

Lawrence Smith Memorial Airport

Airport Master Plan Update



Harrisonville, Missouri



BUCHER, WILLIS & RATLIFF
CORPORATION

LAWRENCE SMITH MEMORIAL AIRPORT MASTER PLAN UPDATE

PREPARED FOR THE
CITY OF HARRISONVILLE, MISSOURI

FINAL REPORT

AUGUST 2005

PREPARED BY:



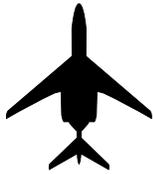
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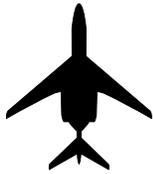


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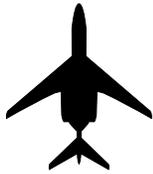
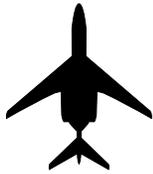


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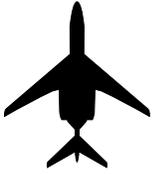
Chapter One

Introduction



Lawrence Smith
Memorial Airport

Harrisonville, Missouri



1

INTRODUCTION

AIRPORT PLANNING STUDY PROGRAM

AIRPORT STUDY PURPOSE

The City of Harrisonville (Airport Sponsor) has initiated this Airport Master Plan to assess the future role of the Lawrence Smith Memorial Airport, and to provide direction and guidance regarding future airport development priorities. The preparation of the Airport Master Plan is evidence that the City recognizes the value of aviation in the overall concept of community and transportation planning.

STUDY GOALS

The goal of this Master Plan is to identify improvement priorities in accordance with MoDOT-Aviation Section policy standards and consistent with current Federal Aviation Administration (FAA) design standards and airspace criteria. An approved Airport Master Plan enables the City of Harrisonville to apply for eligible grants as identified by the updated Airport Layout Plan (ALP) drawings.

In 1992, BWR completed a study to accompany the airport layout plan (ALP) set. It should be noted that this master plan study will reference the previous study from time to time to gain historical information and conditions.

STUDY OBJECTIVES

The Airport Master Planning program provides an objective look at future airport needs based on a comprehensive review of design considerations. In addition, the plan will answer several important questions about the role and function of the Lawrence Smith Memorial Airport, including:

- *What is the airport's existing and future service role?*
- *What are the preferred long-term airfield, terminal area and access development strategies?*
- *What are the existing airport facilities, equipment and operating conditions?*
- *Forecast levels of aeronautical activity from current and potential users?*
- *Immediate and long-term airport facility requirements, and design alternatives?*
- *Preferred long-term airfield, terminal area and access development strategy?*
- *Estimated project costs associated with the development program?*
- *How will additional airport development affect the surrounding environment?*

Answers to these questions and concerns provide the City of Harrisonville with the necessary tools to make an informed decision about the future of the Lawrence Smith Memorial Airport.



Furthermore, the airport study will provide the basis for an airport facility that is:

- *Safe, and in accordance with FAA / MoDOT design standards;*
- *Economically viable and substantially user-supported;*
- *In accordance with broad local, regional, state and national goals.*

STUDY COORDINATION

In May 2003, the City of Harrisonville, Missouri entered into an agreement with Bucher, Willis & Ratliff Corporation (BWR) for the preparation of the Airport Master Plan Study for the Lawrence Smith Memorial Airport. The study is funded 90 percent by the MoDOT - Aviation Section, and 10 percent by the City of Harrisonville.

Overall, the Airport Master Plan Study is tailored to be responsive to local issues, while at the same time, inclusive of more broad regional issues. The study is intended to serve as a medium for assembling community opinion, spirit and concurrence. When adopted by the City, and accepted by the various local, regional, state, and federal agencies, the study represents the long-term intentions regarding the location and extent of airport facility improvements at Harrisonville.

The public coordination and public participation aspect of the Airport Master Plan Update is aimed at encouraging public awareness of the airport planning and development process, along with the costs and benefits associated with airport improvements.

PLANNING ADVISORY COMMITTEE

A Planning Advisory Committee (PAC) has been established to facilitate coordination of this Master Plan at the local level. The PAC is comprised of local officials, airport users, local businesses and community residents. Meaningful input received from the PAC during the meetings, or through later comments, will receive the full consideration of the City and consultant, and incorporated into the documented findings.

Overall, the role of the PAC and purpose of the scheduled airport meetings are:

- *To provide a forum by which individuals, public interest groups and civic organizations desiring to be identified with the social and economic progress of the region can participate in the airport planning process;*
- *To review, respond and disseminate information for each stage of the airport study;*
- *To provide input regarding airport development priorities;*
- *To recommend a “preferred” course of action for future airport development.*



AIRPORT STUDY PHASES AND DOCUMENTATION

Table 1.1 identifies each element and task included in the Airport Master Plan Update. The study is being conducted in six stages to allow participants the opportunity for input, for the formal interim review and discussion of findings, and coordination regarding development priorities.

