appealing entry/departure point and providing a positive impression of the community.

If substantial passenger service were to return, perhaps in the 80,000 or greater enplanement level, there could be a need for the FBO to relocate out of the passenger terminal building. This circumstance is not forecast within the 20-year horizon of this Master Plan. The previous master plan included expansion of the general aviation terminal and parking lot. These improvements are not considered necessary to accommodate forecast growth at the Airport. However, Airport management should continue to monitor passenger growth and be prepared well in advance if the FBO leased space in the passenger terminal building were ever needed to accommodate this growth.

AIR TRAFFIC CONTROL TOWER (ATCT)

Topeka Regional Airport has an ATCT that provides terminal area guidance for pilots in the immediate vicinity of the Airport. The tower is operated and staffed through the FAA's Contract Tower Program. Under this program, the FAA pays for the maintenance and staffing costs of the tower. The tower is staffed by private contractors who are trained and certified in the same manner as FAA-employed controllers.



Historically, FAA has funded the staffing, operations, and maintenance of towers if the airport meets certain operational thresholds and a benefit/cost analysis. If the airport does not meet the threshold, then FAA could discontinue funding or partially fund those services.

The tower was constructed in 2003. It has clear visibility to all airfield movement areas, except for a portion of Taxiway E leading to the Army National Guard unit located at the south end of the airfield. The tower also has non-potable water and is in need of repairs to the HVAC systems. These issues are the responsibility of the FAA.

ALTERNATIVES SUMMARY

The development alternatives presented in this chapter are primarily generated by a need to meet various FAA design standards. FAA design standards are frequently updated with the intent of improving the safety and efficiency of aircraft movements on and around airports. The FAA is also looking to identify high priority projects in order to maximize limited federal development funds.

The existing taxiway geometry does not meet current FAA design standards in several places. The alternatives presented address these deficiencies. It is important for the airport layout plan for reflect a future condition that meets design standards to the greatest degree practical. When it comes time to reconstruct certain pavements, such as Taxiway C, the FAA may desire to implement the selected alternative.

A high priority item is mitigation of FAA identified hot spots. There are three identified at the Airport. All three are located at the south end of Airport and include Taxiways A, D, and E. The alternatives considered will eliminate the existing angled taxiway entrances to the runway, which has the benefit of providing greater pilot peripheral views.

FAA design standards for the RPZ are to eliminate existing incompatible land uses where feasible, and to not introduce new land use incompatibilities. Several options for altering the RPZs are presented in this alternatives discussion.

After review by the PAC, a recommended concept will be presented in the next chapter. The recommended concept will include a list of FAA-eligible potential capital projects and a priority list of those projects.

Topeka Regional Airport

CHAPTER FIVE
Recommended Development Plan







CHAPTER FIVE
Recommended Development Plan

The airport master planning process for the Topeka Regional Airport (FOE) has evolved through the development of forecasts of future demand, an assessment of future facility needs, and an evaluation of airport development alternatives to meet those future facility needs. The planning process has included the development of two (of three total) sets of draft working papers to date which were presented to the Planning Advisory Committee (PAC) and discussed at several coordination meetings. The draft material through Alternatives was also presented at a public information workshop held at the Airport terminal building on April 12, 2016.

In the previous chapter, several alternatives were analyzed to explore options for the future growth and development of the Airport. The development alternatives have been refined into a single recommended development plan for the Master Plan. This chapter describes, in narrai ve and graphic form, the recommended direci on for the future use and development of Topeka Regional Airport. Where appropriate, the alternai ves are summarized and a rai onale for the selected alternai ve is presented.

AIRSIDE CONCEPT

The airside concept generally relates to planned improvements to the runway and taxiway system. **Exhibit 5A** presents the long term Master Plan development concept for the Topeka Regional Airport.







AIRPORT REFERENCE CODE

The FAA has established design criteria to define the physical dimensions of runways and taxiways, as well as the imaginary surfaces surrounding them which protect the safe operation of aircraft at an airport. These design standards also define the separation criteria for the placement of landside facilities.

As discussed previously, the design criteria primarily center on the airport's critical design aircraft. The critical aircraft is the most demanding aircraft or family of aircraft which currently, or are projected to, conduct 500 or more operations (take-offs and landings) per year at an airport. Factors included in airport design are an aircraft's wingspan, approach speed, tail height and, in some cases, the instrument approach visibility minimums for each runway. The FAA has established the Airport Reference Code (ARC) to relate these critical aircraft factors to airfield design standards.

Analysis conducted in Chapter Two – Forecasts and Chapter Three – Facility Requirements concluded that a critical design aircraft must be established for both military activity and civilian activity. The more demanding of the two will define the overall Airport Reference Code (ARC) for the Airport. Only capital projects necessary to meet the civilian needs are eligible for FAA grant funding.

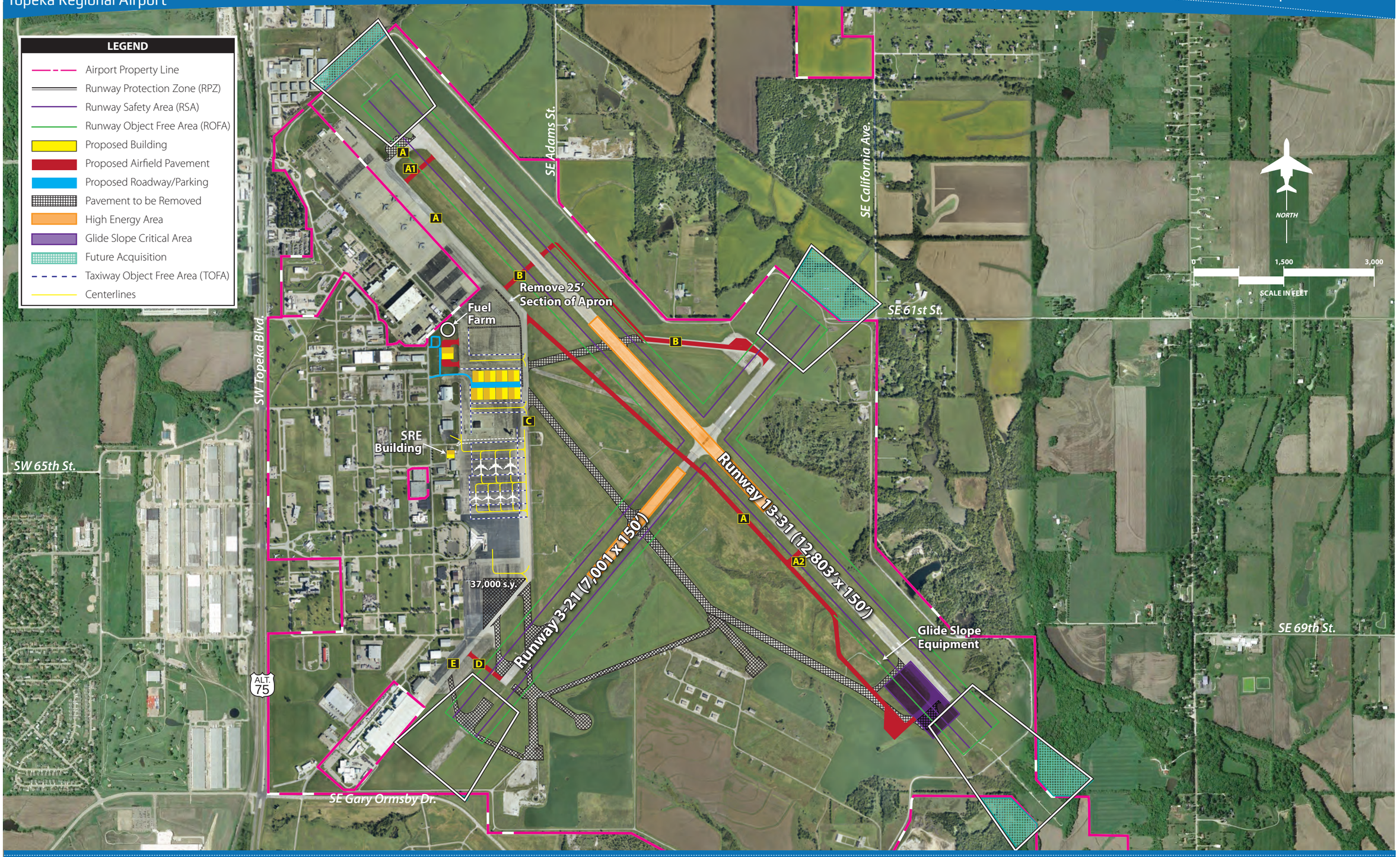
The ARC for the Airport is described as C-IV which is primarily represented by the frequent activity of the KC-135 aerial tanker aircraft based at the Airport. Also contributing are the periodic operations by large transport aircraft utilized in charter activity. The overall ARC for the Airport is the same as that for the military. The civilian design aircraft is ARC C-III. This is primarily represented by current charter operations and scheduled commercial passenger aircraft (should they return). Exhibit 3C shows applicable design standards for the runways.

While airfield elements, such as runway length and safety areas, must meet design standards associated with the applicable ARC, landside elements can be planned to accommodate specific categories of aircraft. For example, a taxilane into a T-hangar area only needs to meet the taxiway object free area (TOFA) width standard for smaller single and multi-engine piston aircraft expected to utilize the taxilane, not those standards for the larger jets representing the overall civilian or military critical aircraft for the Airport.

RUNWAY DESIGN CODE (RDC)

Each runway is also assigned an RDC. As discussed in Chapter Three – Facility Requirements, the RDC is comprised of the Approach Category, the Airplane Design Group, and the instrument visibility minimums. As with the ARC, an RDC is applied for both military and civilian operations. For Runway 13-31, the RDC is described as C-IV-2400 for the military and for civilian operations it is C-III-2400.

The RDC for a crosswind runway is dependent upon the crosswind components which were described in detail in Chapter Three – Facility Requirements. At Topeka Regional Airport, Runway 3-21 should be designed to ARC A/B-I design standards at a minimum. With ¾-mile visibility minimums to both runway ends, the RDC is A/B-I-4000. Runway 3-21 has historically been designed to a minimum of C-II design standards and this should be maintained to the greatest degree feasible. This is particularly important



SRE: Snow Removal Equipment

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because the military does use the runway (and has invested heavily in its maintenance and rehabilitation in the recent past) and because the primary runway is scheduled for a full reconstruction from 2017-2019. Especially during this time, Runway 3-21 will be heavily utilized by all Airport users.

RUNWAY 13-31

Runway 13-31 is 12,803 feet in length and 200 feet wide as of this writing (2016). A project is planned to reconstruct the runway with final dimensions of 12,803 feet by 150 feet. This project is currently in the design phase and construction is anticipated to be completed by 2019.

As discussed previously, the project is being jointly funded by the FAA (with a local matching share) and the National Guard Bureau (NGB). The FAA is providing funding for that portion of the runway length that is justified by civilian activity and eligible for funding. The NGB is funding the remaining length and an overall strengthening of the runway.

RUNWAY 3-21

Runway 3-21 is 7,001 feet long and 150 feet wide. Within the last five years, this runway was milled and overlaid, and several portions were reconstructed. This project was also a joint venture between the FAA (with a local match) and the NGB. A complete reconstruction of the runway is not anticipated to be needed within the 20-year scope of this Master Plan. When a complete reconstruction is needed, a determination will need to be made as to what portion is eligible for FAA funding due to civilian activity.

TAXIWAYS SERVING RUNWAY 13-31

Issue: Portions of the taxiway system serving Runway 13-31 have non-standard geometries. Taxiway C crosses Runway 3-21 in the "high-energy" portion (middle third) and it crosses the runway at a non-standard angle. Taxiway B crosses Runway 13-31 in the "high-energy" portion and it is at a non-standard angle to the runway. The standard is for a taxiway to intersect runways at a 90-degree angle in order to maximize pilot peripheral views (justified high-speed exits are the exception). On Exhibits 4C and 4D, two different potential taxiway reconfigurations were presented.

When Taxiway C needs to be reconstructed, it is recommended to be relocated in order to meet current design standards.

Recommendation: The recommended development plan combines the most practicable elements of each alternative. When Taxiway C needs to be reconstructed, it is recommended to be relocated in order to meet current design standards. The new Taxiway C would extend from Taxiway A, toward Runway 13-31, where it would then cross Runway 3-21 at a perpendicular angle. The portion of the new Taxiway C that is perpendicular to Runway 3-21 is planned at a length of 800 feet (400 feet on both sides of the runway centerline) in order to allow holding aircraft to have full peripheral views. The new Taxiway C would be outside of the "high-energy"

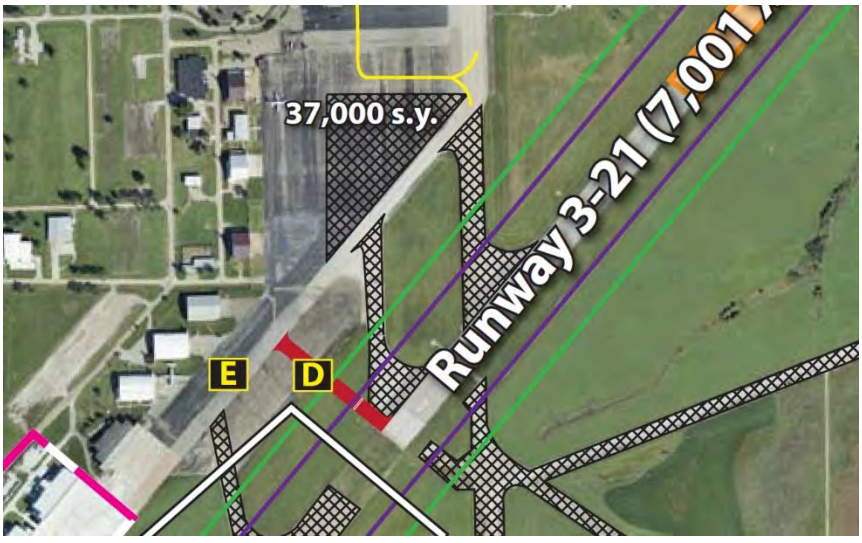
portion of Runway 3-21. The new Taxiway C would then be parallel to Runway 13-31 and at a separation distance of 400 feet extending toward Runway 31.

The taxiway is planned to "jog" to a separation distance of 800 feet at the south end in order to provide clearance of the glide slope critical area. A hold apron is planned at the south end of the taxiway. A new connecting taxiway is planned to extend from the runway to the new parallel taxiway.

The portion of Taxiway B that currently crosses Runway 13-31 in the "high-energy" area is planned to be closed and replaced with a standard 90-degree crossing taxiway that is located outside the "high-energy" portion of the runway. On the northeast side of the runway, crossing Taxiway B will connect with the existing Taxiway B via a new short parallel taxiway segment, thus maintaining access to the Runway 21 threshold. The hold apron located at the Runway 21 threshold is reconfigured to accommodate the critical design aircraft in C-II.

TAXIWAYS SERVING RUNWAY 3

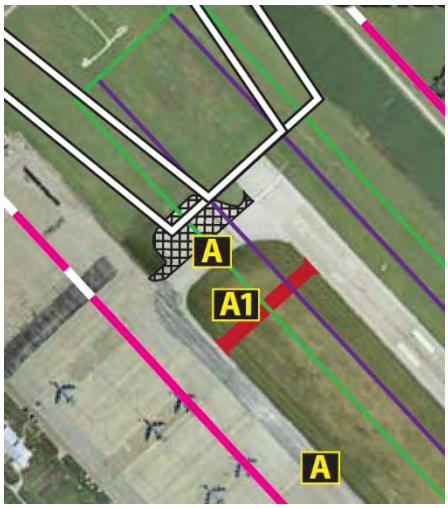
Issue: Taxiways A and D connecting to Runway 3-21 have non-standard geometries. Both enter the runway at an angle which limits pilot peripheral views. The preferred geometry is for taxiways to be at a 90-degree angle to the runway, especially at the runway threshold. This area is also identified as a "Hot Spot" by the FAA because of the potential to inadvertently proceed directly onto the runway without making a more routine turn onto a parallel taxiway prior to turning to the runway. Four different alternatives were presented on Exhibit 4E.



Recommendation: Alternative 3 from Exhibit 4E is the recommended alternative. In this alternative, both thresholds of Taxiway A and D are planned to be removed and replaced with a single threshold taxiway to be constructed at the standard 90-degree angle to the runway. The new threshold taxiway is planned at a width of 75 feet, which exceeds the 50-foot civilian design standard. Therefore, if the National Guard prefers a wider-than-standard threshold taxiway, then a joint funding mechanism is recommended.

RUNWAY 13 THRESHOLD TAXIWAY

Issue: That portion of Taxiway A serving as the threshold taxiway to Runway 13 has a non-standard geometry in that it is a wide expanse of pavement. In addition, the aircraft hold apron extends beyond the lateral edge of the runway end. Two different alternatives were presented on Exhibit 4F. The first was to close the hold apron and narrow the threshold taxiway to 75 feet. The second was to mark-out a taxiway island to create two distinct paths to the runway threshold and to narrow the taxiway to 75 feet.



Recommendation: Following consultation with the planning advisory committee, a third alternative was considered and selected as the preferred alternative. The hold apron is planned to be removed/closed and the threshold taxiway narrowed to the standard 75-foot width. A new 75-foot wide bypass taxiway is then planned to be located 400 feet from the end of the runway.

TAXIWAY DESIGNATIONS

FAA Engineering Brief No. 89, *Taxiway Nomenclature Convention,* and the subsequent FAA Memorandum dated March 29, 2012 provide guidance regarding taxiway designations on airports. With the proposed changes to the taxiway system at the Airport, it is apparent that a new naming convention will be needed. The first step is to develop a simple and logical naming convention utilizing the following guidelines:

a. Keep it simple and logical.
b. Use letters of the alphabet and start at one end of the airfield and proceed, in order, to the other end. Parallel taxiways (including partial parallel taxiways) must use a single alphabet designation.
c. Letters “I”, “O”, and “X” are not to be used.
d. Where there are numerous stub taxiways, the nomenclature should be designated as “A1”, “A2”, “B1”, etc., with the letter being the same as the Taxiway to which the stub taxiway connects.
e. Designate all separate and distinct taxiway segments.

It is recommended that the taxiways be re-designated once the planned improvements are implemented. The most significant change is removing Taxiway C completely and re-designating it Taxiway A. This is logical as the new taxiways will now more closely resemble a full parallel taxiway to Runway 13-31. The stub taxiways are designated as “A1” and “A2”. Since there are relatively few stub taxiways, the threshold taxiways to Runway 13-31 are planned to be designated “A”, as the Runway 13 threshold taxiway is today.

Taxiway B will maintain the same designation. The new threshold taxiway to Runway 3 is planned to initially be designated Taxiway D because it is planned to be completed prior to reconstruction of Taxiway C (and conversion to Taxiway A). Once Taxiway C is reconstructed and converted to Taxiway A, then Taxiway D could be changed to Taxiway C.

RUNWAY PROTECTION SURFACES

The Facility Requirements chapter discussed the requirements for the RSA, ROFA, and runway obstacle free zone (ROFZ). The current runway design meets the runway protections standards.

The RSA is particularly important as it must meet FAA design standards to the greatest extent possible and the FAA will not consider approving a deficient RSA with a Modification to Standard. The RSA is an area surrounding the runway that must be cleared of all penetrating obstructions, graded, drained, and capable of supporting an aircraft veer-off and emergency vehicles. The RSA design standard for both runways is 500 feet wide and it extends 1,000 feet beyond the runway ends. Both runways meet the design standard.

The design standard for the ROFA for both runways is 800 feet wide, extending 1,000 feet beyond the runway ends. The ROFA cannot have penetrations that extend above the lateral elevation of the RSA. Therefore, if objects such as bushes or terrain extend above the lateral elevation of the RSA, they would have to be removed and/or lowered. The ROFA does not have to be graded like the RSA. The ground elevation of the ROFA does not have to be flat and it can be at a lower elevation than the RSA. Both runways meet the ROFA standard.

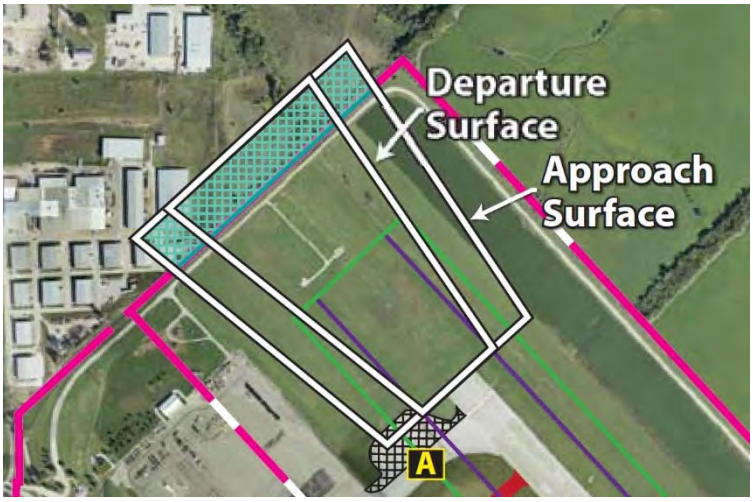
The ROFZ for both runways is 400 feet wide, extending 200 feet beyond the runway ends. Like the RSA, the ROFZ precludes penetrating obstructions except for frangible navigational aids necessary for safe operation of aircraft at an airport. The ROFZ meets the design standard.

RUNWAY PROTECTION ZONES

The RPZ is a trapezoidal area beginning 200 feet beyond the runway end. The function of the RPZ is to protect people and property on the ground. Preferably, this is achieved through airport ownership of the RPZs, although proper land use control measures, such as easements, are acceptable by FAA to mitigate potential incompatible land uses and obstacle conflicts. Some land uses are permitted without further evaluation, such as farming that meets all airport design criteria (e.g., horizontal and vertical runway clearances) and irrigation channels that do not attract wildlife. Prohibited land uses include public roads, residences, and places of public assembly, such as churches, schools, hospitals, office buildings, and shopping centers.

It is not uncommon for RPZs to have existing incompatible land uses. In these cases, it is the responsibility of the airport sponsor to mitigate those incompatibilities when practicable. For example, an airport sponsor may have a plan to acquire and remove an RPZ incompatibility; however, implementation of the

plan may be subject to financial feasibility. With the publication of the *Interim Guidance on Land Uses within a RPZ*, the FAA made clear that the introduction of new RPZ land use incompatibilities would require a detailed alternatives analysis that could avoid, minimize, and/or mitigate the risk to people and property on the ground and headquarters approval.



As discussed in detail in Chapter Three – Facility Requirements, the size and location of RPZs can change. Airport sponsors should be aware if any changes to the RPZ will introduce new incompatible land uses in order to protect the runways. The following are the primary reasons an RPZ may change in size or location:

- An airfield project (e.g., runway extension, runway shift);
- A change in the critical design aircraft that increases the RPZ dimensions;
- A new or revised instrument approach procedure that increases the size of the RPZ; and/or
- A local development proposal in the RPZ (either new or reconfigured).

Issue: All four approach RPZs for the Airport extend beyond Airport property. The Airport owns avigation easement rights for all four. The approach RPZ serving Runway 13 has all or part of three commercial/warehouse buildings in it and the approach RPZ for Runway21 has a small farm equipment storage building.

Recommendation: The identified land use incompatibilities are an existing condition. Therefore, the Airport's responsibility is to have a mitigation plan in place. For Runway 21, it is recommended that the Airport consider fee-simple acquisition of the RPZ that is not on Airport property. RPZ property acquisition is eligible for FAA grant funding; therefore, the Airport and the FAA should work together to identify the appropriate timeframe and funding availability for acquisition.

The presence of incompatible commercial/warehouse structures in the Runway 13 RPZ is of a more urgent concern as these buildings may be occupied more frequently. Exhibit 4H presented three different alternatives for mitigating these RPZ incompatibilities. The first is to acquire the RPZ land (11 acres) and the buildings, and then to raze the buildings. The second was to shorten or shift the runway by 400 feet, thus bringing the RPZ completely onto Airport property. The third option was to implement declared distances, which would have the effect of bringing the RPZ onto Airport property by adjusting the operational runway length.

Following consultation with the FAA, the recommended alternative is to continue to show future acquisition of the 11 acres of RPZ land beyond the Airport property line as well as the three structures. By

maintaining this alternative on the ALP, both the FAA and the Airport can react more quickly if the property becomes available. The FAA indicated that if there is a future immediate need to mitigate the RPZ land use incompatibilities, they can always fall back to the declared distances alternative.