Table 1.1 Description of Airport Planning Program Lawrence Smith Memorial Airport Study	
<p>ELEMENT 1 – INVENTORY</p> <ul style="list-style-type: none"> 📍 Airport “Kick-off” Meeting #1 ➔ Assessment of Airport Facility Conditions ➔ Interview Business Firms/Major Users/Pilots ➔ Review Existing Airport Data/ Plans/Documentation ➔ Determine Existing Airport Activity Levels ➔ Establish Airport Service Area ➔ Identify Existing Critical Aircraft ➔ Conduct Wind/Meteorological Analysis ➔ Review Socio-Economic Condition for the Region 	<p>ELEMENT 2 – DEMAND FORECASTS</p> <ul style="list-style-type: none"> ➔ Forecast Future Based Aircraft and Operational Demand ➔ Determine Future Actual Instrument Operations ➔ Identify Activity by FAA Airport Design Categories ➔ Identify Fleet Mix/ Future Critical Aircraft 📖 City/MoDOT Working Paper #1 (60 Days) 📍 PAC Meeting #2
<p>ELEMENT 3 – FACILITY REQUIREMENTS</p> <ul style="list-style-type: none"> ➔ Facility Requirement Standards ➔ Identification and Phasing of Needed Facilities ➔ Determine Capabilities of Existing Airport Facility ➔ Propose Airfield and Terminal Area Alternatives ➔ Establish Criteria for Alternative Analysis ➔ Prepare Airport Layout Design Concept Drawing 📖 Working Paper #2 (60 Days) 📍 Public/PAC Meeting #3 	<p>ELEMENT 4 – ENVIRONMENTAL REVIEW</p> <ul style="list-style-type: none"> ➔ Environmental Coordination ➔ Affected Environmental Analysis ➔ Summary of Permits/Certifications 📖 City/MoDOT Working Paper #3 (60 Days) 📍 PAC Meeting #4
<p>ELEMENT 5 – AIRPORT LAYOUT PLANS</p> <ul style="list-style-type: none"> ➔ Airport Layout Drawing (Change #7) ➔ Airport Airspace Drawing ➔ Inner Approach Surfaces ➔ Terminal Area Drawing ➔ Airport Land Use Plan ➔ Airport Property Map (Exhibit A) Submit for State / FAA Review (60 Days) 	<p>ELEMENT 6 – CAPITAL IMPROVEMENT PLAN</p> <ul style="list-style-type: none"> ➔ Project Schedule/Phasing ➔ Project Cost Estimates ➔ Financial Plan 📖 City/MoDOT Working Paper #4 (60 Days) 📍 PAC Meeting #5
<p>ELEMENT 7 – FINAL REVIEW/ DELIVERABLES</p> <ul style="list-style-type: none"> ➔ Final Draft Report/Drawings ➔ City and MoDOT Final Review ➔ Deliver Final Report Copies and Drawing Documents 📖 Transmit Final Draft Report/Plans (30 Days) 📍 PAC Meeting #6 – Presentation of Final Study 	
<ul style="list-style-type: none"> ➔ Study Task (Note: total planning project time frame is exclusive of City / State / FAA review). 📖 Deliver Working Paper to City and State for review and coordination (completion days). 📍 Public meeting with Planning Advisory Committee and/or public. 	

Source: BWR, Scope of Services Planning Agreement – May 2001.



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AIRPORT MASTER PLAN UPDATE

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Chapter Two

Airport Inventory



Lawrence Smith
Memorial Airport

Harrisonville, Missouri



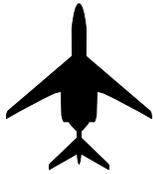
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AIRPORT INVENTORY

FACILITY INVENTORY

The inventory is a detailed data collection process to obtain background information regarding the airport and community in an effort to provide a snapshot of existing and historic aviation use at the Lawrence Smith Memorial Airport. This comprehensive inventory is used to form the basis for airport recommendations throughout the master plan study and includes the following major tasks:

- ❖ An on-site inspection (conducted by the Consultant in July 2003) and itemized inventory of airport facilities, equipment, and services to assess existing physical conditions, and the identification of both on- and off-airport land uses including the heights of objects for airspace purposes;
- ❖ Meetings with City officials, local businesses, Airport Manager, and based aircraft owners regarding recent airport trends, operations, services and future needs;
- ❖ Research local airport activity including the Federal Aviation Administration (FAA) airfield (FAA Form 5010) inspection records, a review of historical airport information and files, previous airport layout plans, maps, charts, photographs of airport facilities, a records search and review of local airport-related ordinances, policies, operating standards and lease agreements, plus any other aeronautical background documentation;
- ❖ Collection of surrounding airport activity to determine the airport service area characteristics;
- ❖ Obtain any planned on- and off-airport land use and development including industrial/commercial and residential development;
- ❖ Collection of regional climatic information, including predominate winds, cloud and visibility conditions, and precipitation levels;
- ❖ Distribution of an Airport or Business Survey to local-area pilots, aircraft owners and businesses to obtain general attitudes and identify facility needs, including follow-up phone interviews with key users and patrons.



AIRPORT CHARACTERISTICS

AIRPORT LOCATION AND ACCESS

The City of Harrisonville, Missouri is located adjacent to Missouri Highway 71 on the west central edge of the state. Harrisonville is the county seat for Cass County, and lies in the approximate center of the county. The Lawrence Smith Memorial Airport (LRY) is located within the Harrisonville city limits and is situated approximately 3 miles south of the central business district (CBD) at the intersection of Missouri Highways 7 and 71.

CURRENT AIRPORT ACTIVITY

In July 2003, BWR conducted a site inspection of the Lawrence Smith Memorial Airport and based on information gathered during the site inspection, it was determined that there are a total of 53 based aircraft (5 multi-engine, 47 single-engine, and 1 helicopter) contributing to approximately 13,250 annual operations¹.

CURRENT AIRPORT ROLE

The FAA *National Plan of Integrated Airport Systems 2001-2005* (NPIAS) identifies the Lawrence Smith Memorial Airport as a general aviation airport facility. Based on the application of airport design criteria from FAA *Advisory Circular 50/5300-13, Change #7, Airport Design*, the Airport has an Airport Reference Code (ARC) of B-II. The ARC is a coding system used to relate airport design criteria to the operational and physical characteristics of the aircraft intended to operate at the airport. The ARC has two components: 1) aircraft approach category, which relates to aircraft approach speeds and is grouped into five categories (A thru E); and 2) airport design group, which relates to the aircraft wingspan and is grouped into six categories (I thru VI).

AIRPORT OWNERSHIP AND MANAGEMENT

The Lawrence Smith Memorial Airport is owned and operated by the City of Harrisonville (airport sponsor). The City is responsible for maintaining and operating the Airport in accordance with FAA grant assurance agreements, with the day-to-day airport operations conducted by a city-employed airport manager. The airport manager is responsible for daily airport administrative duties, facility inspections, general maintenance of airfield equipment, mowing, and terminal office upkeep.

¹ An operation is either a take-off or landing by an aircraft, with the exception of ultralights and military aircraft – which do not count toward the annual operational totals.



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AIRPORT SERVICES

Airport and aircraft provisions at the Lawrence Smith Memorial Airport include basic support services for most single and twin-engine, piston aircraft. The Airport is open continuously for public use and attended during normal daytime hours unless special arrangements are made with the airport manager. The City of Harrisonville provides the following services at the Airport:



- ◆ Aviation fuel (100LL)
- ◆ Aircraft rental*
- ◆ Flight instruction*
- ◆ Aircraft storage hangars / tie-downs
- ◆ Pilot / passenger waiting area
- ◆ Flight planning area
- ◆ Telephone and vending
- ◆ Courtesy car

* Special arrangements are required with Air Associates based in Olathe, KS

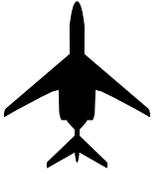


AIRPORT DEVELOPMENT HISTORY

Table 2.1 provides an overview of the Lawrence Smith Memorial Airport's project development history, as accomplished through federal and State grant assistance.

Table 2.1 Grant Assisted Airport Development Project History Lawrence Smith Memorial Airport		
Year	Airfield Project Description	Total Cost
1973	Airport Site Selection Study	\$6,533
1975	Airport Master Plan Study	\$3,766
1983	Pave and light Runway 17-35 (4,000' x 60') including turnarounds with medium intensity runway lights (MIRL); pave connecting taxiway (320' x 25'); pave and seal apron (3,473 S.Y.); install lighted wind cone and segmented circle; construct access road (1,593' x 25')	\$611,649
1985	Grading and paving of airport access road; expanding aircraft parking apron	N/A
1992	Purchase additional land, ALP, reconstruct, widen Runway 17-35 and connector taxiway, construct partial parallel taxiway and aircraft parking apron.	\$1,130,392
2003	Airport Master Plan and Airport Layout Plan Update	\$60,805
Total		\$1,803,145

Source: Project History (Recorded FAA Grant Agreements) FAA File Search – June 2003.



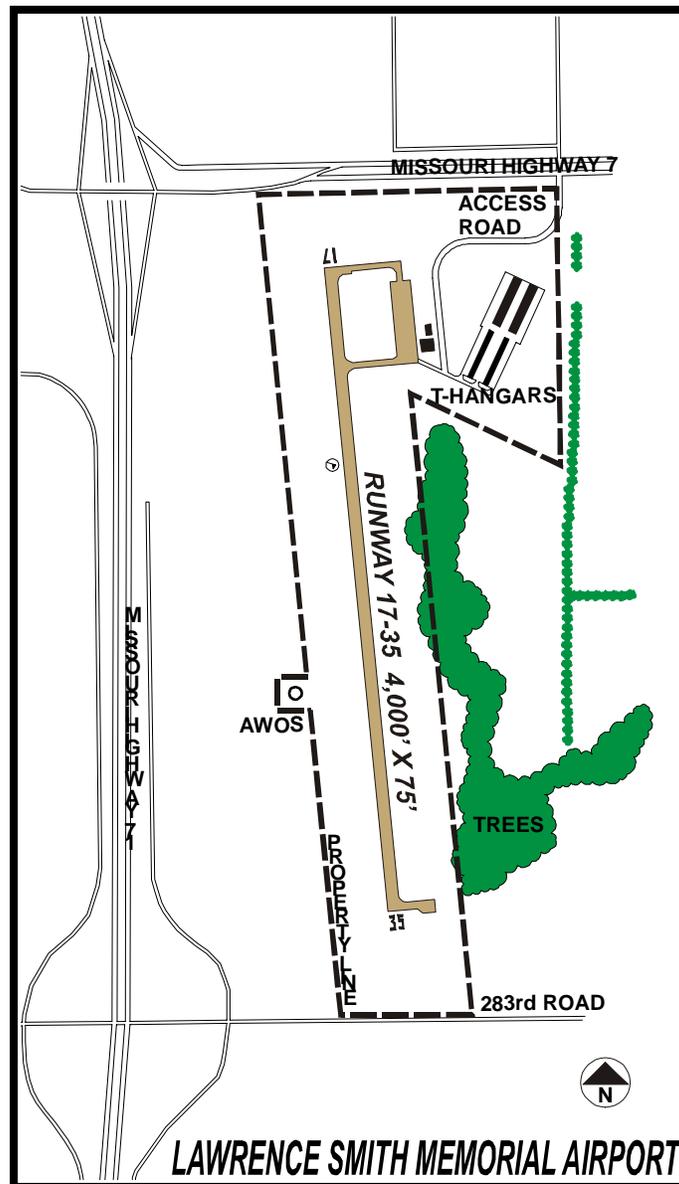
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AIRFIELD CONFIGURATION AND FACILITIES