INSTRUMENT APPROACHES

Topeka Regional Airport has instrument approach procedures to each runway end. The visibility minimums are ½-mile to Runway 31 and ¾-mile to the other three runway ends. These minimums are excellent and common to most commercial service airports. These instrument approaches extend the availability of the runways to times of poor weather conditions.

Issue: The feasibility and impact of introducing ½-mile visibility minimums to Runways 13, 3, and 21 was considered in Chapter Four – Alternatives on Exhibit 4G. Going from ¾-mile to ½-mile would introduce new RPZ incompatibilities because the size of the RPZ becomes larger. In addition, visibility minimums of ½-mile require a medium intensity approach lighting system with runway alignment indicator lights (MALSR).

Recommendation: There is not a pressing need for instrument approach procedures with lower visibility minimums to Runways 13, 2, and 21. As noted in Chapter Four – Alternatives, over the last 10-years, only 0.45 percent of total weather observations had visibility minimums between ¾- and ½-mile. The cost of installing a MALSR and obtaining FAA certification of a new instrument approach would far exceed the operational benefit. Therefore, the current visibility minimums are planned to be maintained throughout the 20-year planning horizon of this Master Plan.

In addition, lowering the visibility minimums from ¾- to ½-mile would introduce new incompatible land uses into the larger RPZ. This would include the Landon Nature Trail beyond Runway 21, a public road beyond Runway 3, and additional commercial building beyond Runway 13.

TAXIWAY HOLD LINES

The location of taxiway hold lines prior to a runway are a function of the critical design aircraft and the instrument approach visibility minimums. In addition, the hold line location may be adjusted based on the elevation of the Airport. For Runway 13-31, the taxiway hold lines are currently established at a distance of 300 feet from the runway centerline. The current design standard for a C-IV critical aircraft is a minimum of 250 feet plus one foot for every 100 feet in elevation. Therefore, at an elevation of 1,078 feet above sea level, these hold lines should be located a minimum of 261 feet from the runway centerline.

The hold lines on taxiways serving Runway 3-21 are of varying distances to the runway centerline with the closest being 275 feet. The design standard for Runway 3-21, with a critical aircraft of C-II, is 250 feet and there is no adjustment for airport elevation.

At the time of the next remarking of taxiway hold lines, consideration should be given to relocating them to a uniform distance and to the distance required for elevation adjustment, where applicable.

VISUAL NAVIGATION AIDS

All runway ends are equipped with visual glideslope indicator lights (VASI). While currently functional, these are an older technology. When the VASIs exceed their useful life, they are planned to be replaced with the current technology, the precision approach path indicator light system (PAPI).

Runway end identification lights (REILs) are strobe lights set to the side of the runway which provide rapid identification of the landing threshold. REILs are normally provided for instrument-capable runways when an approach lighting system is not available. Runways 13, 3, and 21 each have an existing REIL system which is planned to be maintained. Runway 31 has a MALSR approach lighting system which is planned to be maintained.

PROPERTY ACQUISITION

Planning for growth of the Airport includes the consideration of strategic property acquisition of adjacent lands in order to allow for facility expansion or for the protection of the function and role of the Airport. The FAA supports and provides reimbursement for necessary property acquisition. The reimbursements are provided when the land is needed for airport development or protection. While the FAA supports and funds land acquisition, it does not support “land-banking” of property that may or may not be needed in the future.

The FAA recommends that the airport own the entirety of the RPZs where feasible. Therefore, those RPZs that extend beyond the airport property line are planned for fee simple acquisition. This includes approximately 11.0 acres in the Runway 13 RPZ, 19.2 acres in the Runway 21 RPZ, 23.3 acres in the Runway 31 RPZ, and 0.27 acres in the Runway 3 RPZ. The Airport owns avigation easements for each of these areas. These easements provide the Airport with an acceptable level of control of the airspace. Therefore, fee simple acquisition of the identified property may not be a high priority; however, the Airport should be prepared to render a decision on acquisition if the properties become available.

AIRSIDE CONCLUSION

Airside needs are driven by both military and civilian operations at the Airport. Significant changes are not needed to address capacity or forecast growth in activity. Most of the airside recommendations are the result of meeting current FAA design standards.

Primary Runway 13-31 is planned to be reconstructed with final dimensions of 12,803 feet in length and 150 feet in width. Future planning maintains these dimensions. Crosswind Runway 3-21 is planned to remain at 7,001 feet in length and 150 feet in width.

The taxiway system is planned for some alterations in order to meet current FAA standards which are intended to increase pilot situational awareness and to reduce the potential for an inadvertent runway incursion.

Threshold Taxiway A at Runway 13 is planned to be narrowed to the standard 75 feet and the existing hold apron is planned to be closed. In the future, a bypass taxiway is planned. Threshold Taxiways A and D at Runway 3 are planned to be removed and replaced by a single threshold taxiway that interfaces at a 90-degree angle to the runway. This threshold taxiway is planned at a width of 75 feet to accommodate larger military aircraft; however, the civilian design standard is 50 feet. Therefore, if it is to be constructed at the recommended 75-foot width, financial participation from NGB will be necessary.

When Taxiway C needs to be reconstructed, it is planned to be relocated in order to avoid the "high-energy" portion of Runway 3-21. One new exit taxiway is also planned from the runway to the parallel taxiway. The new Taxiway C is planned at a width of 75 feet to accommodate the military critical aircraft; however, the civilian width standard is 50 feet. Therefore, the NGB would need to participate in a width greater than 50 feet.

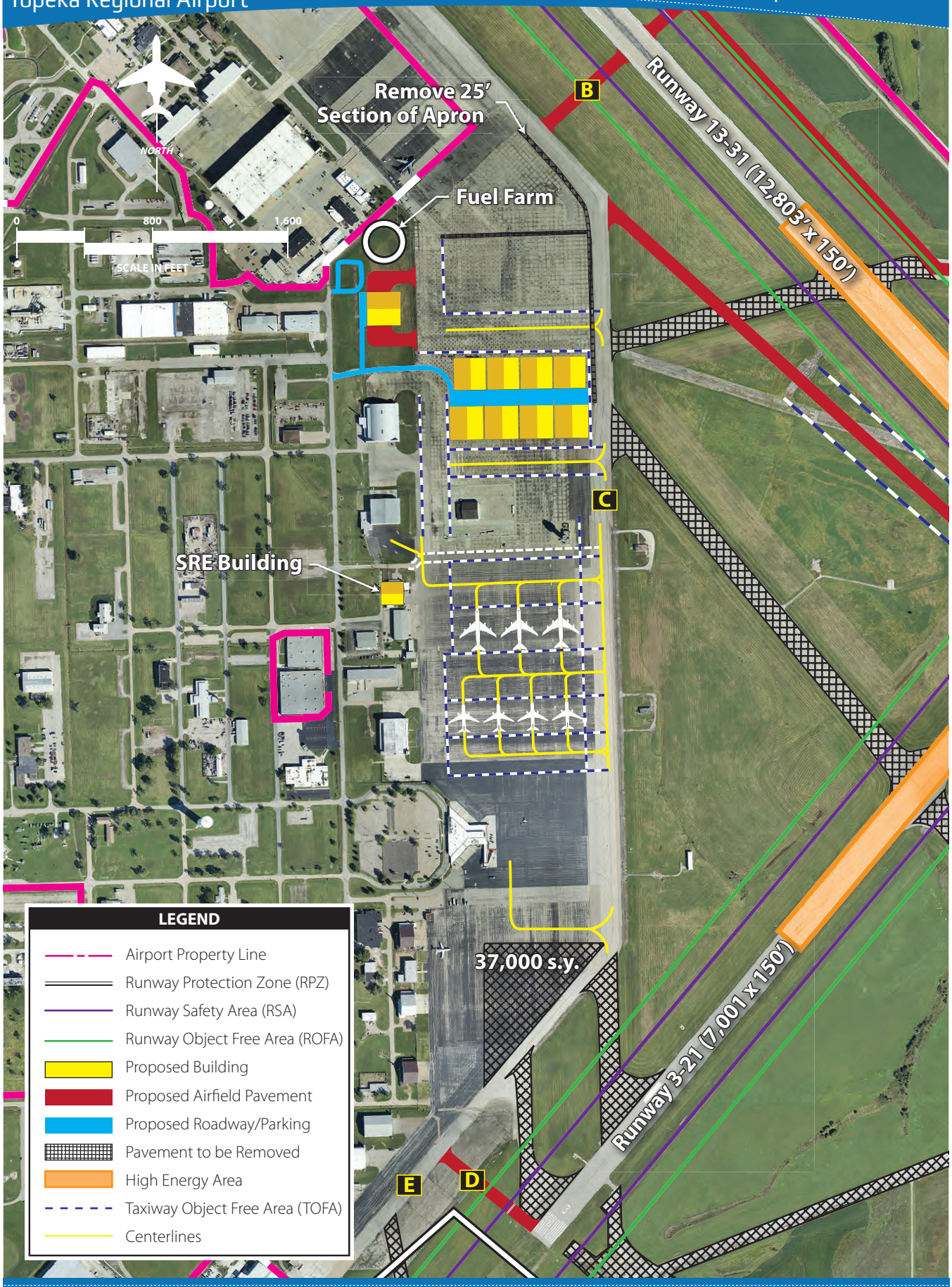
The south end of the planned replacement Taxiway C is planned to "jog" out to a separation distance of 800 feet in order to avoid the glides lope critical area. A hold apron is also planned, however, the need for a hold apron is not currently justified. Therefore, space is planned to be reserved for a hold apron and additional justification will be needed if FAA funding participation is desired.

Currently Taxiway B crosses Runway 13-31 in the "high-energy" portion of Runway 13-31 and it is at a non-standard angle to the runway. The crossing portion of Taxiway B is planned to be closed and replaced with a standard crossing taxiway that is shifted slightly to the north, outside of the "high-energy" portion of the runway. A short parallel section of Taxiway B is planned on the east side to provide connection to the Runway 21 threshold. Taxiway B is planned at a width of 75 feet; however, the civilian design standard is 50 feet.

Each of the RPZs serving the runway ends extend beyond Airport property. While not required, it is preferable for the Airport to have ownership of the RPZ lands in order to insure compatible land uses. All RPZ lands extending beyond are shown for future property acquisition. Fortunately, the Airport owns avigation easements over all of the RPZ lands so the possibility of additional incompatibilities being introduced is somewhat low.

LANDSIDE CONCEPT

The primary goal of landside facility planning is to provide adequate aircraft storage space to meet forecast needs, while also maximizing operational efficiencies. The development scheme presented segregates aircraft activity levels, while placing the airport in a position to maximize revenue potential. The landside facility plan is depicted on **Exhibit 5B**.



SRE: Snow Removal Equipment

There are an unlimited number of potential facility layout concepts that could be considered. The plan shown is only one possible layout for future hangars which may change based on developer needs. Nonetheless, the layout presented is a starting point for future development needs. What should be strongly adhered to is utilization of aviation reserve land for aviation facilities.

HANGARS

In the Facility Requirements chapter, it was determined, based on forecast growth and hangar occupancy arrangements, that the Airport currently has adequate aircraft storage space through the long term planning period. However, individual owner and/or developer needs may indicate a need or desire to construct new hangars customized to their operational needs. To accommodate this potential, locations for new conventional and/or business hangars have been identified.

New hangar development is planned to be primarily on or adjacent to the currently closed north apron, as shown on **Exhibit 5B**. Immediately north of the tower is depicted eight conventional hangars, each measuring approximately 150 feet by 150 feet. Access taxilanes, emanating from Taxiway A, are planned. Vehicular access is planned to be available from a new access road extending from Forbes Avenue.

The north apron pavement where this new hangar complex is planned has been closed for more than 10 years and is in such poor condition it cannot be rehabilitated. Therefore, the pavement would have to be removed and new pavement installed. Consideration should be given to the possibility of utilizing the old pavement as a base layer which would reduce costs and be more sustainable.

In the grassy area immediately west of the closed north apron is planned a single large conventional hangar with doors on both sides. This hangar replicates several of the existing large hangars fronting the aircraft apron.

FUEL FARM

Immediately north of this hangar is planned the replacement fuel farm. It is well-documented that the existing fuel farm is inadequate in many ways and it should be replaced as soon as financially feasible. The current fuel farm is more than 50 years old and has required several “work-around” improvements in order to be maintained. It is made of steel, rather than epoxy, and is thus susceptible to rust. It is underground making exterior inspection impossible. In addition, it is located on the east side of Taxiway A, thus requiring the crossing of Taxiway A in order to access it. Refueling tankers require a lead escort vehicle which consumes FBO staff time.

Several alternative locations were considered. The consensus is that a portion of the undeveloped grassy area adjacent to the closed north apron would be an acceptable location for a replacement fuel farm. A dedicated loop access road extending from Forbes Avenue is also planned. This layout will facilitate easy landside access for refueling tankers and airside escorts would no longer be necessary.

The new fuel farm is planned to encompass three 30,000-gallon Jet A tanks for a total capacity of 90,000 gallons. These tanks are to be above-ground, double-walled, and bullet proof. Previous analysis indicated a desire by the FBO for up to 200,000 gallons of capacity. Financial constraints and fuel flowage rates led to the conclusion that 90,000 gallons will suffice. AvGas is planned to be stored in the fuel delivery trucks, as is the current procedure.

The new fuel farm is planned to encompass three 30,000 Jet A tanks for a total capacity of 90,000 gallons.

SNOW REMOVAL EQUIPMENT BUILDING

The Airport does not have a dedicated snow removal equipment (SRE) storage building. Currently, SRE is stored in vacant hangars or, on occasion, outside. Both the FAA and the Airport have made significant investments in the SRE equipment and it should be maintained within an appropriate dedicated facility.

Optimally, an SRE building will be centrally located in order to allow for quick and ready access to the airfield. The Airport has identified a preferred location immediately north of their administrative offices. The planned new SRE building would either replace the aging building #625 or be located immediately west in the undeveloped grassy area.

AIRCRAFT APRONS

Topeka Regional Airport, like many airfields initially developed for military purposes, has large expanses of apron area. The challenge for civilian operators of these airfields is to both maintain these aprons and to generate revenue from them. The following discussion presents the future plans for each of the main civilian aprons at the Airport.

Passenger Terminal Apron

The passenger terminal apron encompasses approximately 60,000 square yards of pavement. It provides itinerant aircraft parking. It also provides apron space for commercial passenger and certain charter flights. This apron was resurfaced and marked within the last five years. This apron is planned to be maintained in its entirety. Within the next 20 years, routine maintenance and crack sealing should be undertaken. In the long term, it may also be in need of a mill and overlay. It is not anticipated that this pavement will need to be reconstructed within the master plan planning horizon.

General Aviation Apron

The general aviation apron encompasses approximately 89,000 square yards of pavement. Previous analysis indicated that this size exceeds that which is needed to accommodate current and future growth. In an effort to prioritize pavement maintenance funds, consideration is given to removing from

service approximately 37,000 square yards of this apron. Over time, this pavement will deteriorate, much like the closed north apron. Steps should be taken to limit the potential for crumbling pavement to blow onto the active aprons and taxiways, and for heaving pavement to negatively impact active pavements. Ultimately, the pavement may be removed and replaced with grass.

Charter Apron

The 135,000-square-yard charter apron is immediately north of the passenger terminal apron. This pavement provides a unique and necessary capability at the Airport. Charter operators frequent the Airport for a variety of purposes. The military at Fort Riley will contract with private charter operators for troop deployment purposes. It is common for aircraft as large as a Boeing 747 to be utilized for these purposes. Often these aircraft will be flown from Topeka Regional Airport to Germany or other forward bases. In addition, casino and university team charters will utilize the charter apron. At times, there have been several larger transport-type aircraft utilizing the charter apron at the same time.

The apron is in usable condition; however, the top layer of asphalt is showing signs of deterioration. The apron is poorly marked which leads to inefficient use of the pavement. It is recommended that the charter apron be maintained throughout the planning period. Within the next 10 years, it should be milled, overlaid, and remarked. The suggested markings are three taxilane centerlines with pull-through capability intended to accommodate large transport aircraft. **Exhibit 5B** shows three spaces for B-747s and four spaces for B-767 aircraft.

North Apron (Closed)

The north apron encompasses approximately 218,000 square yards of pavement and it has been closed for a number of years. This pavement is not usable by an aircraft. Most of the apron is crumbling concrete that creates Foreign Object Debris (FOD) and tension on adjacent active pavements such as Taxiway A.

Initially, small linear sections of the apron are planned to be removed in order to relieve the pressure on Taxiway A and other active pavements. A line of 25-foot pavement slabs adjacent to Taxiway A and across the northern portion of the apron are planned to be removed for these purposes. This is approximately 5,000 square yards of pavement removal.

This pavement area is not planned to be reopened except on an as-needed basis for reconstruction. For example, the military deployment facility was constructed on a portion of the south end of this pavement by removing the old pavement and constructing new pavement. The long range plan considers utilizing a portion of the apron, immediately north of the tower for future hangar construction. Like before, this would require reconstruction of the appropriate apron areas to accommodate the hangars and taxilanes.

VEHICULAR ACCESS AND PARKING

A planning consideration for any airport master plan is the segregation of vehicles and aircraft operational areas. This is both a safety and security consideration for an airport. Aircraft safety is reduced and accident potential increased when vehicles and aircraft share the same pavement surfaces. Vehicles contribute to the accumulation of debris on aircraft operational surfaces, which increases the potential for FOD, especially for turbine-powered aircraft. The potential for runway incursions is also increased, as vehicles may inadvertently access an active runway or taxiway area if they become disoriented when on the aircraft operational area (AOA). Airfield security may be compromised as there is loss of control over the vehicles as they enter the secure AOA. The greatest concern is for public vehicles, such as delivery vehicles and visitors, which may not fully understand the operational characteristics of aircraft and the markings in place to control vehicle access. One solution is to provide dedicated vehicle access roads to each landside facility that is separated from the aircraft operational areas with security fencing.

The segregation of vehicle and aircraft operational areas is supported by FAA guidance established in June 2002. FAA AC 150/5210-20, *Ground Vehicle Operations on Airports* states, "The control of vehicular activity on the airside of an airport is of the highest importance." The AC further states, "An airport operator should limit vehicle operations on the movement areas of the airport to only those vehicles necessary to support the operational activity of the airport."

The landside alternative for Topeka Regional Airport has been developed to reduce the need for vehicles to cross aprons or taxiways. Dedicated vehicle parking areas, which would be outside the planned airport perimeter fence, are considered in association with new hangars. As a Part 139 certificated commercial service airport, it is incumbent upon the airport operator to permit only badged or escorted vehicles and personnel on the airfield, particularly in the passenger terminal area.

TERMINAL BUILDING AND PARKING

Topeka Regional Airport is equipped with a passenger terminal building. The Airport has diligently maintained the facility despite a period when there was no scheduled commercial service. The Airport FBO has maintained a presence in the terminal building, thus providing services and certain airport staff utilize office space.

It is recommended that the Airport continue to maintain the terminal building. It is sized to accommodate both a return of scheduled passenger service and FBO services. Only when the Airport sees a level of enplanements around 80,000 annually would it become significantly space-constrained.

The parking lots serving the terminal building are ideally located within a circle loop road. Currently, the lots are underutilized since there is not scheduled commercial service. Therefore, it is recommended that maintenance be prioritized with the lots closest to the terminal building being maintained first and those further away having less priority. Consideration may be given to removing the more distant terminal parking areas from service until such time that a return of commercial service warrants bringing them back into service. Overall, the vehicle parking lot size will accommodate even exceptional growth in enplanements.

AIRPORT LAND USE PLAN

The objective of airport land use planning is to coordinate future uses of the airport property in a manner that is both functional with the design of the airport and compatible with the airport environs. There are two primary considerations for on-airport land use planning. First is to secure those areas essential to the safe and efficient operation of the airport. Second is to determine compatible land uses for the balance of the property which would be most economically advantageous to the airport and the community.

ON-AIRPORT LAND USE OBLIGATIONS

The Airport has accepted grants for capital improvements from the FAA. As such, the Airport sponsor has agreed to certain grant assurances (See **Appendix B**). Grant assurances related to land use ensure that Airport property will be reserved for aeronautical purposes. If the Airport sponsor wishes to sell (release) airport land or lease airport land for a non-aeronautical purpose (land use change), they must petition the FAA for approval. The Airport Layout Plan and the Airport Property Map must then be updated to reflect the sale or land use change of the identified property. Additional discussion on this topic was presented in Chapter Three - Facility Requirements.

The FAA's Airport Compliance Program ensures airport sponsors comply with the Federal obligations they assume when they accept Federal grant funds or the transfer of Federal property for airport purposes. The program serves to protect the public interest in civil aviation and ensure compliance with applicable Federal laws, FAA rules, and policies.

Sources of Obligations

When airports receive Federal assistance, the owners or sponsors accept certain obligations and conditions which may be incurred by contract or by restrictive covenants in property deeds. This generally involves the following:

- Grant agreements (Grant Assurances) issued under Federal grant programs;
- Instruments of approved property transfers (e.g., property acquisition);
- Deeds of conveyance.

When Airport owners and operators accept Federal grants, they agree to preserve and operate their facilities in a safe and efficient manner and comply with certain conditions and assurances. These obligations can span different airport development grant programs, including the Federal Aid to Airports Program (FAAP), the Airport Development Aid Program (ADAP), and the current Airport Improvement Program (AIP). Airport owners should be aware that obligations incurred under each program or conveyance document vary.

Major Obligations

The following list includes some of the major obligations an airport owner can incur when accepting a Federal airport development grant.

- Prohibition of exclusive rights
- Proper use of airport revenue for Airport needs
- Proper maintenance and operation of airport facilities
- Protection of approaches
- Keeping good title of airport property
- Compatible land use
- Availability of fair and reasonable terms without unjust discrimination
- Adhering to the approved airport layout plan
- Financial self-sustainability
- Sale or disposal of Federally acquired property
- Preserving rights and powers
- Using acceptable accounting and record-keeping systems
- Compliance with civil rights requirements

The FAA encourages airport owners to review each agreement and conveyance document to ensure that they understand their obligations. Keeping good records will allow them to quickly reference incurred obligations. Further, annual reviews of all agreements will aid efforts in complying with incurred Federal obligations.

ON-AIRPORT LAND USE PLAN

The FAA requires that all federally obligated airports utilize property for aviation purposes first and foremost. If an airport has land that is unlikely to be utilized for aviation purposes because it exceeds that which is forecast to be needed or is inaccessible by aircraft, then these lands may be considered for compatible, non-aviation revenue support development. The revenue from these activities would provide supplemental funds to the airport with the goal of improving an airport's overall financial position.

By categorizing the entirety of airport property, Airport management can plan and direct any development proposals to appropriate locations. There are three major land use categories on an airport: airfield operations, aviation development, and non-aviation revenue support. The non-aviation revenue support category is only available to those airports with property that is unlikely to be needed for airfield operations or aviation development, or cannot be utilized for those purposes. Often these categories are further subdivided to provide a better understanding of current or intended uses of airport property. **Exhibit 5C** presents the proposed land use classification for the Airport, each of which is discussed as follows:

AIRFIELD OPERATIONS

Airfield operations is that portion of airport property that encompasses the major airside elements, such as the runways, taxiways, runway safety area, runway object free area, runway obstacle free zone, runway protection zone (on airport property), taxiway safety area, taxiway object free area, navigational aid critical areas, and the runway visibility zone (where applicable).

Airfield operations are intended for the safe and efficient movement of aircraft to and from the airfield. This land use designation includes the various object clearing areas and only elements necessary for aircraft navigation can be located here.

AVIATION DEVELOPMENT

The Aviation Development land use category includes those areas that should be reserved for development that require access to the airfield operations area. This might include aircraft hangars and transportation terminals. Any aviation business needing access to the runway and taxiway system could locate in these areas. A rule of thumb is that all land immediately adjacent to the runway and taxiway system must be reserved for aviation development. For undeveloped areas in this classification, a depth of approximately 1,200 feet from the runway centerline has been reserved. This distance will allow for future taxiways, taxilanes, aprons, hangars, and access roads. This land use category has been further subdivided as follows:

Passenger Terminal Area: The passenger terminal area is fairly well-defined and it encompasses the terminal building, the vehicle parking lots, and the terminal aircraft apron. This designated area includes enough land area to accommodate long term growth potential in passenger service.