Exhibit 2.1 shows the existing airport facilities at the Lawrence Smith Memorial Airport. Table 2.2 describes the major airfield facilities and equipment along with a corresponding assessment of physical conditions based on the airport site inspection (January, 2002).

EXHIBIT 2.1: AIRPORT LOCATION / FACILITY MAP



Source: BWR ACAD Drawing, 2002



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GENERAL AIRFIELD INFORMATION

The published airport elevation is 915.3' mean sea level (surveyed) with an airport reference point (ARP) coordinate of 38° 36' 39.68" North latitude and 094° 20' 31.67" West longitude. The current magnetic declination for the Airport is 3° 08' E (National Geophysical Data Center, June, 2003). The Airport is situated on approximately 222.8 acres of land owned by the City of Harrisonville in fee simple title.



Runway System



The Lawrence Smith Memorial Airport has a single primary, north-south, asphalt runway that is 4,000' x 60' with estimated pavement strength of 12,500 lbs single wheel gear (SWG). The runway centerline bears a direction of 357.16° (true) to give it the designation Runway 17-35. The Airport has a non-precision approach to Runway 35 and a visual approach to both runway ends. The runway has non-precision markings that consist of the centerline, threshold, and aiming point markings; they are in fair condition.

Taxiway System

The airfield has a partial-parallel taxiway on the north end of the airfield. This taxiway is constructed of asphalt and is 638 feet in length and 35 feet in width, and is part of the aircraft parking area with estimated pavement strength of 12,500 lbs single-wheel gear (SWG); it is in fair condition. The runway to taxiway centerline separation is 422.5 feet. A hangar connector taxiway is located at the southern end of the terminal area and connects the hangar area with the aircraft parking and continues to the runway to provide additional access. In addition, a runway turnaround is provided on the south end of the runway for aircraft preflight run-ups, while avoiding the active runway. The taxiway markings consist of a centerline stripe and hold position markings. These markings are in fair condition.





Airfield Lighting/Signage

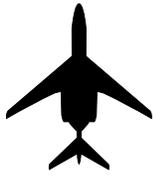
The airport lighting system consists of the airport beacon, runway edge lighting, taxiway radius lights, runway threshold lighting, and visual approach lighting. The airport beacon is located on the terminal hangar, on the east side of the Airport, and is in good condition. The runway edge lighting consists of medium-intensity runway lights (MIRLs); these are in good condition. Medium-intensity taxiway lights (MITLs) are located on the runway at the taxiway entrance, and are in good condition. Six runway threshold lights are used at each runway end and they are in good working order. The Airport uses a 4-box precision approach path lighting (PAPI) system for each runway end and are in good condition.



Other Airfield Items

An airport beacon is located on top of the airport terminal hangar. The beacon is in fair condition. A segmented circle and wind indicator is located to the west of the Runway 17-35, at approximately mid-field and is in good condition. During 2002, an automated weather observation system (AWOS) was installed at the Airport as part of a MoDOT, Aviation Section funded program to increase weather reporting around the State. The airport electrical vault is located inside the terminal office and is reported to be in good condition.





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Table 2.2 provides information regarding the existing airfield facilities, equipment, and condition and gives a representative rating that matches the time the site visit (July, 2003) was conducted.

Table 2.2 Existing Airfield Facilities and Condition Lawrence Smith Memorial Airport		
Airfield Item	Description and Size	Condition
Runway Facilities & Equipment		
RUNWAY 17-35 Runway Surface True Runway Bearing Edge Lighting Pavement Markings Visual Approach Aids	4,000' x 75'; 12,500 lbs. (SWG) 357.16°/177.16° Medium-Intensity Runway Lighting (MIRL) Non-Precision Precision Approach Path Indicators (PAPI's)	Fair N/A Fair Fair Good
Taxiway Facilities & Equipment		
Parallel Taxiway System Taxiway Lighting Taxiway Marking	Partial Parallel (North end) – (638' x 35') Runway entrance (radius) Centerline	Fair-Poor Fair Fair
Additional Airfield Items		
Airport Rotating Beacon Primary Wind Indicator Airfield Signs Weather Reporting Electrical Vault	Located on top of the terminal hangar West of the Primary Runway 17-35 None Automated Weather Observation System (AWOS) Located in the Terminal Office	Fair Good N/A Good Good
General Physical Condition Rating Guidelines:		
Good:	stable during the early portion of the planning period, with no immediate attention required;	
Fair :	requires some initial repair to remain stable;	
Poor:	requires replacement or reconstruction within the immediate future.	

Source: BWR Inventory/Airfield Inspection – July 2003.



AIRPORT COMPLIANCE ISSUES

Airfield safety inspections (FAA 5010 inspections) are conducted periodically by the MoDOT, Aviation Section to inventory and assess existing airport facilities and conditions, or to identify compliance issues that may result in unsafe conditions. The latest safety inspection was conducted in 2002 and a copy of the report was obtained by BWR during the on-site visit (July, 2003).



The inspection noted several objects that were in violation of Federal Aviation Regulation (FAR) Part 77, "Objects Affecting Navigable Airspace." **Table 2.3** outlines the type of obstructions and their relative location.

Table 2.3 FAR Part 77 Violations Lawrence Smith Memorial Airport		
FAR Part 77 Surface	Listed Obstructions	Location
Runway 17 Approach	Tree(s)	1,067 feet north and 315 feet east of the extended runway centerline
Runway 35 Approach	Tree(s)	1,670 feet south and 444 feet east of the extended runway centerline
Runway 35 Approach	Brush	400'-510 feet south and 200-285 feet west of the extended runway centerline
Runway 35 Primary Surface	Tree(s)/Brush	85 feet to 250 feet west and 500 feet to 700 feet north
Transitional Surface	Tree(s)/Brush	Violations to the 7 to 1 slope along both sides of Runway 17-35
<p>Note: All heights and distances were approximate and within tolerances of equipment used. A field survey may be conducted to determine the exact location and height of each object.</p>		

Source: Airfield inspection conducted by MoDOT, Aviation Section, May, 2002.



TERMINAL AREA/LANDSIDE FACILITIES

The airport terminal area is located on the northeast side of the airfield. The following are major terminal area/landside facilities:

- ◆ Airport office / waiting area
- ◆ General aircraft storage
- ◆ Aircraft tie-downs
- ◆ Aircraft fueling area
- ◆ Aircraft maintenance hangar

The following is a discussion of the major terminal area components:

Airport Office

The airport terminal office is attached to the main terminal hangar and occupies approximately 1,200 square feet of the northwest side of the hangar. This office is used for the airport administration, pilot/passenger waiting area, and meeting area. In addition, the office also has restrooms, an upstairs meeting area, and a mechanical/equipment room. The office is normally open during the weekdays or under special arrangements with the airport manager.

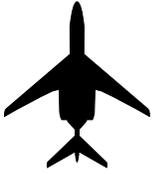


Currently, there is no fixed base operators (FBO's) operating at the Lawrence Smith Memorial Airport.

Aircraft Hangars

The Airport presently has four T-hangar aircraft storage units, and one common hangar (terminal hangar and office). The 3,000 S.F. common hangar is located on the aircraft parking apron and is approximately 25 years old and in fair condition. The four T-hangar units are located east of the airport terminal area, and are accessible by automobile and aircraft via connector taxiway leading from the apron area. T-hangars A and C each have 10 storage units and are approximately 25 years old and are in fair condition; however, these hangars are currently undergoing door replacement. T-hangars B and D are both 8 unit storage units and are about five years old and are in good condition; however, there are areas of flooding around these hangars due to the slope of the pavement. In addition, this pavement is in poor condition due to instability, resulting in aircraft sinking into the asphalt during warm weather conditions.

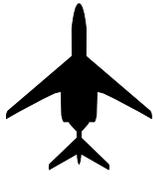




Aircraft Parking Apron



The aircraft parking apron (5,380 S.Y.) is located near the airport terminal office and has 18 tie-down spots. A fueling area is also located on the east side of the parking apron, between tie-down spots. This apron area is fenced from the public with a pedestrian access gate next to the terminal building. The apron is in poor condition with a large amount of transverse and alligator cracking of the pavement.



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Table 2.4 lists the existing terminal area (landside) facilities at the Lawrence Smith Memorial Airport.

Table 2.4 Airport Terminal Area Facilities Lawrence Smith Memorial Airport				
Item	Physical Characteristics			Dimension/Size
Apron	Asphalt aircraft parking apron – 18 tie-downs			5,380 S.Y.
Aviation Fuel	100LL – Storage tank and fuel pump Jet-A – Storage tank and fuel pump (LifeFlight Eagle)			10,000 Gal 10,000 Gal
Auto Parking	Gravel parking area next to the terminal hangar and office			≈ 12 spaces
Ref #	Airport Buildings	Tenant(s)	Building Facilities	Dimension/Size (S.F.)
	Airport Office	Airport Manager	Administrative Office	1,200 S.F.
	Modular Building	LifeFlight Eagle	Administrative Office	2,560 S.F.
	Hangar Style	Structure Condition	Stored Aircraft	Total Hangar Dimension/Area (S.F.)
	T-hangar A	Fair	12	327' x 35' (11,445 S.F.)
	T-hangar B	Good	11	232' x 50' (11,600 S.F.)
	T-hangar C	Fair	11	327' x 35' (11,445 S.F.)
	T-hangar D	Good	12	232' x 50' (11,600 S.F.)
	Common	Fair	1	50' x 60' (3,000 S.F.)
	Aircraft Tie-downs	Poor	5	5,380 S.Y.
Total			53 Aircraft	

Note: The terminal office is attached to the common hangar

Source: BWR Airport Site Inspection – July 2003.



Aviation Fuel Storage

The City of Harrisonville owns a self-fueling, 10,000 gallon 100 LL (AVGAS) fuel tank with a credit card system, located on the east side of the aircraft parking apron. A dedicated fueling area is located between aircraft tie-downs to allow easy access to aircraft that require fuel. A 10,000 gallon Jet-A fuel tank is located on the south side of the terminal hangar, but is owned and operated by LifeFlight Eagle and fuel is not available to the public.