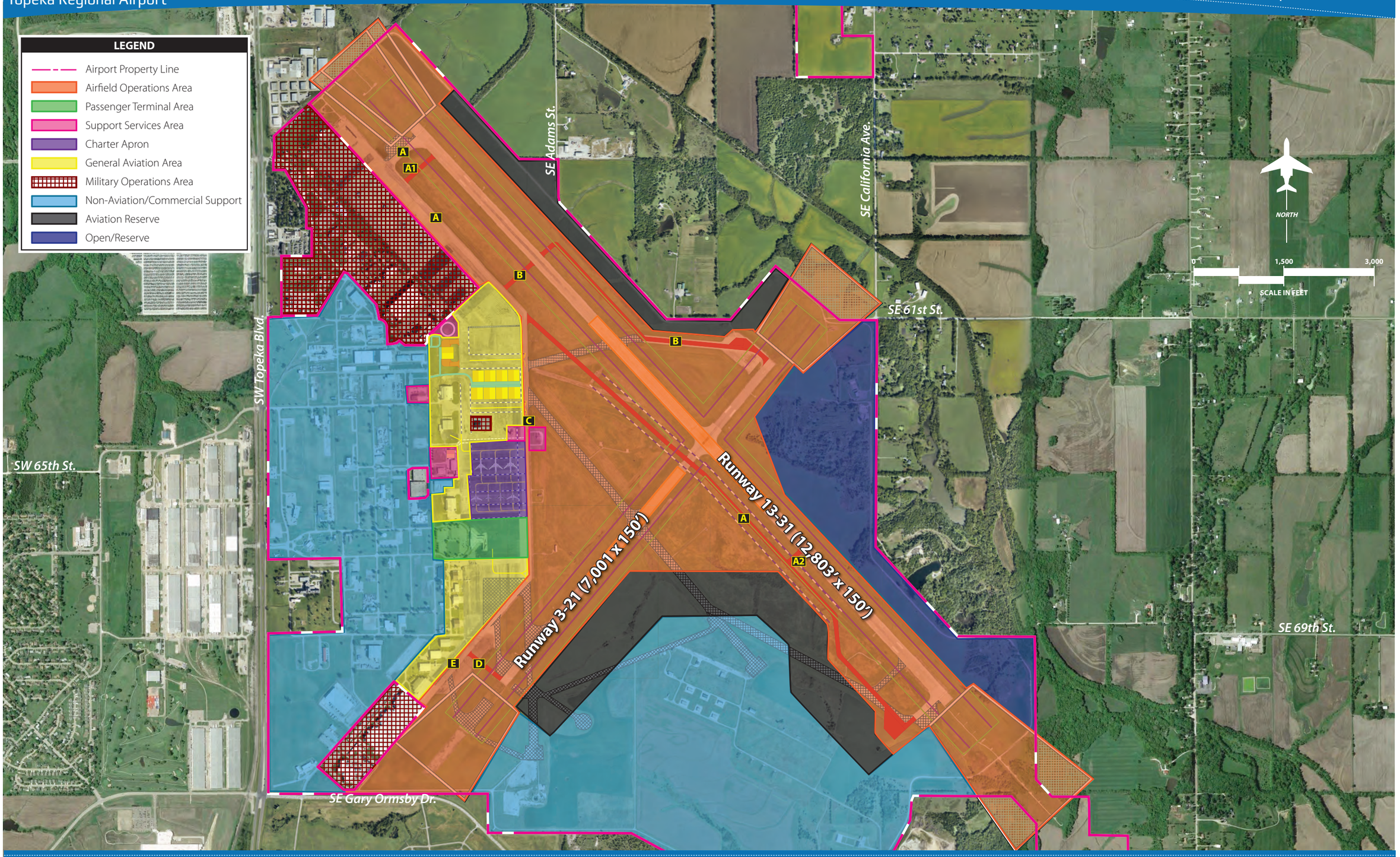
Airport Support Services Area: This land use designation encompasses the variety of services necessary for operating an airport, including the fuel farm, maintenance, and snow removal facilities.

Charter Apron: The apron area immediately north of the passenger terminal area has a primary purpose of serving large transport aircraft used in a charter function.

General Aviation Area: The general aviation area is also fairly well-defined at the Airport. It includes the FBO facilities, aircraft aprons, and other general aviation support services.

Military Operations Area: There are two areas of the Airport that are owned by the National Guard Bureau. At the north end of the airfield is the Kansas Air National Guard 190th Air Refueling Wing. The Kansas Army National Guard leases the land at the south end of the airfield from the National Guard Bureau.

Open Space: The southeast area of the airport, between Runways 21 and 13, has been designated as open space. A portion of this property has a decommissioned landfill originating from when the Airport was exclusively a military base. This area is planned to be left as open space so as not to disturb the former landfill.



SRE: Snow Removal Equipment

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NON-AVIATION REVENUE SUPPORT

This land use classification includes development that is compatible with aviation activities but is unlikely to require access to the runway and taxiway system. Typically, it is preferable that activities in these areas will complement airport activities to some degree, but that is not required. Examples of potential uses include research facilities, laboratories, manufacturing and processing facilities, warehouses, and other facilities compatible with an airport environment.

LAND USE COMPATIBILITY

Land use planning in the area surrounding Topeka Regional Airport occurs through regulatory and non-regulatory means. The primary regulatory tool for directing land use is the zoning ordinance, which limits the types, size, and density of land uses in various locations. Examples of land use types include residential, commercial, industrial, and agricultural. Non-regulatory means of land use control include land use plans. These can be adopted for the greater municipality or for specific areas. Within the vicinity of Topeka Regional Airport, there are areas under the land use planning jurisdiction of the City of Topeka and Shawnee County.

It is important to note the distinction between the primary land use concepts used in evaluating development within the airport environs and existing land use, existing zoning, and general plan land use. Existing land use refers to property improvements as they *exist today* according to county records. Existing zoning identifies the type of land use *permitted on* a given piece of property according to the county and city zoning ordinances and maps. Local governments are required to regulate the subdivision of all lands within their corporate limits.

The general plan land use map identifies the *projected or future* land use according to the locally adopted general plans. This document guides future development within the community planning area and provides the basis for zoning designations. Zoning ordinances should be consistent with the general plan, where one has been prepared. In some cases, the land use allowed in the zoning ordinance or depicted in the general plan may differ from the existing land use.

EXISTING LAND USE

A summary of the existing land uses and associated land use map for the area surrounding Topeka Regional Airport can be found in Chapter One under the section titled Area Land Use. These land uses are depicted on Exhibit 1E.

FUTURE LAND USE

The City of Topeka adopted the *Land Use & Growth Management Plan 2040* in March 2015, which includes growth management, land use, and annexation policies for Topeka, Topeka's Urban Growth Area

(UGA), and the three-mile extraterritorial jurisdiction (ETJ). The purpose of the UGA, as discussed in the plan, is "to direct future urban growth to existing areas within Topeka, either through infill development, redevelopment, or rehabilitation." Land within the Topeka UGA is encouraged, over the planning period, to be annexed into Topeka when ready for urban development. By State law, the City of Topeka has land use subdivision authority over a three-mile buffer of the city limits which is described as extraterritorial jurisdiction. The ETJ encompasses the UGA, and the City of Topeka has extended water and sewer infrastructure beyond the city limits into these areas. Accordingly, the City of Topeka has established rules for connecting to these services which are outlined in the plan as follows, "within the UGA, annexation is required to connect to city water and sewer service. Outside the UGA, but within the ETJ, annexation is required for water service, and only consent to annexation is required for sewer service." The zoning designation for much of the land within the UGA/ETJ is Residential Reserve (RR-1), which is further described below.

To date, Shawnee County has not adopted a long range planning document for the unincorporated areas of the county which are located outside of the UGA/ETJ.

FUTURE LAND USE SUMMARY

For the purposes of this analysis, a study area consisting of a one-mile buffer from each of the runway ends was established. This area is approximately 6,651 acres, of which 904 acres are within the City of Topeka and 5,747 are within Shawnee County.

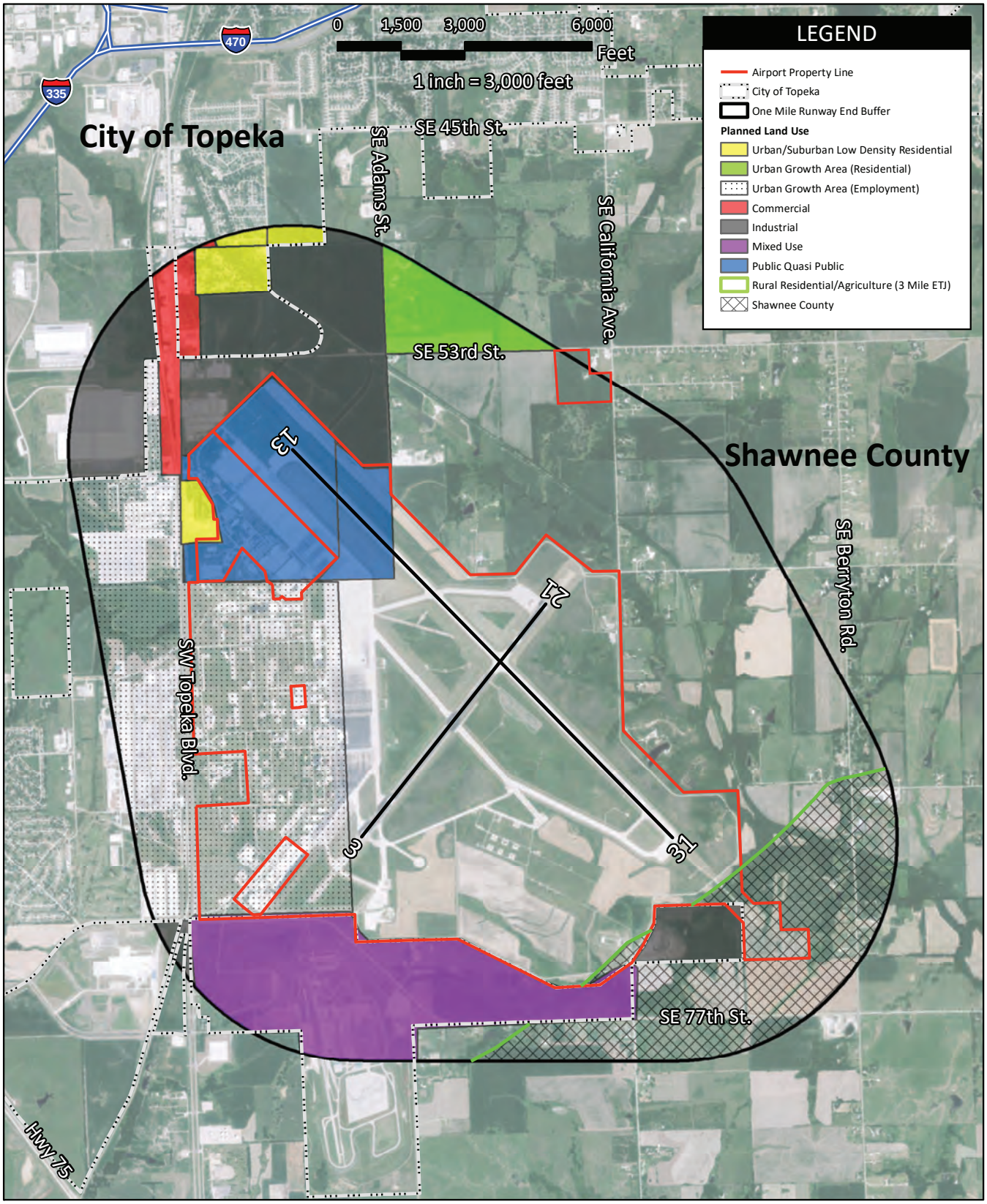
As shown on **Exhibit 5D** and summarized in **Table 5A**, future land use classifications within the study area include: Rural Residential/Agriculture (3 mile ETJ), Industrial, Urban Growth Area (Employment), Mixed Use, Urban/Suburban Low Density Residential, Public/Quasi Public, and Commercial. As indicated in the table, future land use with the largest area is the Rural Residential/Agriculture district, which includes the airport property.

TABLE 5A
Future Land Use Summary

Future Land Use	Acreage[1]	Percent of Study Area
Urban/Suburban Low Density Residential	94	1.41%
Urban Growth Area (Residential)	124	1.85%
Urban Growth Area (Employment)	1133	16.96%
Commercial	88	1.31%
Industrial	648	9.71%
Mixed Use	514	7.69%
Public Quasi Public	398	5.96%
Rural Residential/Agriculture (3 mile ETJ)	3090	46.27%
Shawnee County	591	8.84%
Total	6,679	100%

Source: City of Topeka, Future Land Use & Management Plan 2040. Coffman Associates analysis.
[1] Study area acreage differs from Table 5D due to differences in source data.

These land uses are described in *Land Use & Growth Management Plan 2040*, Section V. – Land Use as follows:



Source: City of Topeka Land Use & Growth Management Plan 2040,
ESRI Basemap Imagery 2014

Rural Residential/Agriculture – The category is intended to recognize areas within the City's three-mile extraterritorial jurisdiction and outside the City's UGA that should remain reserved for rural residential single-family uses, agriculture, or open space with a minimum lot size of 20 acres because of the lack of urban services and infrastructure or the ability to extend these services. Development and urban services are not planned in these areas within this planning horizon.

Industrial – This category comprises both light and heavy industrial uses. The areas are generally located at sites with available transportation access, including rail, air, and roadways, with limited slopes and suitable topography for large scale distribution and warehousing centers. All infrastructure services are generally readily available at these sites or can be extended without significant constraints.

Urban Growth Area (Employment) – This represents the Employment Tier within the UGA that is meant for employment-related uses. The areas are either zoned for industrial uses or are planned future employment areas. As described in the plan, the Employment Tier is for employment related uses which are primarily industrial in nature.

Mixed Use – This category comprises areas which exhibit potential for new development or redevelopment of mixed use commercial, residential, and/or office that may be located within the same buildings or within the same area. These areas are characterized where there is a significant display of undeveloped land or vacant buildings that exhibit potential for mixing uses. The Heartland Park Mixed Use area is located south of the airport, but no further guidance is provided regarding future development in this area.

Urban/Suburban Low Density Residential – These areas are predominately characterized by a cohesive display of single-family or two-family residential development, up to a maximum of six dwelling units per acre, primarily in the form of subdivisions, that are within the current city limits where the full range of urban services (sewer, water, police, fire, and urban roads) are either provided or expected to be extended within this planning horizon.

Typical residential densities are in the range of 3-4 dwelling units per acre on generally ¼-acre platted lots for the post-1950 subdivisions. Single-family development at higher densities (25' wide lots) exists in the pre-1950 neighborhoods of the city. Religious assembly uses are also included within this category.

Public/Quasi Public – This category may include schools, colleges, other educational institutions, government institutions, transportation facilities, public utilities. Adaptive re-use of existing public/quasi-public facilities for other compatible uses such as community centers, religious assembly, multi-family residential, mixed-use, or office may be encouraged if these public facilities are abandoned based upon the pattern of land uses in the surrounding area.

Commercial – Within the plan, commercial areas are categorized as the following: "Regional," "Community," and "Neighborhood" based upon their location, the Average Daily Trips at the intersection, the amount of existing commercially zoned acreage at the center, functional street classification, number of neighborhoods served, proximity to other commercial centers, and the

pattern of surrounding land uses. The commercial area within the study area is classified as Community Commercial. These areas contain large-scale commercial uses that serve multiple neighborhoods in the city with goods and services, large traffic generators, and usually at least 30 acres of land area. Typical uses found in these centers include: super center discount stores, hardware stores, drug stores, lumber yards and home improvement stores, movie theaters, and sporting goods stores. "Big box" retail establishments are appropriate in these areas, but should be developed so that there is limited impact upon any surrounding neighborhoods of less intense zoning regarding traffic, noise and visual clutter.

ZONING

Residential zoning classifications establish the number and type of dwelling units that can be constructed on a piece of land. Density (i.e., number of dwelling units per unit of land) or minimum lot size is of particular note in airport and land use compatibility planning. This figure determines how many dwelling units may be constructed on a given parcel.

If an area zoned for high-density development is exposed to increased levels of noise, a greater impact can result. Limiting the density near an airport can help to improve compatibility and limit the number of impacts on surrounding land uses. A complete list of allowable uses for the City of Topeka and Shawnee County Zoning ordinances is included in **Appendix D.**

The City of Topeka City zoning ordinance includes nine separate residential zoning classifications: Residential Reserve (RR-1), Single Family (R1, R2, R3), Manufactured Home (R4), Two Family (M1), Limited Multiple Family (M1a), Multiple Family (M2, M3). Each of these zoning classifications allows residential development at varying minimum lot sizes, densities, and heights as summarized in **Table 5B**.

Similarly, Shawnee County has six residential zoning classifications: Rural Agriculture District (RA-1), Residential Reserve District (RR-1), Single Family Dwelling District (R-1), Two Family Dwelling District (M-1), Limited Multiple Family Dwelling District (M-1a), and Multiple Family Dwelling District (M-2). The dimensional and density standards for these zoning districts are summarized in **Table 5C**.

Table 5B
City of Topeka Zoning Ordinance Summary

District Name	Minimum Lot Area	Maximum Density (Dwelling Units Per Acre)	Maximum Height[1]
Residential Districts			
RR-1 Residential Reserve	20 acres	None	42 ft.
R1 Single Family	6,500 sq. ft.	None	42 ft.
R2 Single Family	5,000 sq. ft.	None	42 ft.
R3 Single Family	4,000 sq. ft.	None	42 ft.
R4 Manufactured Home	30,000 sq. ft.	None	42 ft.
M1 Two Family	4,500 sq. ft.	6	42 ft.
M1a Limited Multiple Family	4,500 sq. ft.	10	45 ft.
M2 Multiple Family	7,500 sq. ft.	15	50 ft.
M3 Multiple Family	7,500 sq. ft.	30	160 ft.

Table 5B (Continued)
City of Topeka Zoning Ordinance Summary

District Name	Minimum Lot Area	Maximum Density (Dwelling Units Per Acre)	Maximum Height[1]
Industrial and Commercial Districts			
O&I1 Office and Institutional	7,500 sq. ft.	40 ft.	42 ft.
O&I2 Office and Institutional	7,500 sq. ft.	50 ft.	60 ft.
O&I3 Office and Institutional	7,500 sq. ft.	60 ft.	75 ft.
C1 Commercial	7,500 sq. ft.	40 ft.	35 ft.
C2 Commercial	10,000 sq. ft.	50 ft.	50 ft.
C3 Commercial	10,000 sq. ft.	60 ft.	70 ft.
C4 Commercial	10,000 sq. ft.	60 ft.	70 ft.
C5 Commercial	10,000 sq. ft.	100 ft.	None
All Other Districts			
I-1 Light Industrial	10,000 sq. ft.	85 ft.	70 ft.
I-2 Heavy Industrial	10,000 sq. ft.	85 ft.	None
U University	None	None	None
MS-1 Medical Services	None	80 ft.	160 ft.
X1 Mixed Use	None	75 ft.	40 ft.
X2 Mixed Use	None	75 ft.	50 ft.
X3 Mixed Use	None	100 ft.	50 ft.
D1 Downtown	None	100 ft.	None
D2 Downtown	None	75 ft.	50 ft.
D3 Downtown	None	100 ft.	60 ft.
OS-1 Open Space District	None	None	42 ft.

[1] The City of Topeka dimensional standards provide a note stating, "Height restrictions of Airport Overlay District may be more restrictive."
Source: City of Topeka Dimensional Standards by Zoning District, http://www.topeka.org/Planning/ZoningMatrix.shtml, accessed May 2016

Table 5C
Shawnee County Zoning Ordinance Summary

District Name	Minimum Lot Size	Maximum Height
Residential		
RA-1 Rural Agriculture District	3 acres	42 ft.
RR-1 Residential Reserve District	3 acres	42 ft.
R-1 Single Family Dwelling District	6,500 sq. ft.	42 ft.
M-1 Two Family Dwelling District	4,000 sq. ft. for single family 4,500 sq. ft. for two family	45 ft.
M-1a Limited Multiple Family Dwelling District	4,000 sq. ft. for single family 4,500 sq. ft. for two family 4,350 sq. ft. per unit for three or more dwellings	45 ft.
M-2 Multiple Family Dwelling District	3,500 sq. ft. for single family 4,500 sq. ft. for two family 1,500 sq. ft. per unit for three or more dwellings	50 ft.

Table 5C (Continued)
Shawnee County Zoning Ordinance Summary

District Name	Minimum Lot Size	Maximum Height
Office and Institutional		
O & I-1 Office and Institutional	15,000 sq. ft.	42 ft.
O & I-2 Office and Institutional	20,000 sq. ft.	75 ft.
O & I-3 Office and Institutional	None	There is no height limitation except when in conflict with Airport Hazard Zone Regulations.
Commercial and Industrial		
C-1 Commercial District	4,000 sq. ft. for single tenant 15,000 sq. ft. for multi-tenant, with no individual tenant exceeding 2,000 sq. ft.	35 ft.
C-2 Commercial District	50,000 sq. ft.	60 ft.
C-3 Commercial District	None	70 ft.
C-4 Commercial District	None	70 ft.
I-1 Light Industrial District	None	There is no height limitation except when in conflict with Airport Hazard Zone Regulations.
I-2 Light Industrial District	None	There is no height limitation except when in conflict with Airport Hazard Zone Regulations.
Other		
PUD Planned Unit Development District	All development to be in accordance with approved Master and Final Plans.	
OS-1 Open Space District	It is the intent of this district to protect these areas from urban, non-open space or incompatible development.	

Source: Shawnee County Summary Descriptions of Zoning Districts, http://www.snco.us/planning/commission_descriptions.asp, accessed May 2016.

Non-residential Categories

Non-residential zoning classifications, such as commercial and industrial, are typically considered compatible with airport operations because of their inherent noise characteristics; however, non-compatible uses may be allowed with a conditional use or special use permit or exemption.

The City of Topeka zoning ordinance includes several non-residential zoning districts, such as Office and Institutional (O&I1, O&I2, O&I3), Commercial (C1, C2, C3, C4, C5), Light Industrial (I-1), Heavy Industrial (I-2), University (U), Medical Services (MS-1), Mixed Use (X1, X2, X3), Downtown (D1, D2, D3), and Open Space (OS-1).

Shawnee County non-residential zoning categories include: Office and Institutional (O&I1, O&I2, O&I3), Commercial (C1, C2, C3, C4), Light Industrial (I-1), Heavy Industrial (I-2), Planned Unit Development (PUD) and Open Space (OS-1).

Airport-Related Overlays

As discussed in Chapter One, the City of Topeka and Shawnee County have adopted height and hazard zoning for the protection of Topeka Regional Airport. Topeka Municipal Code, Chapter 18.205, *Forbes Field and Philip Billard Airports Hazard Zoning*, codifies these regulations. Shawnee County adopted this zoning by reference with Section 29-181 of the Shawnee County Code. According to Chapter 18.205, the height limitations require that no structure or tree shall be erected, altered, allowed to grow, or be maintained in any zone to a height in excess of the height limit established for each zone. As indicated in **Table 5C**, some of the Shawnee County zoning districts refer to the height limitations set forth in the Height and Hazard Zoning ordinance.

Zoning Summary

Using the zoning maps available from Shawnee County and the City of Topeka, the zoning districts within the study area were summarized based on jurisdiction and zoning classification and are included in **Table 5D** and depicted on **Exhibit 5E**. As indicated in the table, the largest amount of land within the study area is zoned RR-1, Residential Reserve. These acreages also include airport property which is zoned Residential Reserve (RR-1).