Ground Access and Parking



Access to the Airport is from State Highway 7, directly east of the State Highway 7 and 71 interchange. The Airport is located approximately three miles south of the City of Harrisonville CBD. The airport entrance road winds south of Highway 7 and is identified by a small sign with arrow located near the airport entrance. Limited parking is available for visitors near the airport office in a non-marked, gravel parking area with about 12 parking spaces. Based aircraft owners normally park

in or near their hangars. There is no dedicated parking for aircraft owners near the T-hangar area.

Terminal Area Lighting

Terminal area lighting is provided by mercury vapor lights mounted on the terminal hangar. The lights are in good condition; however, additional lighting is needed to illuminate the entire aircraft parking apron and fueling area for safe operations after day-light hours.



Airport Utilities

Table 2.5 displays the utilities located at the Airport, along with the service providers. The current utilities and services are adequate for existing airport operational levels. The Airport is currently on a septic system as no sewer service is available for this area. The City of Harrisonville provides snow removal and fire services, when needed.

Table 2.5 Airport Utilities Lawrence Smith Memorial Airport	
Utility/Service	Provider
Water	Platte Rural District #4
Electricity	Osage Valley Electric
Telephone	Sprint
Gas	ATMOS
Sewer	On-Site Septic System
Solid Waste	Roll-Off Service
Fire Protection	City of Harrisonville
Airport Snow Removal	City of Harrisonville

Note: The septic system consists of an open cesspool located across from the terminal hangar, on the south side of the hangar access taxiway.

Source: BWR on-site visit, July 2003.

AIRSPACE SYSTEM and NAVIGATIONAL AIDS

The airspace system consists of airports, navigational aid facilities (NAVAIDS), and direct airways. **Exhibit 2.2** shows the airspace system surrounding the Lawrence Smith Memorial Airport. NAVAIDs are located at or near an airport, and provide point-to-point reference throughout the national airspace system by either ground or satellite based facilities interfacing with airborne equipment and instrumentation. The NAVAID closest to Lawrence Smith Memorial Airport is the Butler VOR (variable high frequency omni-directional range station) located approximately 25 miles south.



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The general aviation service area for the Lawrence Smith Memorial Airport was determined by application of the following service area models:

NPIAS Service Area: This service area is defined per *FAA Order 5090.B, Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)* by means of 30-minute (25 statute mile) ground access to the originating airport. Several public-use airports and privately-owned facilities fall within this 25 statute mile range, which excludes the NPIAS criteria from realistically defining the entire service area boundary.

Standard Service Area: This service area considers the *role and service level* of surrounding civilian public-use airports, as well as ground access distance and travel times between other public-use general aviation airports and their associated population centers.