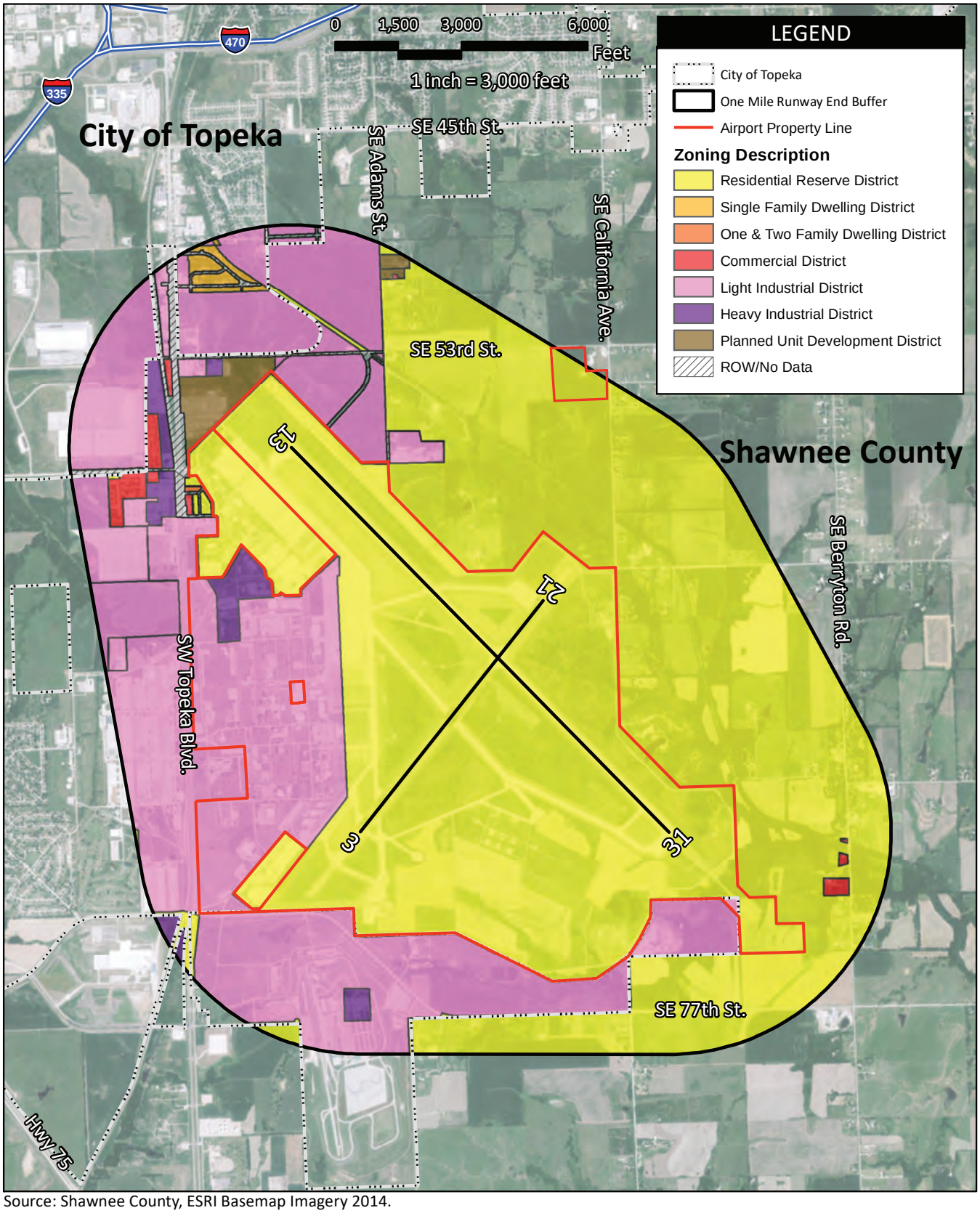
Table 5D
Zoning Area Summary

Zoning District	Acreage[1]	Percent of Study Area
City of Topeka		
Residential Reserve District (RR-1)	13	0.19%
Single Family Dwelling District (R-1)	25	0.37%
Commercial District (C-2)	0	0.00%
Light Industrial District (I-1)	828	12.45%
Heavy Industrial District (I-2)	20	0.30%
ROW/No Data	18	0.27%
City of Topeka Subtotal	**904**	**13.59%**
Shawnee County		
Residential Reserve District (RR-1)	4272	64.23%
One & Two Family Dwelling District (M-1)	1	0.02%
Commercial District (C-2)	40	0.60%
Light Industrial District (I-1)	1229	18.48%
Heavy Industrial District (I-2)	76	1.15%
Planned Unit Development District (PUD)	67	1.00%
ROW/No Data	63	0.94%
Shawnee County Subtotal	**5,747**	**86.41%**
Study Area Total	**6,651**	**100%**

Source: Shawnee County GIS, May 2016. Coffman Associates analysis.
[1] Study area acreage differs from Table 5A due to differences in source data.

SUBDIVISION REGULATIONS

Subdivision regulations apply in cases where a parcel of land is proposed to be divided into lots or tracts. They are established to ensure the proper arrangements of streets, adequate and convenient public



Source: Shawnee County, ESRI Basemap Imagery 2014.

spaces, efficient movement of traffic, adequate and properly located facilities, and orderly and efficient layout and use of land.

Subdivision regulations can be used to specify requirements for airport-compatible land development by requiring developers to plat and develop land to minimize noise impacts or reduce the noise exposure to new development. The regulations can also be used to protect the airport proprietor from litigation for noise impacts at a later date.

The most common requirement is the dedication of a noise or avigation easement to the airport sponsor by the land developer as a condition of the development approval. Easements typically authorize over-flights of property, with noise levels attendant to such operations. They can also require developers to incorporate noise insulation during construction.

Land division and subdivision procedures for the City of Topeka are codified in municipal code Title 18, Comprehensive Plan, Signs, Subdivisions, Zoning, Chapter 30, General Provisions and Chapter 35, Platting. The subdivision regulations were last amended in March 2015. According to these chapters, there are not specific procedures related to airport land use compatibility in the City's subdivision process. However, the City examines all concept plans for their compliance with the applicable city codes and zoning, including the *Forbes Field and Philip Billard Airports Hazard Zoning* ordinance.

Shawnee County adopted subdivision regulations in March 2004. According to the regulations, there are not specific procedures related to airport land use compatibility in the County's subdivision process. However, the County examines all concept plans for their compliance with the applicable codes and zoning, including the *Forbes Field and Philip Billard Airports Hazard Zoning* ordinance.

BUILDING CODE

Building codes regulate the construction of buildings and ensure that they are constructed in a safe manner. Building codes may be used to require sound insulation in new residential, office, and institutional buildings when warranted by existing or potential high aircraft noise levels. According to the Topeka Municipal Code, the City has adopted the 2006 version of the International Building Code which does not include specific provisions for aircraft noise attenuation.

As outlined on the Shawnee County Planning Department website, "Shawnee County does not have an adopted building code but does administer a building permit process to assure that all construction is compliant with the requirements of the Shawnee County Zoning Regulations and other adopted county rules and regulations."

In 2016, Shawnee County selected a consultant to develop a Comprehensive Plan for unincorporated Shawnee County. While the plan is still in development as of this writing (June 2016), consideration is being given to incorporating building code. The MTAA should continue to monitor the progress of the Shawnee County Comprehensive Plan for any potential impact to the Airport.

NOISE EXPOSURE CONTOURS

The standard methodology for analyzing noise conditions at airports involves the use of a computer simulation model. The Federal Aviation Administration (FAA) has approved the Airport Environmental Design Tool (AEDT) for use in environmental analyses. The purpose of the noise model is to produce noise exposure contours that are overlain on a map of the airport and vicinity to graphically represent aircraft noise conditions. When compared to land use, zoning, and general plan maps, the noise exposure contours may be used to identify areas that are currently or have the potential to be exposed to aircraft noise.

To achieve an accurate representation of an airport's noise conditions, the AEDT uses a combination of industry standard information and user supplied inputs specific to the airport. The software provides noise characteristics, standard flight profiles and manufacturer supplied flight procedures for aircraft within the U.S. civil and military fleets, including those which commonly operate at Topeka Regional Airport. As each aircraft has different design and operating characteristics (number and type of engines, weight, and thrust levels), each aircraft emits different noise levels. The most common way to spatially represent the noise levels emitted by an aircraft is a noise exposure contour.

Airport specific information, including runway configuration, flight paths, aircraft fleet mix, runway use distribution, local terrain and elevation, average temperature, and numbers of daytime and nighttime operations are also used as modeling inputs.

Based on the assumptions provided by the user, the AEDT calculates average 24-hour aircraft sound exposure within a grid covering the airport and surrounding areas. The grid values, represented with the day-night noise level metric or DNL, at each intersection point on the grid represent a noise level for that geographic location. To create the noise contours, an isoline, similar to those on a topographic map, is drawn which connect points of the same DNL noise value. In the same way that a topographic contour represents the same elevation, the noise contour identifies areas of equal noise exposure.

DNL is the metric currently accepted by the FAA, EPA, and Department of Housing and Urban Development (HUD) as an appropriate measure of cumulative noise exposure. These three agencies have each identified the 65 DNL noise contour as the threshold of incompatibility.

The FAA guidelines summarized in **Exhibit 5F** indicate that all land uses are acceptable in areas below 65 DNL. At or above the 65 DNL threshold, residential land uses without acoustic treatment, mobile homes, and transient lodging are all incompatible. The exhibit notes that homes of standard construction and transient lodging may be considered compatible where local communities have determined these uses are permissible; however, acoustic treatment of these structures is recommended to meet noise level reduction thresholds when comparing the outdoor noise level to the indoor noise level. Schools and other public use facilities are also generally considered to be incompatible with noise exposure above 65 DNL. As with residential development, communities can make a policy decision that these uses are acceptable with appropriate sound attenuation measures. Hospitals and nursing homes, places of worship, auditoriums and concert halls are structures which are generally compatible if measures to achieve noise level reduction are incorporated into design and construction of structures. Outdoor music shells

LAND USE	Yearly Day-Night Average Sound Level (DNL) in Decibels					
	Below 65	65-70	70-75	75-80	80-85	Over 85
Residential						
Residential, other than mobile homes and transient lodgings	Y	N[1]	N[1]	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N[1]	N[1]	N[1]	N	N
Public Use						
Schools	Y	N[1]	N[1]	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Government services	Y	Y	25	30	N	N
Transportation	Y	Y	Y[2]	Y[3]	Y[4]	Y[4]
Parking	Y	Y	Y[2]	Y[3]	Y[4]	N
Commercial Use						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail-building materials, hardware and farm equipment	Y	Y	Y[2]	Y[3]	Y[4]	N
Retail trade-general	Y	Y	25	30	N	N
Utilities	Y	Y	Y[2]	Y[3]	Y[4]	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing, general	Y	Y	Y[2]	Y[3]	Y[4]	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y[6]	Y[7]	Y[8]	Y[8]	Y[8]
Livestock farming and breeding	Y	Y[6]	Y[7]	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y[5]	Y[5]	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts, and camps	Y	Y	Y	N	N	N
Golf courses, riding stables, and water recreation	Y	Y	25	30	N	N

The designations contained in this table do not constitute a federal determination that any use of land covered by the program is acceptable under federal, state, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under Part 150 are not intended to substitute federally-determined land uses for those determined to be appropriate by local authorities in response to locally-determined needs and values in achieving noise compatible land uses.

See other side for notes and key to table.

KEY

Y (Yes)	Land Use and related structures compatible without restrictions.
N (No)	Land Use and related structures are not compatible and should be prohibited.
NLR	Noise Level Reduction (outdoor-to-indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
25, 30, 35	Land Use and related structures generally compatible; measures to achieve NLR of 25, 30, or 35 dB must be incorporated into design and construction of structure.

NOTES

1. Where the community determines that residential or school uses must be allowed, measures to achieve outdoor-to-indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB, respectively, should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide an NLR of 20 dB; thus, the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.

2. Measures to achieve NLR of 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

3. Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

4. Measures to achieve NLR of 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

5. Land use compatible provided special sound reinforcement systems are installed.

6. Residential buildings require an NLR of 25.

7. Residential buildings require an NLR of 30.

8. Residential buildings not permitted.

Source: ***14 CFR Part 150***, Appendix A, Table 1.

and amphitheaters are not compatible and should be prohibited within the 65 DNL noise contour. Additionally, agricultural uses and livestock farming are generally considered compatible with the exception of related residential components of these uses, which should incorporate sound attenuation measures.

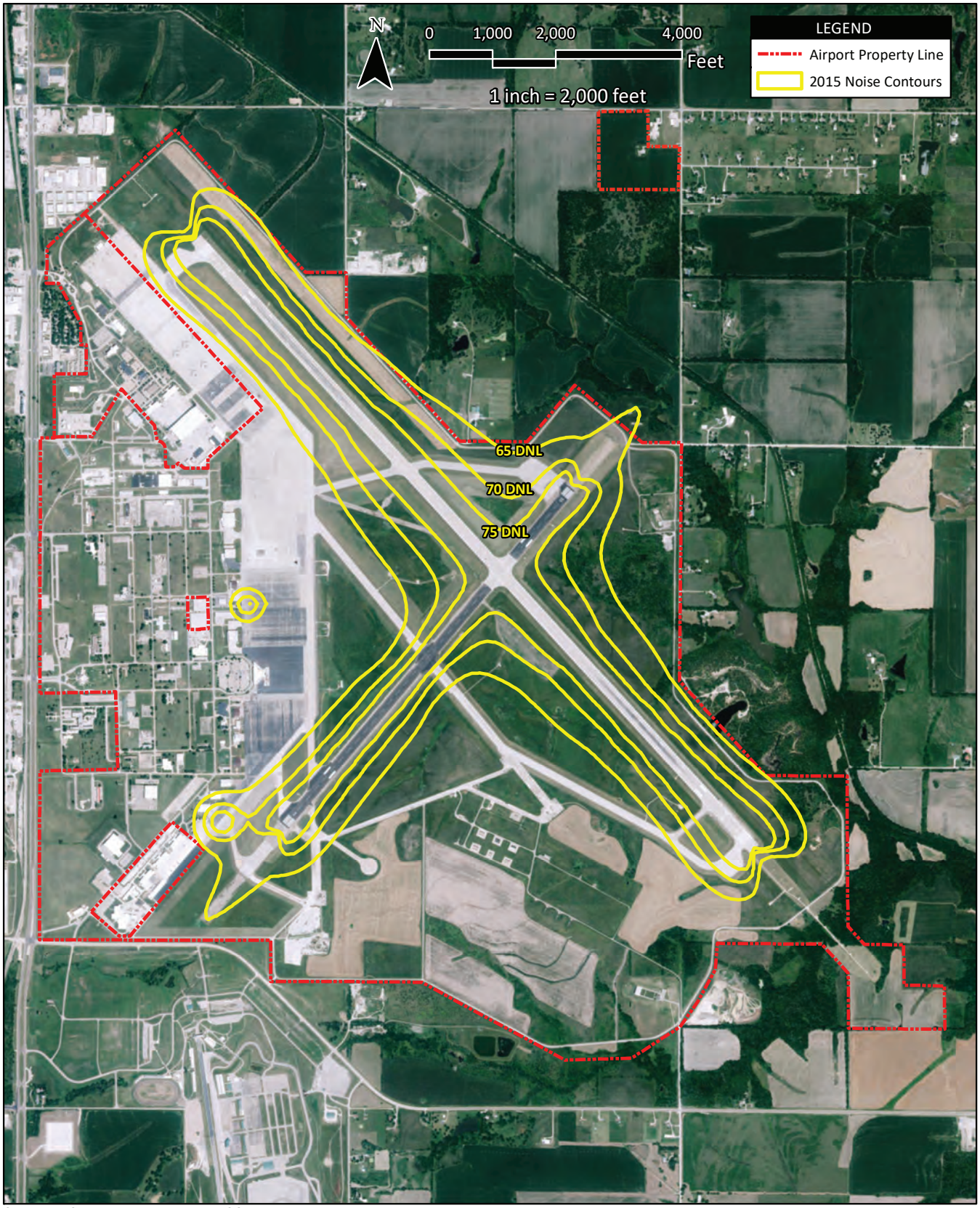
Noise exposure contours were prepared for Topeka Regional Airport for a baseline condition (2015) and a long range condition (2035) based on the operational forecasts presented in Chapter Two. The resulting contours are shown on **Exhibit 5G** and **Exhibit 5H**. As shown on the exhibits, the 70 and 75 DNL noise exposure contours remain entirely on airport property in both the baseline and long range conditions. The 65 DNL noise exposure contour in the baseline and long range condition extends off airport property to the east and northeast. Much of the non-airport area encompassed by the 65 DNL noise exposure contours is undeveloped land that is used for agriculture. However, based on a review of aerial photography there are barns and agricultural equipment storage areas within the 65 DNL noise exposure contours for the baseline and long range conditions. As noted in **Exhibit 5F**, these land uses are considered compatible from an aviation noise perspective.

NON-COMPATIBLE DEVELOPMENT ANALYSIS

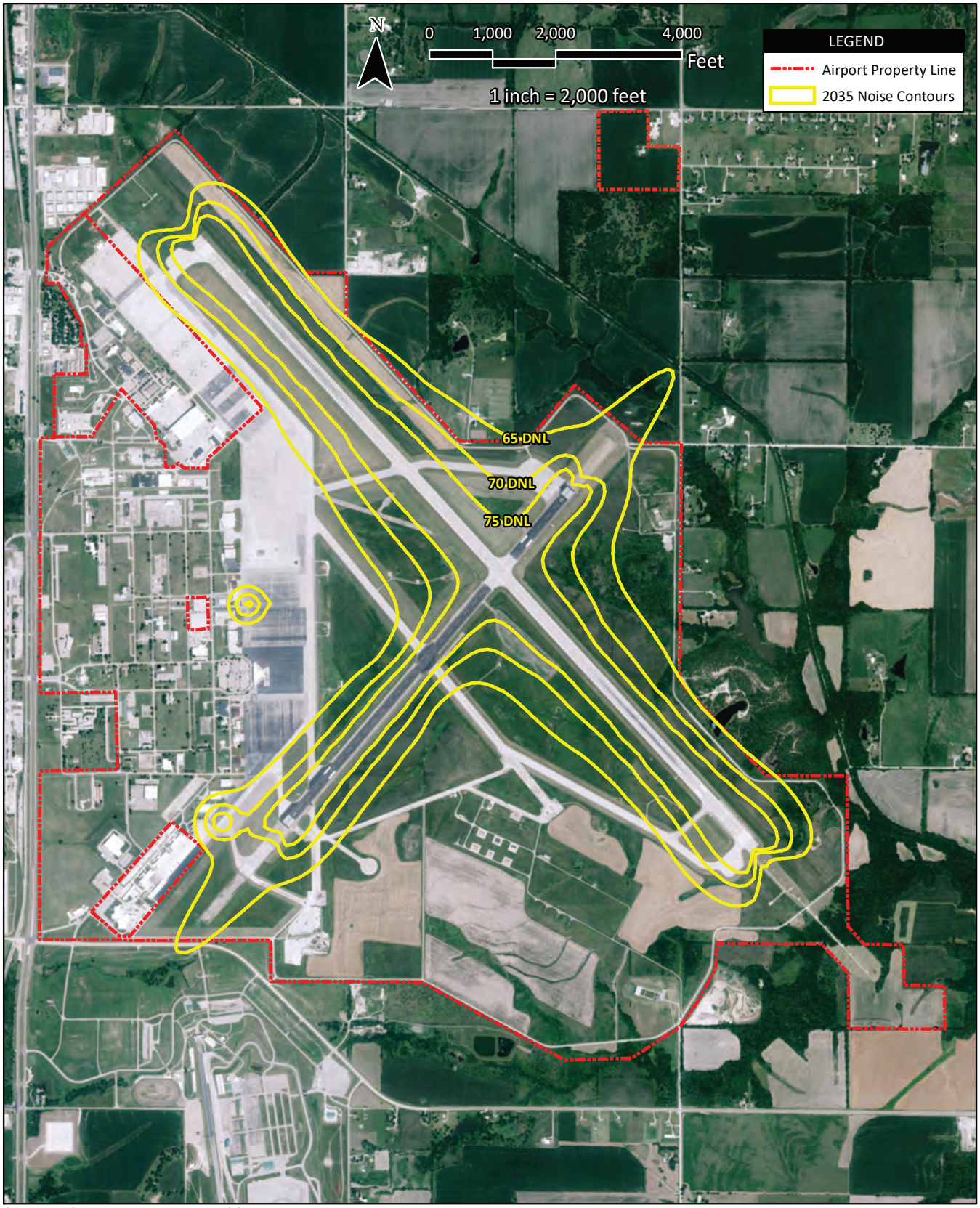
Areas with the potential for non-compatible development, when compared to the noise exposure contours and Part 77 approach surfaces, have been evaluated. Further discussion of these areas can be found in Chapter One. This was done by evaluating the locally adopted future land use plan and zoning designations for those parcels encompassed by the noise contours to determine if noise-sensitive land uses could be developed on these areas. Additionally, for those areas within the Part 77 approach surface, an evaluation of the height of structures was performed to determine if structures within these areas penetrate this surface.

As previously discussed, the 65 DNL noise contour is the threshold of incompatibility for noise-sensitive land uses such as residential land uses without acoustic treatment, mobile homes, transient lodging, schools and public facilities. **Exhibit 5J** depicts the long range noise exposure contours and the existing zoning and future land use map. As indicated on the exhibit, the portion of the 65 DNL noise exposure contour extends over areas that are designated as Rural Residential/Agriculture (3 mile ETJ) in the future land use plan and Residential Reserve (RR-1) on the City of Topeka zoning map. The Rural Residential/Agriculture designation includes “rural residential single-family uses, agriculture, or open space with a minimum lot size of 20 acres because of the lack of urban services and infrastructure or the ability to extend these services. Development and urban services are not planned in these areas within this planning horizon (2040).” The Residential Reserve zone has a minimum lot size of 20 acres.

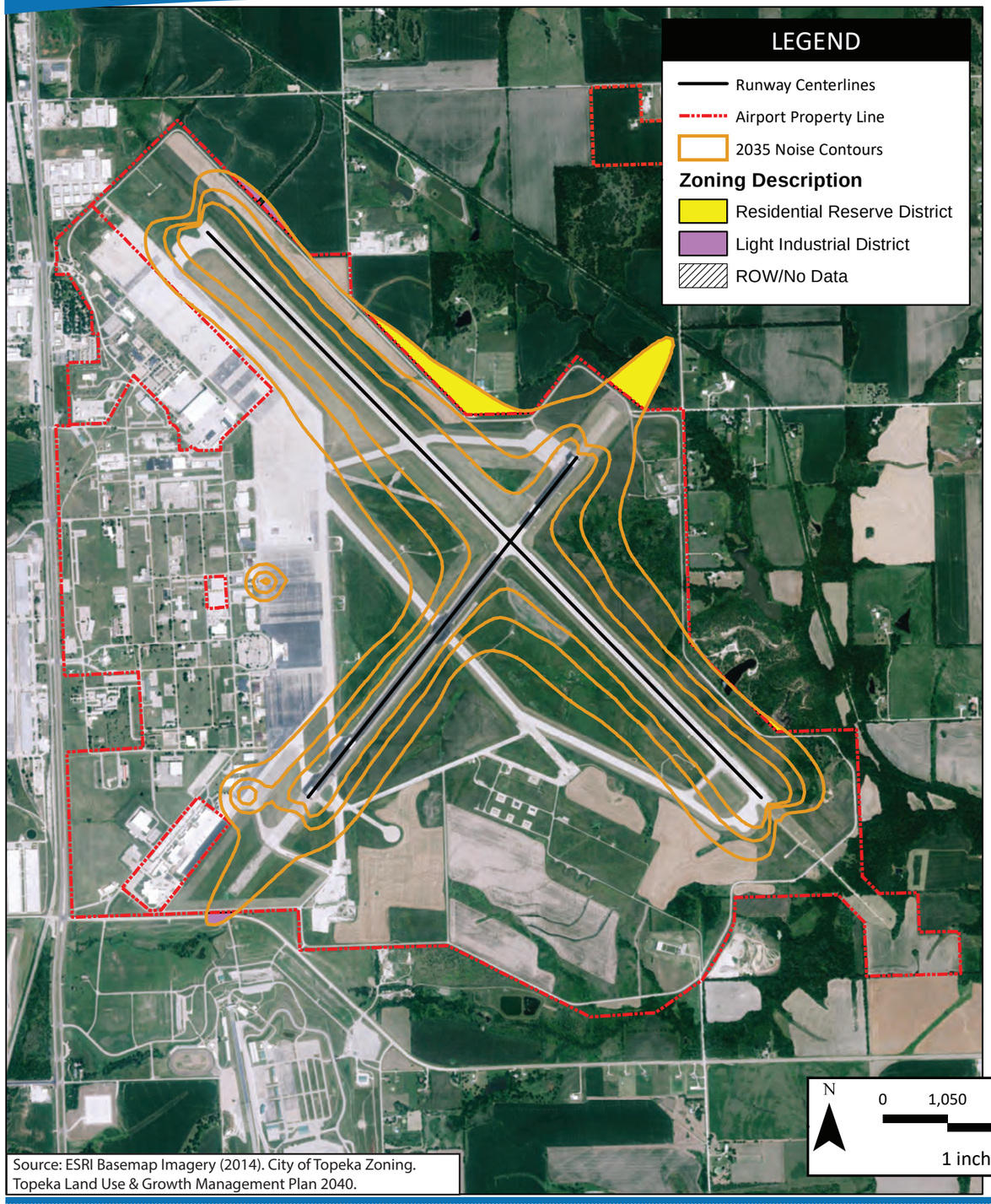
Based on a review of aerial photography, the parcels encompassed by the 65 DNL noise contour are currently used for agricultural purposes as evidenced by existing barns and storage buildings accompanied by a farm residence which is located outside of the 65 DNL noise contour. Given the minimum lot size for development in this area (20 acres) and the relatively small area encompassed by the 65 DNL noise contour, any future residence could be located on these parcels to avoid being constructed within the 65 DNL noise contour. However, there is no current review procedure within the City of Topeka ordinances which references the airport’s 65 DNL noise contour.