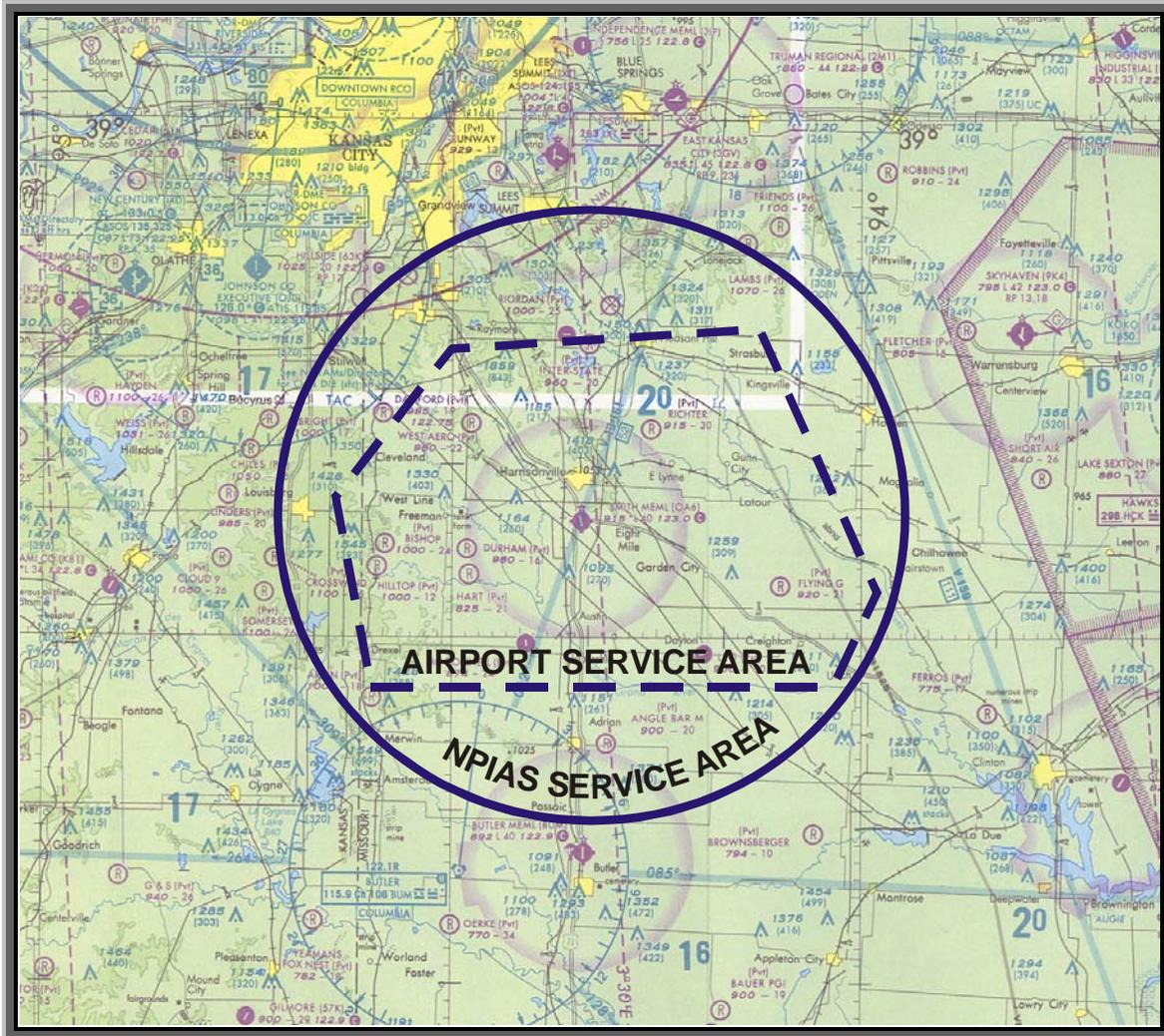


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Exhibit 2.2 illustrates the NPIAS and the Standard Service Areas. The standard service area includes Cass County, and a small portion of Johnson and Henry counties. The population of the standard service area is estimated at 34,500.

EXHIBIT 2.2: LAWRENCE SMITH MEMORIAL AIRPORT SERVICE AREA



Source: NOAA/ FAA Kansas City Sectional Aeronautical Chart, November 2002.



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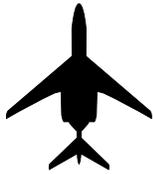
In order to understand the role of the Lawrence Smith Memorial Airport, we have to consider the capacities and influence of other nearby airports. **Table 2.7** lists information regarding the role, facilities, and services offered at the nearest public-use general aviation and commercial service airports.

Table 2.7 Area Public-Use Airport Facilities Lawrence Smith Memorial Airport				
Airport Name Airport Sponsor/Distance From Airport (NM)	Airport Role	Runway Characteristics	Aircraft/ Operations	Airport Services
Lawrence Smith (LRY) Harrisonville, MO	GA	17-35: 4,000' x 75' (P) (L)	53 planes 13,250 ops	NPI Fuel Hangar/Tie Instr/Rntl
Butler Memorial Airport (BUM) Butler, MO 19 S	GA	18-36: 4,000' x 75' (P) (L)	19 planes 6,000 ops	NPI Fuel/Repair Hangar/Tie Instr/Rntl
Lee's Summit Municipal (LXT) Lee's Summit, MO 19 N	GA	18-36: 4,015' x 75'; (P) (L) 11/29: 3,800' x 75' (P) (L)	172 planes 103,800 ops	NPI Fuel/Repair Hangar/Tie
Johnson County Executive Airport (OJC) Olathe, KS 24 NW	GA	18-36: 4,098' x 75'; (P) (L) *	247 planes 89,276 ops	NPI Fuel/Repair Hangar/Tie Rntl/Chtr Instr
Miami County Airport (K81) Paola, KS 27 W	GA	15-33: 3,400' x 60'; (P) (L) 3-21: 2,700' x 55' (T)	23 planes 6,450 ops	Fuel/Repair Tie/Instr
Skyhaven Airport (9K4) Warrensburg, MO 28 NE	GA	18-36: 4,206' x 75'; (P) (L) 13;31: 2,800' x 60'; (P) (L)	46 planes 75,000 ops	NPI Fuel/Repair Hangar/tie Chtr/Instr/Rntl
Clinton Memorial Airport (GLY) Clinton, MO 34 SE	GA	4-22: 4,001' x 60' (P) (L)	35 planes 13,450 ops	NPI Fuel/Repair Hangar/Tie
Total Activity			595 planes 307,226 ops	

Symbols: (♦) Airport within the NPIAS service area; (P) – Paved runway surface; (T) – Turf or gravel runway surface (L) – Lighted pilot controlled runway; (★) – Control tower

GA – General Aviation Airport – designed to serve all small single-engine and twin engine < 12,500 lbs.
Comm – Commercial Service Airport – designed to serve large turboprop and turbine < 60,000 lbs.

Source: NOAA-FAA Sectional Aeronautical Chart, 2002 and most recent FAA 5010 Inspection Data Sheets.



AIRPORT VICINITY LAND USE CHARACTERISTICS

The important considerations regarding the types of land use and zoning on and adjacent to an airport include aircraft noise, natural and man-made obstructions to flight, and incompatible development encroaching upon the airport and runway protection zones (RPZ).

AIRPORT PROPERTY/ZONING/LAND USE CONTROLS

The Lawrence Smith Memorial Airport is located on nearly 223 acres owned by the City of Harrisonville in fee simple title. The area surrounding the existing Airport has been included in the Comprehensive Plan 2002. The Plan has outlined existing and future land uses on and near the Airport. The Airport has been zoned for Government Use with adjacent property zoned as Commercial-Light Industry. Cass County does not participate in land use or zoning controls.

GENERAL AVIATION ACTIVITY

GENERAL AVIATION FUNCTION AND ROLE

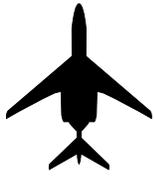
The FAA recognizes three broad categories of aviation: 1) general aviation, 2) certificated air carrier, and 3) military. General aviation includes all civilian aircraft other than the certified air carriers, and represents the largest component of the national air transportation system, including 95 percent of all airport landing facilities and total civilian aircraft fleet utilization (hours flown).