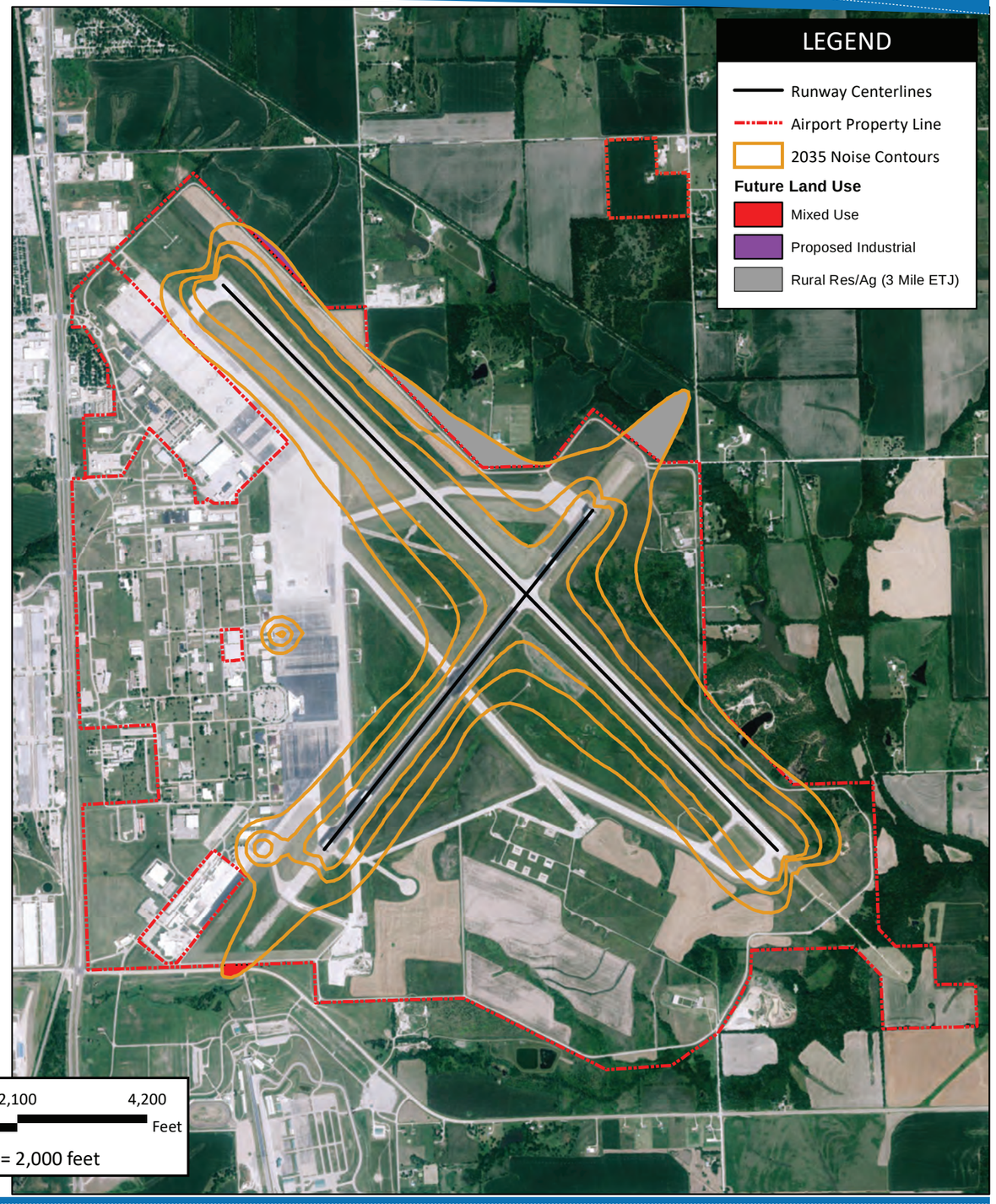


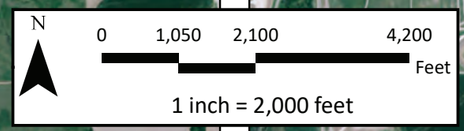
Source: ESRI Basemap Imagery 2014



Source: ESRI Basemap Imagery 2014







Source: ESRI Basemap Imagery (2014). City of Topeka Zoning.
Topeka Land Use & Growth Management Plan 2040.

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Using a similar process to the non-compatible development analysis for the noise contours, the zoning for parcels within the Part 77 approach surfaces out to one mile from the end of the runways were evaluated. Future land use designations were not included in this analysis as the *Land Use & Growth Management Plan 2040* does not specify height limitations for future land uses. As depicted on **Exhibit 5K**, areas within the Part 77 approach surfaces out to one mile of the runway ends are zoned Residential Reserve, Planned Unit Development, Light Industrial, Heavy Industrial, and Single Family. As noted in **Table 5C** and **Table 5D**, the maximum height limits for these zones are as follows:

- Residential Reserve (42 ft.)
- Single Family (42 ft.)
- Planned Unit Development (None specified)
- Light Industrial (70 ft.)
- Heavy Industrial (None)

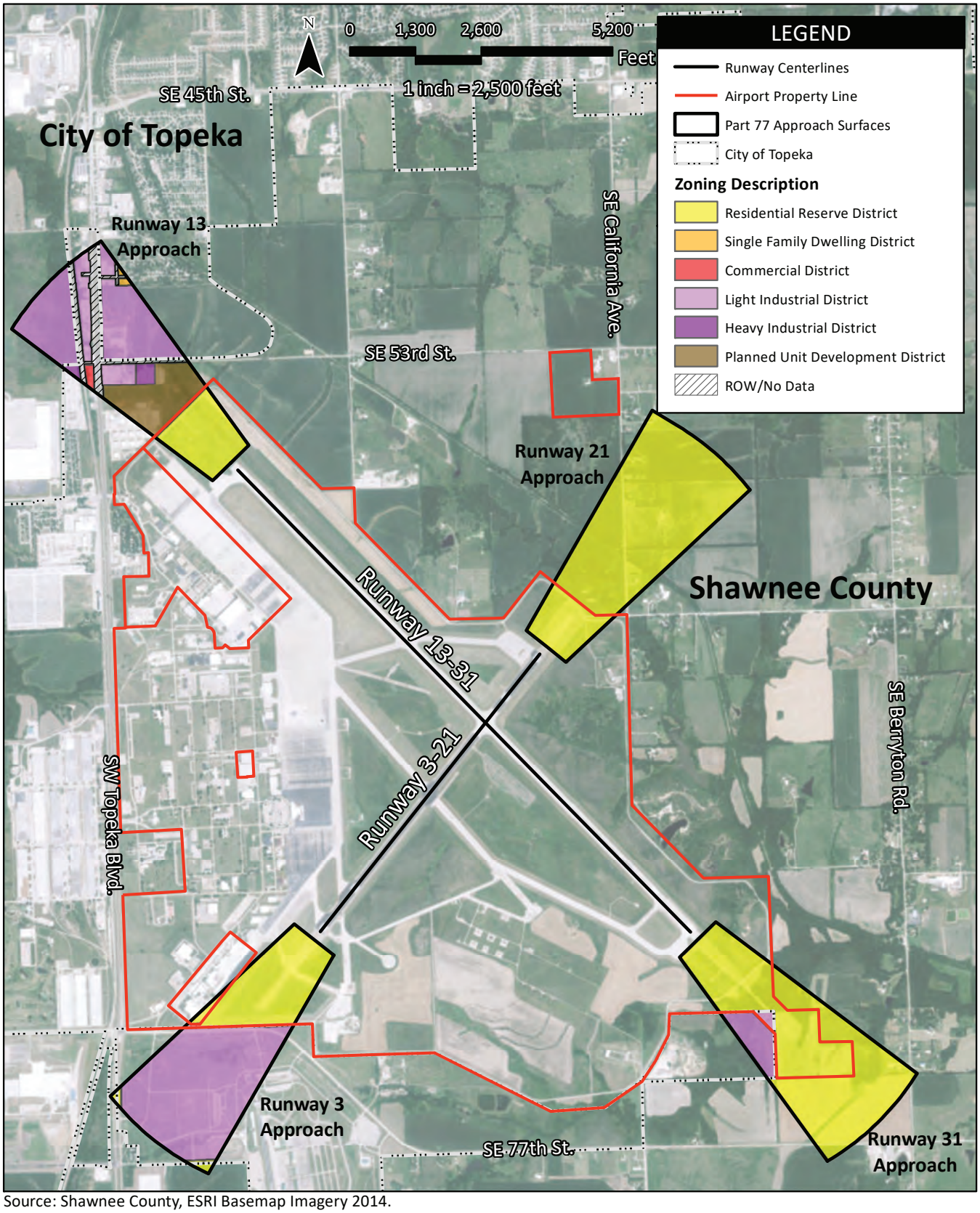
Given the location of the Residential Reserve and Light Industrial zoning districts and the maximum heights when compared to the Part 77 Approach Surface elevations, it is unlikely that development on these parcels at the maximum allowable height would result in a penetration to these surfaces. However, further analysis would be needed on a case by case basis, including filing an FAA Form 7460-1, Notice of Proposed Construction or Alteration, to determine if proposed development would be classified as an obstruction. For the Planning Unit Development and Heavy Industrial areas, no height limit is established which could potentially lead to penetrations of the Part 77 Approach surfaces depending on the proposed height of structures on these parcels.

RECOMMENDATIONS

Based on the information presented above and the non-compatible development analysis, the following recommendations are provided to maintain airport land use compatibility in the vicinity of Topeka Regional Airport.

Establish an Airport Zoning District. Airports, including landing strips and heliports, are listed as conditional uses within the City of Topeka's Single Family (R-1, R-2, R-3), Light Industrial (I-1), and Residential Reserve (RR-1) zoning districts. The existing Topeka Regional Airport property is zoned Residential Reserve (RR-1). Although permitted as a conditional use, establishment may be more appropriate. An airport property specific zone could be established to accommodate all aspects of airport operations, identify land uses that rely on proximity to the airport and, limit incompatible uses that may interfere with daily airport operations. Examples of permitted uses may include:

- Aircraft or aircraft parts manufacturing
- Uses required for airport operations, support services, or uses that depend on proximity to air transportation facilities
- Schools for the training of pilots, navigators, air traffic controllers, etc.
- Air freight handlers, including distribution centers and warehousing
- Hotels, motels and other temporary lodging



Source: Shawnee County, ESRI Basemap Imagery 2014.

Examples of prohibited uses may include:

- Any use which creates dust, smoke, steam or other airborne fumes which could present an obstruction to visibility for a pilot operating an aircraft
- Any use which would create atmospheric disturbance of radio communications between aircraft and control tower
- Signs and outdoor advertising, except for airport directional purposes and airport-related facilities

An airport property zone would be adopted as part of the City of Topeka Municipal Code and would be applied to airport property and potentially to properties adjacent to the airport.

Consider Including the 2035 65 DNL Noise Exposure Contour as an Overlay Zone. The Long Range 2035 65 DNL noise exposure contour extends off airport property over parcels zoned Residential Reserve (RR-1). This zoning designation permits land uses, including single family residences, that are considered to be incompatible with aircraft noise at levels greater than 65 DNL. An overlay zone, similar to the *Forbes Field and Philip Billard Airports Hazard Zone,* could incorporate the long range 65 DNL noise exposure contour into the development approval process to discourage construction of incompatible land uses within this area.

Revise Shawnee County Code Reference to City of Topeka Municipal Code. As discussed above, Shawnee County incorporates by reference the Forbes Field and Philip Billard Airports Hazard Zones from the City of Topeka Municipal Code. However, the Shawnee County Code Article V, Sec. 29-181 dated 2006 includes the following reference, "City of Topeka Code, Article II, Forbes Field and Phillip Billard Airport Hazard Zoning, §§ 22-26 et seq." Since that time, the City of Topeka revised its municipal code and the *Forbes Field and Philip Billard Airports Hazard Zoning* provision is contained within Topeka Municipal Code Chapter 18.205. It is recommended that the Shawnee County code be updated to reflect the more current citation for the overlay zone.

Adopt Fair Disclosure Requirements for Real Estate Transactions Within the Vicinity of the Airport. As noted in the FAA's Chart Supplement (formerly known as the Airport/Facility Directory), a noise abatement notice is provided for regarding the residential development located two nautical miles west of the airport. The notice states that visual flight rules traffic should avoid overflight of this area. As additional development occurs near the airport, it may be beneficial to the airport to consider coordinating with the City of Topeka to establish fair disclosure notices for property within the vicinity of the airport.

Fair disclosure regulations are intended to ensure that prospective buyers of property are informed that the property is or will be exposed to potentially disruptive aircraft noise or overflights. It is not uncommon, around even the busiest airports, for newcomers to report having bought property without having been informed about airport noise levels. At the most formal level, fair disclosure can be implemented through a City or County ordinance requiring a deed notice for property within the vicinity based on an existing boundary such as the Part 77 Horizontal Surface. The following is an example of deed notice language that would notify the property owner of the proximity of an airport and expectations for living in the vicinity of an airport:

The subject property is within the vicinity of Topeka Regional Airport, located at 6510 SE Forbes Ave. 1, Topeka, KS 66619-1446. Properties within this area are routinely subject to overflights by aircraft using this public-use airport and, as a result, residents may experience inconvenience, annoyance, or discomfort arising from the noise of such operations. Residents of property near such airports should therefore be prepared to accept the inconvenience, annoyance, or discomfort from normal aircraft operations. Residents also should be aware that the current volume of aircraft activity may increase in the future in response to Shawnee County population and economic growth. Any subsequent deed conveying this parcel or subdivisions thereof shall contain a statement in substantially this form.

ENVIRONMENTAL OVERVIEW

A review of the potential environmental impacts associated with proposed airport projects is an essential consideration in the Airport Master Plan process. The primary purpose of this discussion is to review the proposed capital improvement program at Topeka Regional Airport to determine whether the projects identified in the Master Plan could, individually or collectively, significantly affect existing environmental resources. The information contained in this section was obtained from previous studies, official internet websites, and analysis by the consultant.

Construction of any and all improvements depicted on the Airport Layout Plan (ALP) will require compliance with the National Environmental Policy Act (NEPA) of 1969, as amended. This includes privately funded projects and those projects receiving federal funding. For projects not categorically excluded under FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, compliance with NEPA is generally satisfied through the preparation of an Environmental Assessment (EA). In instances where significant environmental impacts are expected, an Environmental Impact Statement (EIS) may be required.

While this portion of the Master Plan is not designed to satisfy the NEPA requirements, it will provide a preliminary review of environmental issues that may need to be considered in more detail within the environmental review processes. This evaluation considers all environmental categories required as outlined within FAA Order 1050.1F and FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementation Instructions for Airport Actions*.

The following sections describe environmental resources which could be impacted by the proposed ultimate airport development depicted on **Exhibit 5A**. As discussed in the Environmental Inventory, it was determined that the following resources are not present within the airport environs:

- Coastal Resources (Coastal Barriers and Coastal Zones)
- Wild and Scenic Rivers

AIR QUALITY

Air quality in a given location is described by the concentrations of various pollutants in the atmosphere. The significance of a pollution concentration is determined by comparing it to the state and federal air quality standards. In 1971, the U.S. Environmental Protection Agency (EPA) established standards that specify the maximum permissible short-term and long-term concentrations of various air contaminants. The National Ambient Air Quality Standards (NAAQS) consist of primary and secondary standards for six criteria pollutants which include: ozone (O_3), carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen oxides (NO_x), particulate matter (PM_{10} and $PM_{2.5}$), and lead (Pb).

Based on both federal and state air quality standards, a specific geographic area can be classified as either an "attainment," "maintenance," or "non-attainment" area for each pollutant. The threshold for non-attainment designation varies by pollutant. Topeka Regional Airport is located in Shawnee County, which is an attainment area for all federal criteria pollutants.

Planned projects at the Airport could result in impacts to air quality. Temporary impacts would result during the construction of improvements, such as the new hangars, access taxilanes, and vehicular access roads. The replacement of the fuel farm, addition of a snow removal equipment building, and runway improvements will also result in temporary impacts. Exhaust emissions from the operation of construction vehicles and fugitive dust from pavement removal are common air pollutants during construction. During evaluation of these specific projects, an emissions inventory using on-road and off-road construction emissions models may be required.

BIOLOGICAL RESOURCES

Biotic resources include the various types of plants and animals that are present in a particular area. The term also applies to rivers, lakes, wetlands, forests, and other habitat types that support plant and animal species. Typically, development in areas such as previously disturbed airport property, populated places, or farmland would result in minimal impacts to biotic resources.

The Fish and Wildlife Service (FWS) is charged with overseeing compliance with Section 7 of the *Endangered Species Act*. This Act was put into place to protect animal or plant species whose populations are threatened by human activities. The FAA and FWS review projects to determine if a significant impact to these protected species will result with implementation of a proposed project. Significant impacts occur when the proposed action could jeopardize the continued existence of a protected species or would result in the destruction or adverse modification of federally designated critical habitat in the area.

Table 5E depicts federally and state listed threatened and endangered species for Shawnee County. These include the Topeka shiner, the least tern, and the northern long-eared bat. The Topeka shiner has designated critical final habitat, but none of this habitat type is present in Shawnee County. There are no other areas of critical habitat designations in the County. As discussed in Chapter One, the Topeka shiner is a species of fish that occurs in prairie, or former prairie, perennial streams with clear water and

sandy or rocky bottoms. The least tern typically occupies barren to sparsely vegetated sandbars along rivers, sand and gravel pits, or lake and reservoir shorelines in late April to August. The northern long-eared bat hibernates in caves during the wintertime. During the summer, the northern long-eared bat roosts in crevices and cavities of live and dead trees. These habitat types are not present at the airport.

TABLE 5E
Threatened or Endangered Species
Shawnee County, Kansas

Topeka Shiner (endangered, bird)
Interior least tern (endangered, bird)
Northern long-eared bat (threatened, mammal)

Several of the planned projects at the Airport are on existing developed land and would not likely require field investigation prior to project implementation to determine the presence of protected species. Other projects, such as property acquisition and proposed new airfield pavement, may cause disturbance to areas that are currently undeveloped, natural areas. These projects may require field surveys to determine the potential presence of protected species. Coordination with the FWS and/or the Kansas Department of Wildlife and Parks may be necessary to determine the extent, if any, of field investigations prior to undertaking these planned improvements.

In addition to the *Endangered Species Act* (ESA), the *Migratory Bird Treaty Act* (MBTA) is also applicable at the Airport as much of the study area constitutes habitat for birds protected under the MBTA. The IPaC report for the airport lists 25 bird species that may be affected by projects at the Airport.

TABLE 5F
Birds Protected Under the *Migratory Bird Treaty Act*
Shawnee County, Kansas

Acadian Flycatcher	Henslow's Sparrow
Bald Eagle	Hudsonian Godwit
Bell's Vireo	Least Bittern
Bewick's Wren	Loggerhead Shrike
Black-billed Cuckoo	Mississippi Kite
Black-crowned Night-heron	Northern Flicker
Cerulean Warbler	Painted Bunting
Dickcissel	Red-headed Woodpecker
Field Sparrow	Rusty Blackbird
Golden Eagle	Short-eared Owl
Grasshopper Sparrow	Swainson's Hawk
Harris's Sparrow	Upland Sandpiper

Birds protected under the MBTA may nest, winter, or migrate throughout the area, including those protected by the ESA. Under the requirements of the MBTA, all project proponents are responsible for complying with the appropriate regulations protecting birds when planning and developing a project. Protected migratory birds known to occur in the study area are listed in **Table 5F**.

CLIMATE

Research has shown that there is a direct link between fuel combustion and greenhouse gas (GHG) emissions. Therefore, sources that require fuel or power at an airport are the primary sources that would generate GHGs. GHGs are those that trap heat in the earth's atmosphere. They include: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF_6). GHGs are both naturally occurring and anthropogenic (man-made). Aircraft jet engines, similar to other vehicle engines, produce CO_2, H_2O, nitrogen oxides (NO_x), carbon monoxide (CO), sulfur oxides (SO_x), volatile organic compounds (VOCs), particulates and other trace compounds. Due to its innate properties, CO_2 is the most important GHG to monitor. It remains in the atmosphere for up to 100 years, causing both short- and long-term impacts, locally and internationally. Climate

change impacts include: increased air temperatures, sea level rise, and more frequent and intense storms.

Similar to the air quality concerns, temporary construction activity would result in increased equipment emissions.

DEPARTMENT OF TRANSPORTATION ACT, SECTION 4(f)

Section 4(f) properties include publicly owned land from a public park, recreational area, or wildlife and waterfowl refuge of national, state, or local significance; or any land from a historic site of national, state, or local significance.

Building 679, which is located west of the runway complex, is a historic site eligible for listing the National Register of Historic Places (NRHP). The building is not located near any proposed development and thus should not be affected. There are also two publicly owned parks, both within two miles of the airport. Shawnee South Community Park, west of the intersection of Runway 13-31 and Runway 3-21, and Southboro Park, located north of the runway intersection. Landon Nature Trail, part of the Kanza Rail-Trails Conservancy, is located ½ mile east of the Runway 21 threshold, outside of the proposed northeast acquisition area. None of the proposed airport improvements will result in direct or indirect impacts to these properties.

FARMLANDS

The *Farmland Protection Policy Act* (FPPA) was enacted to preserve farmland. FPPA guidelines apply to farmland classified as prime or unique, or of state or local importance as determined by the appropriate government agency, with concurrence by the Secretary of Agriculture.

Information obtained from the Natural Resource Conservation Service's (NRCS) Web Soil Survey indicates that much of the Airport property, and property adjacent to the Airport, is classified as prime farmland, if irrigated. Additionally, the soils located immediately east of the Airport, associated with Lynn Creek, are classified as farmlands of statewide importance. Development of projects proposed on existing Airport property will likely be exempt from the requirements of FPPA as NRCS may consider them to be committed to urban use. For the land affected for property acquisition, though, further coordination with NRCS may be required.

HAZARDOUS MATERIALS, SOLID WASTE, AND POLLUTION PREVENTION

Federal, state, and local laws regulate hazardous materials use, storage, transport, and disposal. These laws may extend to past and future landowners of properties containing these materials. In addition, disrupting sites containing hazardous materials or contaminates may cause significant impacts to soil, surface water, groundwater, air quality, and the organisms using these resources. According to

EJSCREEN, there are no Superfund sites within five miles of the Airport, causing no impact on proposed Airport development. The closest active solid waste landfill, Green Point C & D Processing Center, is 17 miles north of the Airport. There are two former landfill sites – north landfill and south landfill – currently undergoing remediation on the eastern side of the airport property. These were discovered by the US Army Corps of Engineers (USACE) in 1995 and determined to pose a contamination risk to both ground-water and soils. In 2005 and 2010, the north and south landfills were inspected. Several 55-gallon drums were found and noted as exposed and corroded. The remedial action, approved in 2015, is to consolidate exposed material at the south landfill and cover it with earthen material. The north landfill will have the contaminated soils removed and a municipal solid waste landfill cover installed[1]. Remediation of both landfills began in 2016. The landfill remediation areas are shown on **Exhibit 5L**.

Several areas of pavement, concentrated primarily on the western portions of the Airport, are slated for removal. This demolition will generate additional solid waste during the removal period.

HISTORICAL, ARCHITECTURAL, ARCHEOLOGICAL, AND CULTURAL RESOURCES

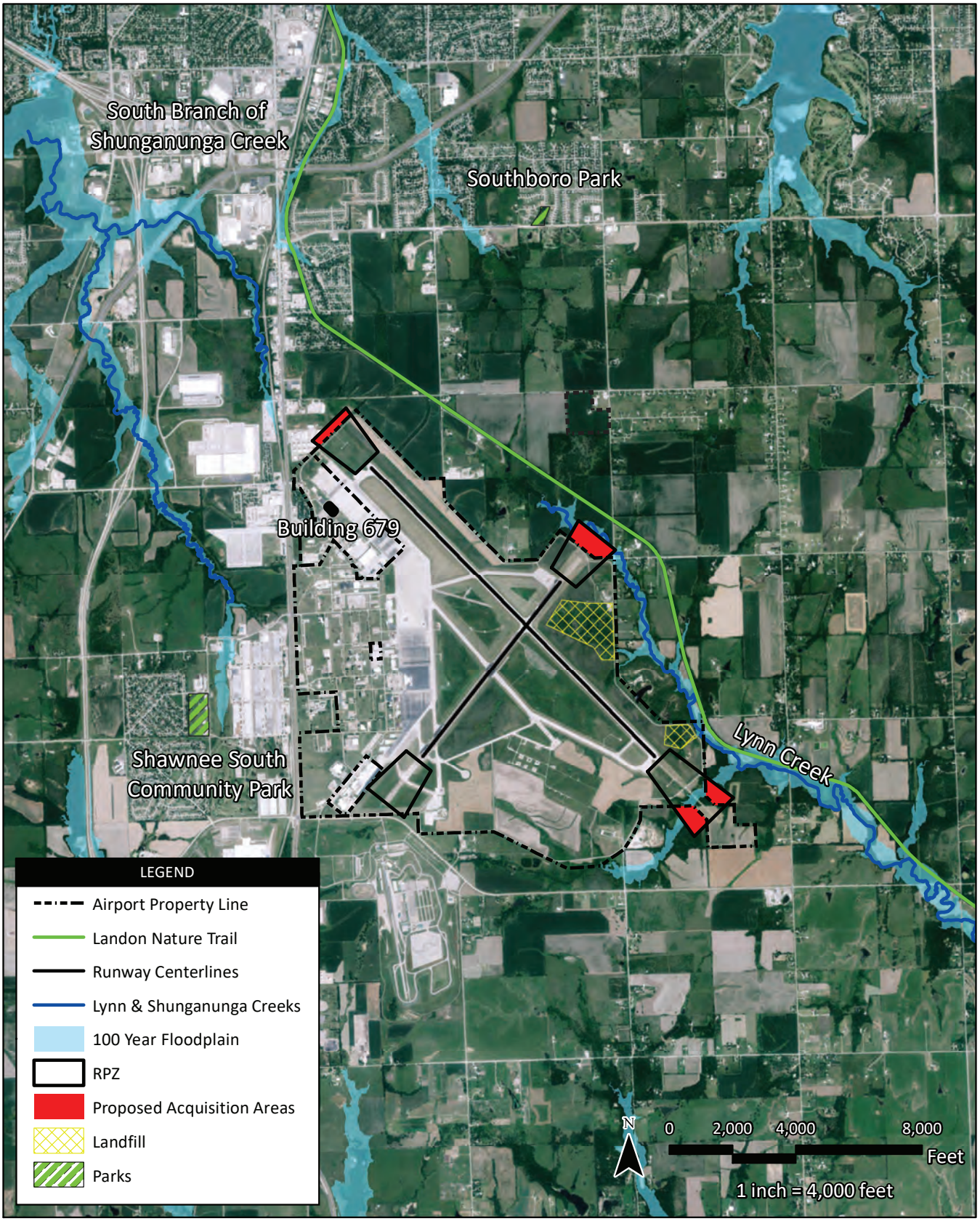
Determination of a project's impact to historical and cultural resources is made in compliance with the *National Historic Preservation Act* (NHPA) *of 1966*, as amended for federal undertakings. A historic property is defined as any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the NRHP. Properties or sites having traditional religious or cultural importance to Native American Tribes may also qualify. To satisfy the requirements of NHPA, further coordination with the Kansas State Historic Preservation Office (SHPO) may be necessary to determine the extent, if any, of field investigations prior to undertaking any of the planned improvements.

A cultural resources survey of Forbes Field Air National Guard Base in April 2008 identified one existing structure that is eligible for listing on the National Register of Historic Places. Identified as Building 679 and located on the west side of Runway 13-31 abeam the Runway 13 threshold markings, this structure is described as a 150-man alert mission dormitory. This building underwent extensive renovations between 2010 and 2012 and currently houses the Kansas National Guard's 190th Operations Group, 190th Operations Support Flight, the 117th Air Refueling Squadron and several airfield support functions.[2] There are no proposed or planned airport improvements in the vicinity of Building 679.

LAND USE

Compatible land use evaluations for airports must consider the land uses in the vicinity of an airport to ensure those uses do not adversely affect safe aircraft operations. In addition, if an airport action would result in impacts exceeding FAA thresholds of significance, which have land use ramifications, such as disruption of communities, relocation of businesses or residences, and induced socioeconomic impacts, the effects of the land use impacts shall be discussed.

[1] http://kensas.kdhe.state.ks.us/plsISL/ISL_Pub_Detail?id=C408970143
[2] http://www.kansastag.gov/press_release_detail.asp?PRid=977, accessed May 2016



Sources: ESRI Basemap Imagery, FEMA NFHL 2012 Floodplain, National Hydrography Dataset Streams.

Land use compatibility also includes a consideration of wildlife attractants. Wildlife attractants include those land uses that bring wildlife into areas that can prove hazardous to aircraft operations. Wildlife attractants include landfills, wastewater treatment facilities, wetlands, agricultural crops, wildlife refuges, or any other land use that attracts wildlife. FAA AC 150/5200-33B, Hazardous Wildlife Attractants on or Near Airports, states that wildlife attractants are hazardous if they are located within:

- 5,000 feet of an airport serving piston-powered aircraft;
- 10,000 feet of an airport serving turbine-powered aircraft; and/or
- For all airports, the FAA recommends a distance of five miles between the farthest end of the airport operating area and the hazardous wildlife attractant if the attractant can cause hazardous wildlife movement into or across the airport approach or departure airspace.

With regard to FAA AC 150/5200-33B, there are no solid waste landfills or wastewater treatment facilities within the immediate vicinity of the Airport site that would be considered wildlife attractants. The area surrounding the land is primarily agricultural with intermixed farm houses, commercial and residential developments, and industrial uses.

SOCIOECONOMICS, ENVIRONMENTAL JUSTICE, AND CHILDREN'S ENVIRONMENTAL HEALTH AND SAFETY RISKS

Socioeconomic impacts known to result from airport improvements are often associated with relocation activities or other community disruptions, including alterations to surface transportation patterns, division or disruption of existing communities, interferences with orderly planned development, or an appreciable change in employment related to the project.

The acquisition of real property or displacing people or businesses is required to conform to the *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970* (URARPAPA). These regulations mandate that certain relocation assistance services be made available to owners/tenants of the properties. As indicated on **Exhibit 5A**, five tracts of land are proposed for acquisition near the Airport to accommodate areas within the runway protection zone (RPZ). Three of the five areas are currently undeveloped. The area northeast of the Airport includes two structures which appear to be used for agricultural-related storage. The area north of the approach end to Runway 13 includes acquisition of three warehouse structures and would result in displacing businesses.

FAA Order 5100.37B *Land Acquisition and Relocation Assistance for Airport Projects* outlines the appropriate measures that must take place during non-residential moves that are required due to airport property acquisition. In the case of the three warehouses in the northwest acquisition site, the Airport would be responsible for the transportation (up to 50 miles) of the person(s) and personal property on site, as well as the packing and unpacking of property at the relocation site. In addition to the eligible moving expenses, a displaced small business is entitled to a payment (up to $10,000) for expenses incurred in relocating and reestablishing the business on a new site.

Executive Order 12898, *Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations,* and the accompanying Presidential Memorandum, and Order DOT 5610.2, *Environmental Justice*, require FAA to provide for meaningful public involvement by minority and low-income populations, as well as analysis that identifies and addresses potential impacts on these populations that may be disproportionately high and adverse.

According to *EJSCREEN,* 11 percent of the population within the Census tract encompassing the Airport is below the poverty level. Additionally, the population of the Census block group which encompasses the Airport is eight percent minority. This indicates that the Airport environs do not contain high percentages (above 50 percent) of minority populations or high percentages of residents below the poverty level.

Pursuant to Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks,* federal agencies are directed to identify and assess environmental health and safety risks that may disproportionately affect children. These risks include those that are attributable to products or substances that a child is likely to come in contact with or ingest, such as air, food, drinking water, recreational waters, soil, or products to which they may be exposed.

During construction of the projects outlined within the Master Plan, appropriate measures should be taken to prevent access by unauthorized persons to construction project areas. Additionally, best management practices should be implemented to decrease environmental health risks to children.

WATER RESOURCES

The *Clean Water Act* provides the authority to establish water quality standards, control discharges, develop waste treatment management plans and practices, prevent or minimize the loss of wetlands, and regulate other issues concerning water quality. Water quality concerns related to airport development most often relate to the potential for surface runoff and soil erosion, as well as the storage and handling of fuel, petroleum products, solvents, etc.

During construction of any of the planned improvements at the Airport, it is suggested that mitigation measures from FAA Advisory Circular 150/5370-10A, *Standards for Specifying Construction of Airports, Item P-156, Temporary Air and Water Pollution, Soil Erosion and Siltation Control* be incorporated into project design specifications to further mitigate potential water quality impacts. These standards include temporary measures to control water pollution, soil erosion, and siltation through the use of berms, fiber mats, gravels, mulches, slope drains, and other erosion control methods.

Additionally, as development occurs at the Airport, the stormwater pollution prevention plan will need to be modified to reflect the additional impervious surfaces and any stormwater retention facilities. The addition and removal of impervious surfaces may require modifications to this plan should drainage patterns be modified.

Wetlands

According to the U.S. Fish and Wildlife Service, which manages the National Wetlands Inventory on behalf of all federal agencies, there are no wetlands present on existing airport property, nor are there wetlands present on any of the future acquisition sites.

Floodplains

Based on a review of Federal Emergency Management Agency (FEMA) maps dated September 29, 2011, the 100-year floodplain associated with Lynn Creek is located immediately east of the Airport. The extent of this floodplain is shown on **Exhibit 5L**. The proposed property acquisitions may include the western edge of the Lynn Creek floodplain.

Surface Waters

According to *EJSCREEN*, the closest Clean Water Act Section 303d impaired streams or water body is a portion of the South Branch of Shunganunga Creek located 1.8 miles west of the runway intersection. Proposed airport improvements will not interfere with this waterbody nor impair it further.

Groundwater

Much of eastern Kansas, including Shawnee County, is underlain by the Western Interior Plains aquifer system. As discussed in the *Ground Water Atlas of the United States*, the Western Interior Plains aquifer system is classified as a minor aquifer which yields little water because it is deeply buried and contains highly mineralized water.[3] Examples of direct impacts to groundwater could include withdrawal of groundwater for operational purposes, or reduction of infiltration or recharge area due to new impervious surfaces. During construction, surface waters near the airport can be subject to contamination due to runoff. Surface waters recharge groundwater supplies, potentially resulting in contamination of the Western Interior Plains Aquifer. Proper on-site mitigation will need to take place during construction to reduce the amount of contaminants that may enter the water sources nearby.

When the aforementioned landfill sites were found by USACE, the groundwater was not investigated. Eight monitoring events for groundwater at the landfills were performed and demonstrated long-term VOC contamination above maximum contaminant levels (MCL). In addition, Kansas Department of Health and Environment (KDHE) discovered that a private water well just east of the north landfill was contaminated with vinyl chloride above its MCL. In 2006, USACE completed installation of a replacement residential well, but it is impacted with bacteria and not suitable for drinking purposes, thus leading to its abandonment in 2007. The latest remedial action in terms of groundwater on the site is to install a waterline for the residents with impacts or potentially impacted wells.

[3] http://pubs.usgs.gov/ha/ha730/ch_d/D-text7.html, Ground Water Atlas of the United States, accessed May 2016.

SOLID WASTE AND RECYCLING PLAN

This section presents guidance on developing a Solid Waste Recycling Plan (Plan) for Topeka Regional Airport which meets the requirements of Section 133 of the *FAA Modernization and Reform Act of 2012*. Consistent with Section 133, the Plan addresses the following issues:

- The feasibility of solid waste recycling at the airport;
- Minimizing the generation of solid waste at the airport;
- Operation and maintenance requirements;
- A review of waste management contracts; and
- The potential for cost savings or the generation of revenue.

INTRODUCTION

Topeka Regional Airport is a general aviation airport with the potential to serve regularly scheduled commercial service. The Airport is owned and operated by the Metropolitan Topeka Airport Authority. Daily management of the facility is the responsibility of a professional airport management staff. Daily business functions, such as aircraft servicing and fueling, is provided by the fixed-base operator.

At Topeka Regional Airport, most of the aircraft hangars are owned by MTAA and leased to various businesses and tenants. Aircraft owners wishing to store an aircraft in a hangar at the Airport will contract with MTAA for the facility. Aircraft owners may sub-lease space in a hangar as well. The tenants of the hangars are each responsible for contracting for solid waste (trash) and recycling services. MTAA is directly responsible for the following four buildings: Terminal building (#610), police/fire building (#623), administration building (#620), and the maintenance building (#186), as well as unleased buildings. MTAA is responsible for disposal of their own waste and recycling for all unleased buildings.

SOLID WASTE AND RECYCLING PROVIDERS

There are four providers of solid waste removal services in the Topeka area: Shawnee County Solid Waste (SCSW), Waste Management, Deffenbaugh Industries, and Ditch Trash Service. SCSW is the largest solid waste removal service provider in the Topeka area. They provide both residential and commercial waste disposal. SCSW has a robust residential recycling program; however, they do not currently provide for commercial recycling. SCSW provides larger recycling containers at several public locations. The closest location to the Airport is at Brewster Place (1205 SW 29th St).

According to the Waste Management website, they offer commercial solid waste and recycling removal services. Recycling services are not currently available from Deffenbaugh Industries and Ditch Trash Service.

Most solid waste is transported to the Rolling Meadows landfill located approximately 20 miles north of the Airport.

CURRENT AIRPORT PROGRAM

MTAA contracts with SCSW for three eight-yard dumpsters which are located at the terminal building, fire/police/administration complex, and the maintenance building. MTAA pays approximately $300 per month for solid waste removal services. SCSW has a robust residential curbside recycling program; however, they do not provide commercial recycling services at the Airport at this time.



Through an informal program, the Airport administration recycles paper at their offices. A separate container is provided and when it is full, a staff member takes it to a central recycling location.

ESTABLISHING A RECYCLING PROGRAM FOR THE AIRPORT

The Environmental Protection Agency (EPA) has developed a multi-step program for establishing a successful airport recycling program:

- Obtain commitment from upper management;
- Organize a green team/recycling coordinator;
- Identify types and sources of waste;
- Assess current waste collection contracts;
- Develop a plan;
- Educate staff and customers;
- Monitor and refine the plan;
- Measure performance;
- Promote successes; and
- Expand the program.

The Environmental Protection Agency (EPA) has developed a multi-step program for establishing a successful airport recycling program.

Management support is crucial to developing and sustaining a recycling program since management must authorize team members' time commitment, responsibilities, and financial investment. Case studies from other airports have indicated that programs can be successful regardless of the size of the airport.

A "green team" should be assembled to help in the implementation of any recycling programs at the Airport. The "green team" should be knowledgeable of local haulers and material markets. The recycling coordinator will help organize, execute, and evaluate the recycling program.

A waste assessment provides qualitative and quantitative data and a baseline to measure progress in future years. Specifically, it will help answer the following questions:

- What areas on the airport generate waste?
- What recyclable material is generated?
- What type of waste is generated in each area?
- How much waste is generated? and
- What are the costs for trash and recycling containers, hauling, and disposal?

Three primary approaches to conducting a waste assessment include:

- Records examination;
- Facility walk-through; or
- Waste sort.

Each of the three approaches provides strengths and limitations. The records examination requires the least time and effort but lacks quantitative data for specific waste components. The facility walk-through allows first-hand examination of facility operations but limited identification of wastes generated. The waste sort provides quantitative data on total waste generated but requires more time and effort than other approaches.

For this study, all three approaches were undertaken. Records of current solid waste disposal contracts were examined (via interview) and a facility walk-through was conducted. A waste audit was also conducted. This was accomplished by examining two of the three eight-yard dumpsters (at the police/fire/administration and terminal building). It was estimated that approximately half of the solid waste could have been recycled if such services were available at the Airport.

The following resources will aid the Airport in establishing a successful recycling program:

- *Recycling, Reuse and Waste Reduction at Airports: A Synthesis Document*. Prepared by the Office of Airports, Federal Aviation Administration, April 24, 2013. Accessible at: https://www.faa.gov/airports/resources/publications/reports/environmental/media/RecyclingSynthesis2013.pdf

- *Developing and Implementing an Airport Recycling Program*. Prepared by the Environmental Protection Agency (EPA 530-K-08-002). April, 2009. Accessible at: http://www.epa.gov/wastes/conserve/tools/rogo/documents/airport-recycling-guide.pdf

- FAA Memorandum: *Guidance on Airport Recycling, Reuse, and Waste Reductions Plans* (September 30, 2014). Accessible at: http://www.faa.gov/airports/environmental/media/airport-recycling-reuse-waste-reduction-plans-guidance.pdf

- Sustainable Aviation Guidance Alliance. Accessible at: http://www.airportsustainability.org

RECOMMENDATIONS FOR THE AIRPORT

Since the MTAA only controls the waste disposal at four on-airport facilities, opportunities for direct impact on waste recovery by MTAA is somewhat limited. This is especially true because the current solid waste removal service does not offer recycling for commercial operations. At a minimum, the Airport should contact all solid waste providers and inquire about the potential to offer recycling at the Airport. It appears that some haulers will provide a larger dumpster for recycling. Nonetheless, MTAA could take several cost-efficient steps to encourage airport users to recycle such as:

- Information Campaign: Post flyers, include recycling language in leases;
- Competition: Contact other solid waste providers and explore the possibility of receiving recycling service and containers;
- Recycling Dumpster: Obtain a recycling dumpster;
- Recycling Containers: Consider separate recycling containers at the terminal building and other MTAA-owned facilities;
- Set Goals: Develop a set of uniform recycling goals and procedures for all state airports;
- Lead by example: Source recycled materials for business functions;
- Construction: Encourage contractors to recycle material resulting from various capital projects; and
- Lease Agreements: Consider provisions to encourage recycling.

SUMMARY

A recommended development plan has been put forward that addresses future airside and landside needs. In addition, an on-airport land use plan has been developed. The long term plan is designed to accommodate activity by both military and civilian operators. The airside projects identified are the result of meeting current FAA design standards. Forecast growth in aviation demand can be accommodated with the current runway/taxiway configuration and thus related projects are not driven by forecast demand. Those elements that are justified by civilian activity are eligible for FAA funding participation.

At the time of the next major reconstruction of Taxiway C, it is planned to be relocated to be more parallel to Runway 13-31 and to be shifted outside the “high-energy” portion of Runway 3-21. The “Hot-Spot” at the south end of Taxiway A is planned to be mitigated by removing/closing threshold Taxiway A and Taxiway D and replacing them with a single threshold taxiway constructed at the standard 90-degree angle. Taxiway B, which currently crosses the “high-energy” portion of Runway 13-31, is planned to be shifted to the north in order to meet design standards.

All four of the RPZs extend beyond Airport property. Following FAA recommendations, RPZ land not owned by the Airport is planned for ultimate acquisition. It should be noted that the Airport already has a significant degree of control over the RPZs by means of avigation easements; however, if the subject property becomes available, it will be easier to pursue purchase and FAA reimbursement because it is already shown on the Airport Layout Plan.

The instrument approach capability to the runways is adequate through the long term planning period. Therefore, the ILS approach with ½-mile visibility minimums to Runway 31 is planned to remain in place as are the ¾-mile visibility minimums to the other three runway ends.

On the landside, sites have been identified for future conventional hangars. Smaller T-hangars are not planned for the Airport as Philip Billard Municipal Airport is designed to accommodate this type of general aviation activity.

The vast aircraft apron areas have been defined as to their primary function and prioritized for routine maintenance and ultimate reconstruction when necessary. Approximately 37,000 square yards of the general aviation apron (south of the terminal building) is planned to be removed from service, thus saving maintenance funds. The terminal apron was recently resurfaced and is planned to be maintained. The charter apron (north of the terminal apron) serves a unique purpose at the Airport which is to accommodate frequent activity by operators of large passenger aircraft in use for charter operations. The charter apron is planned to be milled, overlaid, and remarked to increase the efficiency of use. The closed north apron is planned to remain closed. When development pressures increase, portions of this apron area can be reclaimed as suggested with future hangars.

Planning also considers various airport services. A location has been identified for a replacement fuel farm in the grassy area immediately west of the closed apron. A consolidated SRE building is planned to front the charter apron in place of building #625 or in the undeveloped grassy area immediately west of building #625.

The next chapter of this master plan will present the 20-year capital improvement program, a reasonable schedule for undertaking the projects, and strategies for funding the recommended improvements over the course of the next 20 years.

Topeka Regional Airport

CHAPTER SIX
Capital Improvement Program







CHAPTER SIX
Capital Improvement Program

The analyses completed in previous chapters evaluated development needs at the Airport over the next 20 years and beyond, based on forecast ac. vity, operational efficiency, and meeting FAA design standards. Next, basic economic, financial, and management rationale is applied to each development item so that the feasibility of each item contained in the plan can be assessed.

The presentation of the capital improvement program (CIP) has been organized into three sections. First, the airport development schedules and CIP cost estimates are presented in narrative and graphic form. Second, capital improvement funding sources on the federal, state, and local levels are identified and discussed. Third, a funding plan is presented which identifies the range of potential capital expenses for the Airport based on various funding assumptions.

AIRPORT DEVELOPMENT SCHEDULES AND COST SUMMARIES

Now that the recommended development concept has been presented and specific needs and improvements for the Airport have been established, the next step is to determine a realistic schedule (implementation timeline) and associated cost estimates for the plan. The recommended improvements are grouped by planning horizon: short term, intermediate term, and long-term. The short term planning horizon is further subdivided into yearly increments. Those short term projects that include multiple phases for environmental documentation, design, and construction have been separated into the yearly increments. **Table 6A** summarizes key activity milestones for the three planning horizons.







TABLE 6A
Planning Horizon Summary
Topeka Regional Airport

	Base Year 2015	Short Term	Intermediate Term	Long Term
BASED AIRCRAFT	42	43	44	48
ENPLANEMENTS	4,959	3,506	3,531	3,581
ANNUAL OPERATIONS				
Commercial Operations				
Air Carrier (>59 Seats)	200	200	210	230
Air Taxi/Commuter (<60 seats)	64	70	90	120
General Aviation				
Itinerant	5,749	5,900	6,100	6,900
Local	971	1,000	1,050	1,200
Subtotal	6,720	6,900	7,150	8,100
Other Air Taxi Activity				
Itinerant	398	430	510	680
Military Activity				
Itinerant	8,186	11,200	11,200	11,200
Local	10,421	8,200	8,200	8,200
TOTAL OPERATIONS	**25,989**	**27,000**	**27,360**	**28,530**

Source: Coffman Associates analysis

A key aspect of this Master Plan is the use of demand-based planning milestones; however, future aviation demand is limited. Therefore, the majority of the projects identified are the result of meeting current FAA design standards for safety and performing anticipated maintenance and rehabilitation of the airfield pavements.

The majority of projects identified are the result of meeting current FAA design standards.

The plan includes siting of new conventional hangars. For purposes of this Master Plan, all future hangar construction is assumed to be undertaken by private developers. The airport sponsor's responsibility, related to new hangars, is to provide public access taxilanes, typically in conjunction with FAA development grants.

The airport sponsor can construct hangars and act as the lessor, as they do on the existing MTAA owned hangars. The economics of hangar construction and leasing over the last decade have made it difficult to amortize a 20-year loan on facilities while charging a reasonable monthly rent. This is the case across the country where local airport sponsors are relying increasingly on private developers to build facilities at airports. Nonetheless, some airport sponsors see a benefit to building hangar facilities in order to stimulate aviation activity and business development, even if the monthly rents have to be subsidized to some degree. Naturally, this will be a local decision, and nothing in this Master Plan and development schedule should be construed to indicate that only private developers can construct facilities at the Airport.

As a master plan is a conceptual document, implementation of the capital projects should only be undertaken after further refinement of their design and costs through architectural and engineering analyses. Moreover, some projects may require additional infrastructure improvements (i.e., drainage improvements, extension of utilities, etc.) that may take more than one year to complete.

At this juncture, it is difficult to know, precisely, what the cost of individual projects will be; however, preparing order-of-magnitude cost estimates is an effective way to get a feel for the current costs. Many federal agencies utilize a system of five classes of estimates, as presented in **Table 6B**. The Master Plan scope limits cost estimates to Class 5.

TABLE 6B
Cost Estimate Classification

Estimate Class	Name	Purpose	Project Definition Level
Class 5	Order-of-Magnitude	Screening or Feasibility	0% to 2%
Class 4	Intermediate	Concept Study or Feasibility	1% to 15%
Class 3	Preliminary	Budget, Authorization, or Control	10% to 40%
Class 2	Substantive	Control or Bid/Tender	30% to 70%
Class 1	Definitive	Check Estimate or Bid/Tender	50% to 100%

Source: U.S. Department of Energy

Once the list of necessary projects was identified and refined, project-specific cost estimates were developed. The cost estimates include environmental documentation, design, engineering, construction administration, and contingencies that may arise on the project. Capital costs presented here should be viewed only as estimates subject to further refinement during design. Nevertheless, these estimates are considered sufficient for planning purposes. Cost estimates were developed based on recent airport construction costs in the region. Cost estimates for each of the development projects in the CIP are in current (2016) dollars. **Exhibit 6A** presents the proposed CIP for Topeka Regional Airport. **Exhibit 6B** presents the CIP overlaid onto the airport aerial photograph and broken out into planning horizons.

Most, but not all, of the projects identified are eligible for FAA grant funding because this Master Plan follows FAA guidelines and focuses on those projects that are eligible for FAA grant funding. There are a variety of capital expenses that the Airport will have that are not eligible for FAA funding and which are not presented in great detail in this CIP. Non-eligible costs included are annual routine maintenance and a replacement fuel farm.

The FAA utilizes a national priority ranking system to help objectively evaluate potential airport projects. Projects are weighted toward safety, infrastructure preservation, standards, and capacity enhancement. The FAA will participate in the highest priority projects before considering lower priority projects, even if a lower priority project is considered a more urgent need by the local sponsor. Nonetheless, the project should remain a priority for the airport, and funding support should continue to be requested in subsequent years.

PROJECT DESCRIPTION	PROJECT COST	CIVILIAN COST	MILITARY COST	FAA ELIGIBLE	LOCAL SHARE
SHORT TERM PROGRAM (0-5 Years)					
1 Runway 13-31 Reconstruction - Construct	$16,176,200	$9,026,320	$7,149,880	$8,123,688	$902,632
2 Pavement Preservation Maintenance	50,000	50,000	-	-	50,000
2017 Total	**$16,226,200**	**$9,076,320**	**$7,149,880**	**$8,123,688**	**$952,632**
3 Runway 13-31 Reconstruction - Construct	$16,176,200	$9,026,320	$7,149,880	$8,123,688	$902,632
4 Pavement Preservation Maintenance	50,000	50,000	-	-	50,000
2018 Total	**$16,226,200**	**$9,076,320**	**$7,149,880**	**$8,123,688**	**$952,632**
5 Runway 13-31 Reconstruction - Construct	$16,176,200	$9,026,320	$7,149,880	$8,123,688	$902,632
6 Pavement Preservation Maintenance	50,000	50,000	-	-	50,000
2019 Total	**$16,226,200**	**$9,076,320**	**$7,149,880**	**$8,123,688**	**$952,632**
7 "Hot Spot" Mitigation at Runway 3 - Design	$459,000	$183,600	$275,400	$165,240	$18,360
8 Pavement Preservation Maintenance	50,000	50,000	-	-	50,000
2020 Total	**$509,000**	**$233,600**	**$275,400**	**$165,240**	**$68,360**
9 "Hot Spot" Mitigation at Runway 3 - Construct	$4,680,000	$1,872,000	$2,808,000	$1,684,800	$187,200
10 Pavement Preservation Maintenance	50,000	50,000	-	-	50,000
2021 Total	**$4,730,000**	**$1,922,000**	**$2,808,000**	**$1,684,800**	**$237,200**
TOTAL SHORT TERM PROGRAM	**$53,917,600**	**$29,384,560**	**$24,533,040**	**$26,221,103**	**$3,163,456**
INTERMEDIATE TERM PROGRAM (6-10 YEARS)					
1 North Apron Section Removal/Twy A Edge Lights	$207,000	$207,000	$-	$186,300	$20,700
2 Perimeter Fence - Design (All)	809,000	809,000	-	728,100	80,900
3 Perimeter Fence - Construct (Phase 1)	3,043,000	3,043,000	-	2,738,700	304,300
4 SRE Building - Design	358,000	358,000	-	322,200	35,800
5 SRE Building - Construct	3,222,000	3,222,000	-	2,899,800	322,200
6 Taxiway C - Reconstruction (Convert to Twy A)	21,030,000	12,618,000	8,412,000	11,356,200	1,261,800
7 Narrow Twy A at Rwy 13 (Marking & Lighting).	60,000	60,000	-	54,000	6,000
8 PAPI-4L (All Rwy ends)	350,000	350,000	-	315,000	35,000
9 RPZ Rwy 13 Land Acquisition (11 acres/3 buildings)	1,033,000	1,033,000	-	929,700	103,300
10 Charter Apron (Mill and Overlay)	7,690,000	7,690,000	-	6,921,000	769,000
11 Snow Blower - Acquire	600,000	600,000	-	540,000	60,000
12 Close Portion of GA Apron (Marking & Lighting)	133,000	133,000	-	119,700	13,300
13 Runway 3-21 Seal Coat	1,437,000	1,437,000	-	1,293,300	143,700
14 Perimeter Fence - Construct (Phase 2)	3,043,000	3,043,000	-	2,738,700	304,300
15 Terminal Apron - Mill & Overlay	3,427,000	3,427,000	-	3,084,300	342,700
16 ARFF Vehicle (Index A) - Acquire	175,000	175,000	-	157,500	17,500
17 Middle Taxiway A - Rehabilitate	$9,272,000	$5,563,000	$3,709,000	$5,006,700	$556,300
18 Upper Taxiway A - Rehabilitate	$7,035,000	$4,221,000	$2,814,000	$3,798,900	$422,100
19 Pavement Preservation Maintenance	$250,000	$250,000	$0	$0	$250,000
TOTAL INTERMEDIATE TERM PROGRAM	**$63,174,000**	**$48,239,000**	**$14,935,000**	**$43,190,100**	**$5,048,900**
LONG TERM PROGRAM (11-20 YEARS)					
1 Taxiway B - Reconstruction	$11,331,000	$6,799,000	$4,532,000	$6,119,100	$679,900
2 New Fuel Farm (90K Jet A)	$1,552,000	$1,552,000	$0	$0	$1,552,000
3 Perimeter Fence - Construct (Phase 3)	$3,043,000	$3,043,000	$0	$2,738,700	$304,300
4 De-icing Pad - Construct	$1,900,000	$1,900,000	$0	$1,710,000	$190,000
5 Bypass Twy at Rwy 13 - Construct	$1,436,000	$862,000	$574,000	$775,800	$86,200
6 Runway 3-21 - Mill & Overlay	$6,828,000	$4,097,000	$2,731,000	$3,687,300	$409,700
7 RPZ Rwy 21 Land Acquisition (19.2 Acres)	$480,000	$480,000	$0	$432,000	$48,000
8 RPZ Rwy 31 Land Acquisition (23.2 Acres)	$583,000	$583,000	$0	$524,700	$58,300
9 GA Apron - Rehabilitate	$3,682,000	$3,682,000	$0	$3,313,800	$368,200
10 Runway 13-31 - Crack Repair	$2,031,000	$1,178,000	$853,000	$1,060,200	$117,800
11 Master Plan Update	$450,000	$450,000	$0	$405,000	$45,000
12 Pavement Preservation Maintenance	$500,000	$500,000	$0	$0	$500,000
TOTAL LONG TERM PROGRAM	**$33,816,000**	**$25,126,000**	**$8,690,000**	**$20,766,600**	**$4,359,400**
TOTAL PROGRAM COSTS (Rounded to nearest $1,000)	**$150,908,000**	**$102,750,000**	**$48,158,000**	**$90,178,000**	**$12,572,000**

SRE: Snow Removal Equipment ARFF: Airport Rescue and Firefighting Note: Totals may not equal due to rounding

The most important feature of the CIP is that future projects for which the Airport may request FAA funding are included on the list. On an annual basis, the CIP is updated and reviewed with the FAA. Projects on the CIP will be moved up and down depending on priority and funding availability. Periodically, new projects will arise that can then be added to the annual CIP presented to the FAA.

On an annual basis, the CIP is updated and reviewed with the FAA.

The following sections will describe in greater detail the projects identified for the Airport over the next 20 years. The short term (0-5 years) projects are presented in yearly increments. The intermediate (years 6-10) and long-term (years 10-20) are grouped by local priority.

SHORT TERM IMPROVEMENTS

The projects identified for the short term planning period have been prioritized based on airport need and potential to be funded. If any of these projects cannot be funded in the time frame indicated, the airport sponsor should consider the project for the following year.

2017-2019 Projects

The reconstruction of Runway 13-31 is currently in the design phase which is partially funded with a 2016 FAA grant. Other funding sources include the local matching share and a significant portion from the National Guard Bureau. It is anticipated that the construction portion will take up to three years (construction seasons) to complete. As a result, it is assumed that FAA participation in capital projects in fiscal years 2017, 2018, and 2019 will be limited to the rehabilitation of Runway 13-31.

2020 Projects

Once the Runway 13-31 reconstruction project is complete, the next highest priority project is fixing the "Hot Spot" located at the south end of Taxiway A. Mitigation of "Hot Spots" are a high priority safety item for the FAA. As presented previously, Taxiway D and threshold Taxiway A leading to Runway 3 allow for direct access to the runway and are at a non-standard angle to the runway, thus limiting pilot peripheral views.

The recommended solution is to close both Taxiway D and threshold Taxiway A and replace them with a single new threshold taxiway to Runway 3 that is constructed at a 90-degree angle to the runway. The new threshold taxiway is planned to be 75 feet wide. The project also includes reconstruction of the lower portion of Taxiway A. This width is desired by the National Guard because their KC-135 aircraft will utilize Runway 3-21. The civilian design standard for taxiways exclusively serving Runway 3-21 is 35 feet. Therefore, a funding partnership among the Airport, the FAA, and the NGB is assumed. Since the new taxiway would also need to be strengthened to military standard, it is estimated that the military share would be approximately 60 percent and the FAA/local share would be 40 percent.

The 2020 project includes the environmental documentation (likely a CATEX since this is already developed land) and the engineering design work.

If for some reason the project cannot be pursued as described, an intermediate taxiway surface treatment such as a slurry seal may be necessary to maintain the existing pavement.

2021 Projects

The following year, in 2021, the construction element of the "Hot Spot" mitigation is planned to take place. Like the environmental/design element, the construction cost is planned to be shared with 60 percent from NGB and 40 percent from FAA/MTAA. The cost estimate includes complete removal of Taxiway D and threshold Taxiway A. Some cost savings could be realized by simply marking out the old pavement or limiting pavement removal to the shoulder areas.

Short Term Summary

Two capital projects are considered in the short term planning horizon. The first is the reconstruction of Runway 13-31 which is currently in the engineering/design phase. This is followed by up to three construction seasons. The second project is the "Hot Spot" mitigation project to remove Taxiway D and threshold Taxiway A and replace them with a single new threshold taxiway to be constructed at a 90-degree angle to the Runway 3 threshold.

On an annual basis, the Airport performs regular and routine maintenance on the airfield pavements. While the amount invested will vary from year to year, an average is estimated at $50,000 annually. The CIP reflects this cost for every year of the plan.

The short term projects total approximately $53.9 million. The military portion is estimated at $24.5 million and the civilian portion is estimated at $29.4 million. The civilian portion is assumed to be shared between FAA and MTAA. The FAA share is estimated at $26.2 million and the local matching share is $3.2 million.

INTERMEDIATE TERM IMPROVEMENTS

In order to provide maximum flexibility for management when programming capital improvement projects, the intermediate term projects have been grouped and generally include those projects that may be needed in years six through ten. Airport management should regularly assess the need and timing for these projects based on actual demand and growth at the Airport.

The first project considered in the intermediate term is to remove sections of the closed north apron in order to prevent damage to Taxiway A. This project involves removing two rows of 25-foot concrete sections. One row is adjacent to Taxiway A and the other runs across the northern portion of the closed apron.

The Airport completed a Wildlife Hazard Management Plan in 2013. One primary recommendation from the study was for the Airport to install full perimeter fencing with an in-ground concrete barrier to prevent borrowing animals from accessing the airfield. The fencing is planned to be 8-foot chain-link topped with three-strand barbed wire. Installing nearly 58,000 linear feet of wildlife fencing becomes an expensive project. As a result, the project has been divided into three different timeframes. Future consideration will identify which sections of fencing are of the highest priority.

The next project is the design and construction of a dedicated snow removal equipment (SRE) building. As noted previously, SRE is stored in multiple locations, including aircraft hangars. This structure would provide a single facility and is planned to be centrally located facing the charter apron north of the terminal building. Current planning places the SRE facility in the location of building 625. Immediately east of this building is an undeveloped grassy area that could also suffice.

Existing Taxiway C is showing signs of age and deterioration. By the intermediate planning period, it will need to be reconstructed. As shown on **Exhibit 6B**, it is planned to be reconstructed in a more standard location. The Taxiway would extend from the north "jog" in Taxiway A, extending toward Runway 13-31. It would cross Runway 3-21 at a perpendicular angle and outside the "high-energy" portion of the runway. It would then extend to the Runway 31 threshold with a "jog" to avoid the glide slope critical area. The civilian design standard is for this taxiway to be 50 feet wide. It is planned at a width of 75 feet to accommodate the military aircraft; therefore, the cost estimate includes military participation.

Relocating Taxiway C will be a relatively expensive project for which obtaining adequate funding may be a challenge. If it cannot be reconstructed and relocated as described, an intermediate surface treatment such as a slurry seal may be necessary to extend the life of the pavement.

The next project is to narrow threshold Taxiway A leading to Runway 13. This area is a wide expanse of pavement which exceeds the 75-foot design standard. In addition, the aircraft hold apron extends beyond the lateral end of the runway, which is a non-standard geometry. Therefore, the hold apron is planned to be taken out of service with pavement marking and new taxiway edge lights installed.

All four runway ends are outfitted with visual approach slope indicator (VASI) lighting. This is somewhat older technology and is planned to be upgraded with precision approach path indicator lights once the VASI reach the end of their useful life.

The RPZ for Runway 13 extends beyond Airport property and over all or part of three commercial/warehouse buildings. The structures are considered an incompatible land use for the RPZ. The Master Plan considers the fee-simple acquisition of 11 acres of RPZ land and includes the three structures.

The charter apron is showing signs of spalling and cracking. A project is planned to mill and overlay the apron and then mark the pavement with a more efficient layout. This is a very large apron area encompassing approximately 135,000 square yards of pavement. If the maintenance of this apron is justified, then the project would be eligible for FAA grant funding. When it is time to pursue this project, additional documentation of the usage of the apron may be required in order to justify FAA funding participation. For now, the project is shown as eligible.

As a Part 139 certificated airport located in a region that periodically receives heavy snowfall, the Airport must maintain an adequate fleet of SRE. By the mid-to-late intermediate planning horizon, one of the large snow blowers will be in need of replacement.

The existing general aviation apron immediately south of the terminal building is larger than is needed to accommodate activity. A 37,000 square yard section of the pavement is planned to be removed from service. The cost associated with this project is pavement marking and installation of edge lighting along Taxiway A.

Several years ago, sections of Runway 3-21 were rehabilitated with a mill and overlay and other sections were replaced. By the mid-to-late intermediate planning horizon, it is anticipated that a full seal coat will be needed to maintain the pavement.

Phase 2 of the perimeter fence construction project is anticipated in the late intermediate planning period. By the end of the intermediate planning period, the terminal apron will be in need of a mill and overlay.

For the Airport to retain its operating certificate, it must maintain an adequate fleet of airport rescue and firefighting vehicles. The acquisition of a vehicle that can carry firefighting agents to maintain ARFF Index A is planned.

Both the upper and middle portions of Taxiway A will be in need of reconstruction by the long term planning period. Both are planned to be constructed at a width of 75 feet, which exceeds the 50-foot civilian design standard. Therefore, these two projects are planned for cost sharing between the military and FAA/MTAA.

A placeholder for routine pavement maintenance is also included in the intermediate planning horizon.

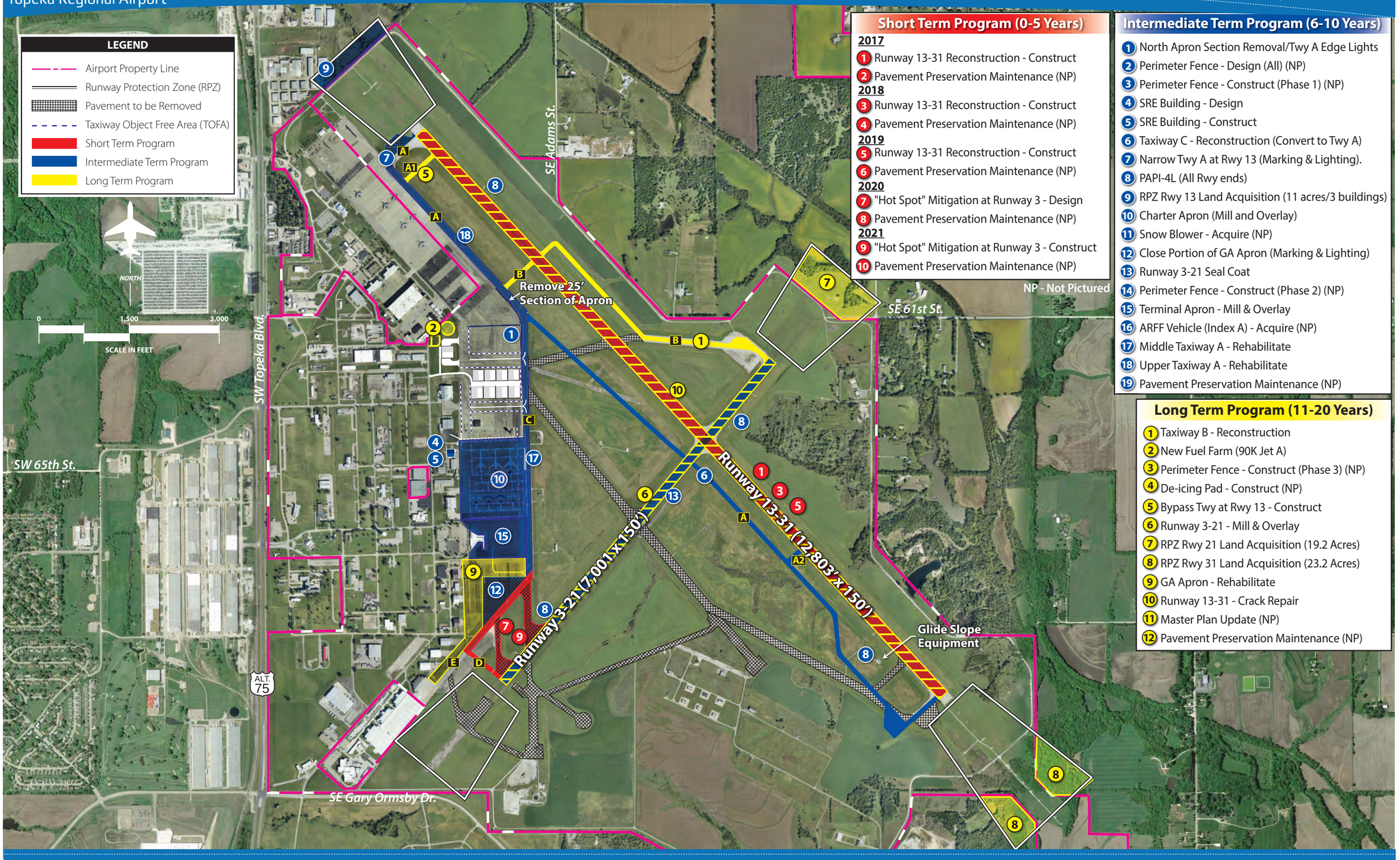
Intermediate Term Summary

A variety of capital projects are considered for the intermediate planning horizon. This includes installation of sections of the perimeter fence, construction of a dedicated SRE building, and reconstruction of Taxiway C (re-designated Taxiway A).

The intermediate term projects total approximately $63.2 million. The military portion is estimated at $15.0 million and the civilian portion is estimated at $48.2 million. The civilian portion is assumed to be shared between FAA and MTAA. The FAA share is estimated at $43.2 million and the local matching share is $5.0 million.

LONG-TERM IMPROVEMENTS

Long-term projects are those planned for years 11-20. These projects are grouped as demand could shift over time. The need for these projects could be accelerated if exceptional growth occurs at the Airport.



Short Term Program (0-5 Years)

2017
1. Runway 13-31 Reconstruction - Construct
2. Pavement Preservation Maintenance (NP)

2018
3. Runway 13-31 Reconstruction - Construct
4. Pavement Preservation Maintenance (NP)

2019
5. Runway 13-31 Reconstruction - Construct
6. Pavement Preservation Maintenance (NP)

2020
7. "Hot Spot" Mitigation at Runway 3 - Design
8. Pavement Preservation Maintenance (NP)

2021
9. "Hot Spot" Mitigation at Runway 3 - Construct
10. Pavement Preservation Maintenance (NP)

NP - Not Pictured

Intermediate Term Program (6-10 Years)

1. North Apron Section Removal/Twy A Edge Lights
2. Perimeter Fence - Design (All) (NP)
3. Perimeter Fence - Construct (Phase 1) (NP)
4. SRE Building - Design
5. SRE Building - Construct
6. Taxiway C - Reconstruction (Convert to Twy A)
7. Narrow Twy A at Rwy 13 (Marking & Lighting).
8. PAPI-4L (All Rwy ends)
9. RPZ Rwy 13 Land Acquisition (11 acres/3 buildings)
10. Charter Apron (Mill and Overlay)
11. Snow Blower - Acquire (NP)
12. Close Portion of GA Apron (Marking & Lighting)
13. Runway 3-21 Seal Coat
14. Perimeter Fence - Construct (Phase 2) (NP)
15. Terminal Apron - Mill & Overlay
16. ARFF Vehicle (Index A) - Acquire (NP)
17. Middle Taxiway A - Rehabilitate
18. Upper Taxiway A - Rehabilitate
19. Pavement Preservation Maintenance (NP)

Long Term Program (11-20 Years)

1. Taxiway B - Reconstruction
2. New Fuel Farm (90K Jet A)
3. Perimeter Fence - Construct (Phase 3) (NP)
4. De-icing Pad - Construct (NP)
5. Bypass Twy at Rwy 13 - Construct
6. Runway 3-21 - Mill & Overlay
7. RPZ Rwy 21 Land Acquisition (19.2 Acres)
8. RPZ Rwy 31 Land Acquisition (23.2 Acres)
9. GA Apron - Rehabilitate
10. Runway 13-31 - Crack Repair
11. Master Plan Update (NP)
12. Pavement Preservation Maintenance (NP)

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All relevant cost elements including environmental documentation, design, and construction are included for each project.

The first long term project is reconstruction and relocation of Taxiway B. This taxiway currently crosses the "high-energy" portion of Runway 13-31 and it crosses at a non-standard angle. When reconstruction is necessary, it is planned to be shifted slightly to the north in order to avoid the "high-energy" area, and where it crosses the runway, it is planned to be perpendicular to the runway. It will then continue to the Runway 21 threshold. Taxiway B is currently 75 feet wide, which is planned to be maintained. The civilian taxiway width standard is 50 feet. Therefore, a cost sharing program would be needed to fund the taxiway construction at 75 feet in width.

Relocating Taxiway B will be a relatively expensive project for which obtaining adequate funding may be a challenge. If it cannot be reconstructed and relocated as described, an intermediate surface treatment such as a slurry seal may be necessary to extend the life of the pavement.

The next project considered is a replacement fuel farm. The age and condition of the current fuel farm has been well documented and it needs to be replaced. Fuel farms are considered to be revenue producing facilities and thus are not eligible for FAA AIP grant funding. The cost estimate presented considered installation of three above-ground 30,000-gallon Jet A tanks. The tanks are double-walled and bulletproof. A location immediately west of the closed north apron is considered.

In the long term, the third and final phase of the perimeter fence reconstruction project is considered. A de-icing pad is included in the CIP. These facilities allow aircraft to taxi to a central location for de-icing. The fluids are then collected and recycled.

At some point in the future, a bypass taxiway leading to Runway 13 may be needed or desired. This would allow aircraft that are ready for departure to bypass another aircraft that is holding prior to entering the runway. Currently, a bypass taxiway is not justified by activity at the Airport. When this project rises in priority, a justification survey should be undertaken to determine if it is eligible for FAA funding. The bypass is planned to be 75 feet wide with a 50-foot width considered to be justified for civilian operations.

By the mid-to-late long term, Runway 3-21 may be in need of a mill and overlay project. Like several other airfield pavements, only a portion of the length is eligible for FAA funding. For planning purposes, the project cost is shared between the military and FAA/MTAA. The exact dimensions of eligibility will need to be reevaluated at the time of the project.

In the long term, RPZ lands beyond Airport property are planned to be acquired. There is approximately 19.2 acres in the Runway 21 RPZ and 23.2 acres in the Runway 31 RPZ. This acquisition is a recommendation only and not a requirement so long as the land uses remain compatible.

That portion of the general aviation apron that was not previously taken out of service is planned to be rehabilitated in the long term planning period.

By the end of the long term planning period, Runway 13-31 will be more than 15 years old. In this timeframe, concrete pavement sections can show edge cracking. A project has been reserved to accommodate this need in the long term.

The long range planning documents for the Airport should periodically be updated. The last project considered is a placeholder for a Master Plan update.

Long Term Summary

The long term projects total approximately $33.8 million. The military portion is estimated at $8.7 million and the civilian portion is estimated at $25.1 million. The civilian portion is assumed to be shared between FAA and MTAA. The FAA share is estimated at $20.8 million and the local matching share is $4.3 million.

CAPITAL IMPROVEMENT SUMMARY

The CIP is intended as a road map of airport improvements to help guide the airport sponsor, FAA, and state aviation officials on needed projects. The plan as presented will meet the forecast demand over the next 20 years and, in many respects, beyond. The first five years of the CIP are separated into yearly installments, and the intermediate and long-term projects are grouped together. It should be noted that the sequence of projects will likely change due to availability of funds or changing priorities in the years to come. Nonetheless, this is a comprehensive list of capital improvement projects the Airport should consider in the next 20 years.

The total 20-year CIP proposes approximately $150.9 million in airport development. The military portion is estimated at $48.2 million and the civilian portion is estimated at $102.8 million. The civilian portion is assumed to be shared between FAA and MTAA. The FAA share is estimated at $90.2 million and the local matching share is $12.6 million.

CAPITAL IMPROVEMENT FUNDING SOURCES

There are generally four sources of funds used to finance airport development: airport cash flow, revenue and general obligation bonds, federal/state/local grants, and passenger facility charges (PFCs), which are reserved for commercial service airports. Access to these sources of financing varies widely among airports, with some large airports maintaining substantial cash reserves and most small commercial service and general aviation airports often requiring subsidies from local and state governments to fund operating expenses and to finance modest improvements.

Financing capital improvements at the Airport will not rely solely on the financial resources of the Airport or the taxpayers. Capital improvement funding is available through various grant-in-aid programs on both the state and federal levels. Historically, Topeka Regional Airport has received federal and state grants. While some years more funds could be available, the CIP was developed with project phasing in

order to remain realistic and within the range of anticipated grant assistance. In the CIP, state grants are not specifically called out and are assumed to be part of the local responsibility. The following discussion outlines key sources of funding potentially available for capital improvements at Topeka Regional Airport.

FEDERAL GRANTS

Through federal legislation over the years, various grant-in-aid programs have been established to develop and maintain a system of public-use airports across the United States. The purpose of this system and its federally based funding is to maintain national defense and to promote interstate commerce. The most recent legislation affecting federal funding, the *FAA Modernization and Reform Act of 2012*, was enacted on February 17, 2012

The law authorizes the FAA's Airport Improvement Program (AIP) at $3.35 billion for fiscal years 2012 through 2015. The AIP is funded through the collection of user fees such as those imposed on airline tickets, aircraft parts, and aviation fuel. Eligible airports, which include those in the *National Plan of Integrated Airport Systems* (NPIAS) such as Topeka Regional Airport, can apply for airport improvement grants. **Table 6C** presents the approximate distribution of the AIP funds. Currently, Topeka Regional Airport is eligible to apply for grants which may be funded through passenger entitlements, state apportionments, the small airport fund, and/or discretionary categories. The Airport may also be eligible for set-aside AIP grants from the Military Airport Program (MAP).

TABLE 6C
Federal AIP Funding Distribution

Funding Category	Percent of Total	Funds*
Apportionment/Entitlement		
Passenger Entitlements	29.19%	$977,865,000
Cargo Entitlements	3.00%	$100,500,000
Alaska Supplemental	0.65%	$21,775,000
State Apportionment for Nonprimary Entitlements	10.35%	$346,725,000
State Apportionment Based on Area and Population	9.65%	$323,275,000
Carryover	10.77%	$360,795,000
Small Airport Fund		
Small Hubs	1.67%	$55,945,000
Nonhubs	6.68%	$223,780,000
Nonprimary (GA and Reliever)	3.34%	$111,890,000
Discretionary		
Capacity/Safety/Security/Noise	11.36%	$380,560,000
Pure Discretionary	3.79%	$126,965,000
Set Asides		
Noise	8.40%	$281,400,000
Military Airports Program	0.99%	$33,165,000
Reliever	0.16%	$5,360,000
Totals	100.00%	$3,350,000,000

* FAA *Modernization and Reform Act of 2012*
AIP: Airport Improvement Program
Source: FAA Order 5100.38C, Airport Improvement Program Handbook

Funding for AIP-eligible projects is undertaken through a cost-sharing arrangement in which FAA provides up to 90 percent of the cost and the airport sponsor invests the remaining 10 percent. In exchange for this level of funding, the airport sponsor is required to meet various Grant Assurances, including maintaining the improvement for its useful life, which is usually 20 years.

Apportionment (Entitlement) Funds

Federal AIP funds are distributed each year by the FAA from appropriations by Congress. A portion of the annual distribution is to primary commercial service airports based upon minimum enplanement levels of at least 10,000 passengers annually. If the airport exceeds the enplanement threshold, then it receives a minimum of $1 million. Other entitlement funds are distributed to cargo service airports, states and insular areas (state apportionment), and Alaska airports. In the past, Topeka Regional Airport has qualified for the enplanement entitlement of at least $1.0 million.

Potential Entitlement Funds:
-$150,000 (< 10,000 enplanements)
-$1.0 million (>10,000 enplanements)

General aviation airports included in the NPIAS can receive up to $150,000 each year in Non-Primary Entitlement (NPE) funds. These funds can be carried over and combined for up to four years, thereby allowing for completion of a more expensive project. In the past, Topeka Regional Airport has received NPE funding.

The states also receive an apportionment based on a federal formula that takes into account area and population. The FAA then distributes these funds for projects at various airports throughout the state.

Small Airport Fund

If a large or medium hub commercial service airport chooses to institute a passenger facility charge (PFC), which is a fee of up to $4.50 on each airline ticket, for funding of capital improvement projects, then their apportionment is reduced. Part of the reduced apportionment goes to the small airport fund. The small airport fund is reserved for small-hub primary commercial service airports, non-hub commercial service airports, and general aviation airports. Topeka Regional Airport is eligible for funds from this source.

Discretionary Funds

The remaining AIP funds are distributed by the FAA based on the priority of the project for which they have requested federal assistance through discretionary apportionments. A national priority ranking system is used to evaluate and rank each airport project. Those projects with the highest priority from airports across the country are given preference in funding. High priority projects include those related to meeting design standards, capacity improvements, and other safety enhancements.

Under the AIP program, examples of eligible development projects include the airfield, public aprons, and access roads. Additional buildings and structures may be eligible if the function of the structure is to serve airport operations in a non-revenue generating capacity, such as maintenance facilities. Some revenue-enhancing structures, such as T-hangars, may be eligible if all airfield improvements have been made; however, the priority ranking of these facilities is very low.

Whereas entitlement monies are guaranteed on an annual basis, discretionary funds are not assured. If the combination of entitlement, discretionary, and airport sponsor match does not provide enough capital for planned development, projects may be delayed. Topeka Regional Airport is eligible for discretionary funds.

Set-Aside Funds (Military Airports Program)

Portions of AIP funds are set-asides designed to achieve specific funding minimums for noise compatibility planning and implementation, select former military airfields, and select reliever airports.

The military airport program (MAP) is a component of the Federal AIP and is a discretionary funding set-aside, meaning the MAP funds are taken off the top of the discretionary pool of funds. The MAP set-aside was established to assist current and former military airports located in congested metropolitan areas in converting to viable civilian airports. Currently, the MAP set-aside is authorized at 4.0 percent of the discretionary fund. For Fiscal Year 2015, the amount was $33.2 million.

There are three conditions for an airport to be eligible for MAP funds:

1) the airport must be a former or current military airport that meets certain technical conditions;
2) the airport must have the potential for conversion either to a public use commercial service or reliever airport; and
3) the conversion of the airport would, in whole or part, enhance airport and air traffic control system capacity in major metropolitan areas and reduce current and projected flight delays.

Airports meeting these criteria are eligible for inclusion in the MAP for up to five years. Eligible projects include (in addition to other eligible airport improvement program projects), terminals, fuel farms, utility systems, parking lots, and hangars (which are generally not eligible for AIP funds).

The FAA can designate up to 15 current or former military airfields in the MAP. Three of the 15 airports may be general aviation airports and the remaining 12 must be commercial service or reliever airports.

Topeka Regional Airport has not previously applied for MAP grants. Additional research should be undertaken with the FAA to determine if the Airport is eligible.

FAA Facilities and Equipment (F&E) Program

The Airway Facilities Division of the FAA administers the Facilities and Equipment (F&E) Program. This program provides funding for the installation and maintenance of various navigational aids and equipment of the national airspace system. Under the F&E program, funding is provided for FAA Airport Traffic Control Towers (ATCTs), enroute navigational aids, on-airport navigational aids, and approach lighting systems.

While F&E still installs and maintains some navigational aids, on-airport facilities at general aviation airports have not been a priority. Therefore, airports often request funding assistance for navigational aids through AIP and then maintain the equipment on their own. The FAA owns and maintains the MALSR, VASIs and REILs. The Airport owns the SALS approach lights leading to Runway 13.

DEPARTMENT OF DEFENSE (DOD)

The 190th Air Refueling Wing of the Kansas Air National Guard is located at the Airport. Their aviation equipment includes 12 based KC-135 air tanker aircraft. The Kansas Army National Guard is also based at the Airport with a fleet of 12 Black Hawk helicopters. The National Guard Bureau (NGB) makes appropriation decisions for capital expenditures at the Airport on behalf of these National Guard units. Most recently, NGB participated in major rehabilitation of Runway 3-21 and is currently sharing funding for the reconstruction of Runway 13-31.

As a civilian Airport, FAA funding grants are only available for facilities necessary to support civilian activity. The military requirements may be greater than the civilian needs. As a result, the NGB may participate in future projects if those projects are necessary to support the military operations. For example, several taxiways are planned to be reconstructed in the future, however, the maximum width supported by civilian activity is 50 feet. KC-135 aircraft typically require a 75-foot taxiway width. Under this circumstance, NGB may financially participate in the additional taxiway width.

KANSAS AIRPORT IMPROVEMENT PROGRAM

The State of Kansas recognizes the valuable contribution to the state's transportation economy that airports make. Therefore, the Kansas Department of Transportation – Aviation Division administers the Kansas Airport Improvement Program (KAIP). The program provides approximately $5 million annually to airports in the state.

All public-use airports are eligible to apply for KAIP funding. There are several criteria for project consideration:

1. Scope of eligible project:
   a) Projects addressing safety and preservation concerns
   b) Projects focused on development needs identified in the Kansas Airport System Plan (KASP)

c) All projects deemed by the sponsor to be critical to the airport's ability to support the community

2. Projects should be capable of completion in one year
3. State funding cannot be used to leverage federal assistance projects

All KAIP funding requests are reviewed by the Project Evaluation Team whose members are designated by the Secretary of Transportation and consist of members with aviation, construction, and maintenance knowledge. All grant requests are evaluated objectively through a priority rating system. The factors used in evaluating projects are:

a. Safety
b. System Preservation
c. KASP Recommendation
d. Geographic remoteness
e. Discretionary
   i) willingness of sponsor to exceed minimum match requirements
   ii) previous project experience
   iii) other considerations

A financial match is required of the airport sponsors. The sponsor participation levels are as follows:

1. Design and Planning projects are funded 95 percent state and 5 percent sponsor match.

2. Privately owned, public-use airport projects will be funded 90 percent state and 10 percent sponsor match.

3. For publicly owned airports, the state/sponsor match is determined by the population of the associated city. Cities with less than 3,000 people will participate at 90 percent state and 10 percent sponsor match. Cities with between 3,000 and 10,000 people will participate at 75 percent state and 25 percent sponsor match. Cities larger than 10,000 people will participate at a 50 percent state and 50 percent sponsor match.

In addition, the airport sponsor must agree to keep the airport open to the public for a minimum of ten years. The maximum level of state participation is $800,000, unless the project is a new runway, which is eligible for up to $1.6 million or a full-depth replacement runway, which is eligible for up to $1.2 million.

LOCAL MTAA FUNDING

The balance of project costs, after consideration has been given to grants, must be funded through local resources. The goal of the airport is to generate enough revenue to cover all operating and capital expenditures. As with many general aviation airports, this is not always possible and other financing methods will be needed.

In 1978, the MTAA, formed under KSA 27-237 through 27-330, was instituted as an autonomous agency responsible for the administration of Topeka Regional Airport (formerly Forbes Field Airport), Philip Billard Municipal Airport, and the Topeka Air Industrial Park (TAIP), located at Topeka Regional Airport. The area administered by MTAA covers in excess of 4,000 acres, with the TAIP encompassing approximately 450 acres.

The MTAA is a legally chartered institution with the status of a public corporation. As owner and manager of the Airport (and Philip Billard Municipal Airport), the MTAA has relative independence from state and local governments, but also has the responsibility to manage its own budget. MTAA's financial independence rests largely on its ability to issue its own debt, in the form of general revenue bonds, as well as a limited authority to impose taxes upon airport patrons and users in order to fund capital projects at the airport(s). The MTAA receives its operational and capital funding from certain state and local tax programs, including a Shawnee County property tax mil levy, as well as from self-generated income such as land leases, hangar leases, landing fees, fuel flowage fees, etc. In addition to taxes and bonds, the airport collects various user fees, such as rental and fuel flowage fees, which allow the MTAA to operate as a financially self-sustaining public enterprise.

Other sources of development funding are available, including leasehold financing which refers to a developer or tenant financing improvements under a long term ground lease. The obvious advantage of such an arrangement is that it relieves the MTAA of all responsibility for raising the capital funds for improvements. However, the private development of facilities on a ground lease, particularly on property owned by a quasi-governmental agency, produces a unique set of concerns.

In particular, it may be more difficult to obtain private financing as only the improvements and the right to continue the lease can be claimed in the event of a default. Ground leases normally provide for the reversion of improvements to the airport at the end of the lease term, which reduces their potential value to a lender taking possession. Also, companies that want to own their property as a matter of financial policy may not locate where land is only available for lease.

General MTAA Revenue and Expenses

The balance of project costs, after consideration has been given to grants, must be funded through local resources. From a financial management perspective, the MTAA manages three facilities (Topeka Regional Airport, Philip Billard Municipal Airport, and the Topeka Air Industrial Park) under one accounting function; therefore, it is not possible to consider the financial status of one independently from the other two entities. **Table 6D** presents the scheduled revenue and expenses for MTAA for the previous ten years. Due to the minimum revenue guarantee provided to an airline in 2014, operating results were quite different when compared to previous years.

TABLE 6D
Revenue and Expenses
Metropolitan Topeka Airport Authority

Fiscal Year	Schedule of Revenues	Schedule of Expenses	Total Revenue Less General Expenses
2015	$5,320,269	$3,794,887	$1,525,382
2014	$6,998,551	$5,756,715	$1,241,836
2013	$3,816,431	$3,433,195	$383,236
2012	$3,870,741	$3,452,646	$418,095
2011	$4,033,944	$3,255,989	$777,955
2010	$4,071,668	$3,264,336	$807,332
2009	$4,122,220	$3,352,384	$769,836
2008	$4,126,476	$3,323,926	$802,550
2007	$3,534,600	$3,336,897	$197,703
2006	$3,403,375	$3,264,294	$139,081

Source: MTAA financial records

The operations of the MTAA generate revenues, which are secured by federal grant assurances to be utilized at the MTAA properties. All receipts, excluding bond proceeds or related grants and interest, are irrevocably pledged to the punctual payment of operating and maintenance expenses, payment of debt service for as long as bonds remain outstanding, or for additions or improvements to airport facilities.

All public use airports should establish standard basis rates for various leases. All lease rates should be set to adjust to a standard index such as the Consumer Price Index to assure that fair and equitable rates continue to be charged into the future. The condition and location of hangar space should also be considered when establishing the lease rates. Standard basis rates should be established for sponsor-owned hangars, terminal building office space, and ground leases. Fuel flowage fees and aircraft tie-down fees should also be uniform.

Financial Summary

The above financial discussion is intended to show that the operation of Topeka Regional Airport meets various requirements and goals set forth by the FAA.

Grant Assurance #24 – Fee and Rental Structure: Requires the airport sponsor to set fee, lease rates, and other charges that are directed at making the airport as self-sustaining as possible. Airport sponsors must impose fair market value charges for noncommercial uses of airport property, but aeronautical user charges may be less than fair market value. As demonstrated, the fee and rental structure for airport property and facilities is fair and equitable.

Grant Assurance #25 – Airport Revenues: Restricts the use of airport revenue generated by the airport and local taxes on aviation fuel to be expended for the capital or operating costs of the airport, the local

airport system, or other facilities owned or operated by the airport sponsor, which directly and substantially relate to the actual air transportation of passengers or property or noise mitigation efforts. Under the *Single Audit Act of 1984*, the airport must conduct an annual audit and assure the government that airport funds have been properly used. In general, revenue generated by the airport may not be diverted to functions unrelated to the operation and maintenance of the airport. Examples of revenue diversion include:

a) General economic development;
b) Marketing and promotional activities unrelated to the airport;
c) Payments in lieu of taxes or other assessments that exceed the value of services;
d) Payments to compensate sponsoring governmental bodies for lost tax revenues exceeding stated tax rates; and
e) Direct or indirect payments of airport revenue beyond that which is required to pay for services and facilities provided to the airport.

The MTAA meets all requirements for financial auditing.

FUNDING PLAN

The underlying strategy of the funding plan is to present the range of costs that the Airport may be responsible for if the entire CIP were to be undertaken in the timeframe suggested. Total project costs in the short, intermediate, and long term have been identified. Projects that are not eligible for FAA grant funding have been removed as has necessary funding from the military for certain projects. The remaining amount is what is eligible for FAA AIP grant funding. This amount is reduced by 10 percent, which is the Airport matching share. It is further reduced by the maximum entitlement funding (either non-primary or enplanement entitlement). The remaining amount is what is eligible for FAA AIP discretionary funding.

Table 6E outlines the maximum potential funds from AIP entitlements and FAA discretionary sources that could be attained during each planning horizon, based upon the activity levels forecast. This analysis assumes that the short term horizon would be attained in five years, the intermediate horizon would be achieved in the next five years, and the long-term horizon would be achieved in an additional 10 years. Each horizon includes the aggregate total costs and funds available for the given planning horizon. The table shows two scenarios: one with non-primary entitlement funds (assumes enplanements do not exceed 10,000 annually), and one with enplanement entitlement funds (assumes more than 10,000 annual enplanements).

In the short term, if the Airport were to receive full FAA discretionary funding for eligible projects, the minimum local investment would be $3.2 million. If no discretionary funding is available, then the high end for local funding would be $28.6 million. If the Airport were to receive the minimum enplanement entitlement of $1.0 million per year, then the high end exposure would be reduced to $24.4 million.

In the intermediate term, the low end local cost would be $4.1 million, which assumes full discretionary FAA funding. The high end exposure would range between $33.5 and $37.7 million, depending of the level of entitlement funding.

In the long term, the minimum investment required from local sources is $5.3 million. The high range is between$24.9 and $33.4 million, depending on the level of entitlement funding.

The local share of the $150.9 million 20-year CIP is a minimum of $12.6 million.

The funding plan makes no assumption about the potential for state grants or the method for financing the local responsibility. Instead, a range is provided for the likely level of required local financial participation if the entire CIP were to be implemented. If the full level of FAA discretionary funding can be obtained, then the Airport would be responsible for approximately $3.2 million in the short term, $4.1 million in the intermediate term, and $5.3 million in the long-term. The maximum high-end cost assumes no discretionary FAA funds are available, but it does consider the difference between non-primary entitlement funds ($150,000 per year) or enplanement entitlement funds ($1.0 million per year). To receive the enplanement entitlement funds, the Airport would have to record at least 10,000 annual enplanements.

TABLE 6E
CIP Financial Assumptions ($2016)
Topeka Regional Airport

	Short Term	Intermediate Term	Long Term	Total
NO ENPLANEMENT ENTITLEMENT				
Total Project Costs	$53,918,000	$63,174,000	$33,816,000	$150,908,000
Non-Eligible Civilian Costs	$250,000	$250,000	$2,052,000	$2,552,000
Military Costs	$24,533,000	$14,935,000	$8,690,000	$48,158,000
Total Grant Eligible Project Costs	$29,135,000	$47,989,000	$23,074,000	$100,198,000
AIP Project Grant Match (10%)	$2,914,000	$4,799,000	$2,307,000	$10,020,000
Remaining Costs Less Matching Funds	$26,221,000	$43,190,000	$20,767,000	$90,178,000
AIP NPE Funds	$750,000	$750,000	$1,500,000	$3,000,000
Remaining Costs Eligible for FAA Discretionary Funding	$25,471,000	$42,440,000	$19,267,000	$87,178,000
Airport CIP Costs High End[1]	**$28,635,000**	**$47,489,000**	**$23,626,000**	**$99,750,000**
Airport CIP Costs Low End[2]	**$3,164,000**	**$5,049,000**	**$4,359,000**	**$12,572,000**
WITH ENPLANEMENT ENTITLEMENT				
AIP Enplanement Entitlement	$5,000,000	$5,000,000	$10,000,000	$20,000,000
Remaining Costs Eligible for FAA Discretionary Funding	$21,221,000	$38,190,000	$10,767,000	$70,178,000
Airport CIP Costs High End[1]	**$24,385,000**	**$43,239,000**	**$15,126,000**	**$82,750,000**
Airport CIP Costs Low End[2]	**$3,164,000**	**$5,049,000**	**$4,359,000**	**$12,572,000**

[1]Assumes no discretionary FAA funding.
[2]Assumes eligible costs receive full discretionary FAA funding.
AIP - Airport Improvement Program
All figures rounded to nearest 1,000.

SUMMARY

The best means to begin implementation of the recommendations in this Master Plan is to first recognize that planning is a continuous process that does not end with completion and approval of this document. The issues upon which this master plan is based will remain valid for a number of years. The primary goal is for the airport to best serve the air transportation needs of the region, while striving toward economic self-sufficiency.

The CIP and the phasing program presented will change over time. An effort has been made to identify and prioritize all major capital projects that would require FAA grant funding. Nonetheless, the Airport and the FAA review the five year CIP on an annual basis.

The real value of a usable Master Plan is in keeping the issues and objectives in the minds of the managers and decision-makers so that they are better able to recognize change and its effect. In addition to adjustments in aviation demand, decisions made as to when to undertake the improvements recommended in this Master Plan will impact the period that the plan remains valid. The format used in this plan is intended to reduce the need for formal and costly updates by simply adjusting the timing. Updating can be done by the manager, thereby improving the plan's effectiveness.

In summary, the planning process requires the airport management to consistently monitor the progress of the airport. The information obtained from continually monitoring airport activity, as well as changes to FAA design standards, will provide the information necessary to determine if the development schedule should be accelerated or decelerated.



www.coffmanassociates.com

KANSAS CITY
(816) 524-3500

237 N.W. Blue Parkway
Suite 100
Lee's Summit, MO 64063

PHOENIX
(602) 993-6999

4835 E. Cactus Road
Suite 235
Scottsdale, AZ 85254