CURRENT AIRPORT ACTIVITY

The airport activity has been identified as a result of the pilot surveys, interviews with airport users, and based aircraft operators, and includes:



- ◆ recreational / pleasure flying
- ◆ flight instruction, training, promotion
- ◆ personal business / executive transport
- ◆ government use (state agencies)
- ◆ Department of Conservation
- ◆ State Highway Patrol



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SUMMARY OF BASED AIRCRAFT and HISTORIC ANNUAL OPERATIONS

The historic number of based aircraft, registered aircraft and annual operations (local and itinerant) at the Lawrence Smith Memorial Airport are outlined in **Table 2.8**. The following observations were identified at the Airport as part of the inventory of historical and existing airport activity levels. FAA 5010 Airfield Inspections were not available for years 1996 to 1999.

Aircraft Activity Summary: Since 1991, based aircraft have fluctuated between 24 and 53. Of the existing 53 based aircraft, five are twin-engine piston aircraft.

Operational Activity Summary: Over the past 10 years, the Airport operational activity has varied between 9,250 and 13,250 annual operations. The airport survey questionnaires indicated that "touch and go" operations account for 13 percent of the total operations. Runway 17 is used approximately 57 percent while Runway 35 is used 43 percent of the time. The average flight distance from the Airport is over 114 nautical miles.

Table 2.8
Historic Aviation Activity (Civilian Based Aircraft and Annual Operations)
Lawrence Smith Memorial Airport

Year	Single-Engine Aircraft	Multi-Piston/Turbine	Total Based Aircraft	Registered County Aircraft	Total Local Operations	Total Itinerant Operations	Total Annual Operations
1991	20	4	24	90	8,650	600	9,250
1992	25	4	29	90	10,000	1,725	11,725
1993	29	2	31	86	8,200	1,400	9,600
1994	29	2	31	N/A	5,400	4,100	9,500
1995	29	1	30	N/A	7,966	3,414	11,380*
2000	41	3	44	N/A	5,275	5,675	10,950
2001	41	3	44	N/A	5,275	5,675	10,950
Existing	48	5	53	157	9,275*	3,975*	13,250

Based Aircraft – An actively registered general aviation airplane stationed at a select airport.

Aircraft Operation – An aircraft *operation* is one take off and/or landing of an aircraft. Aircraft operations are identified as *local* and *itinerant*. Local operations consist of those within 20-mile radius of the airport vicinity. Itinerant operations include all other than local operations, having a terminus of flight from another airport at least 20 miles away.

* - Annual Operations provided by Mid-America Regional Council (MARC) airport traffic counts.

Note: Ultralights, sailplanes and gyrocopters not counted as based aircraft.

Note: Military operations are not counted towards airport operations.

Source: FAA 5010 Airfield Inspection Forms (1991-2001) as available. U.S. Registered General Aviation Aircraft by Aircraft Owner - FAA Census of U.S. Civil Aircraft (1992-1993). AIRPAC Database, 2000.



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CRITICAL AIRCRAFT AND AIRPORT REFERENCE CODE (ARC) CLASSIFICATION

MoDOT utilizes the airport design criteria developed by the FAA which determines the Airport's role and airport reference code (ARC) designation. This designation is used to provide minimum safety standards with respect to the performance and characteristics of the *critical* aircraft using the Airport. This particular aircraft, as determined with respect to approach speed and wingspan, is within a design category of airplanes that conduct at least 500 itinerant operations (combination of landings and takeoffs) per year. The critical aircraft for the Lawrence Smith Memorial Airport was chosen based the characteristics of a family of aircraft since one particular type of aircraft alone did not meet the minimum 500 operations requirement. **Table 2.9** identifies the existing *critical* aircraft for the Lawrence Smith Memorial Airport as the Cessna 421 Golden Eagle, which is an ARC B-I aircraft. This aircraft can hold 8 passengers and has a maximum takeoff weight of approximately 7,450 lbs with a range of 845 nm.

Table 2.9 Existing Critical Aircraft Information Lawrence Smith Memorial Airport							
Aircraft Type & ARC	Wing Span	Aircraft Length	Aircraft Height	Pass. Seats	Max. Gross Takeoff Weight	Standard Takeoff Distance	Approach Speed (knots)
Cessna 421 Golden Eagle	41.7'	36.1'	11.6'	8	7,450 lbs	2,387 feet	96 knots

Note 1: Takeoff weight indicates maximum takeoff and ramp weight, respectively.
 Note 2: Takeoff distance computed for using pressure altitude, no wind, *normal* aircraft operating takeoff conditions, including no flaps and no runway grade differential.
 Note 3: The Airport Reference Code (ARC) yields specific characteristics about the type of airplane that the airport is designed to accommodate. The current aircraft mix activity is determined in accordance with ARC design classifications in the Advisory Circular 150/5300-13, Change #7.

Source: BWR, Aircraft Performance File, 2003.



Source: BWR Aircraft Library



2003 AIRPORT INTERVIEWS/SURVEY RESPONSES

LifeFlight Eagle: operates a forward location from the Lawrence Smith Memorial Airport (LRY). The mission of LifeFlight Eagle is emergency ambulatory patient transport with their specially equipped helicopters. As an airport tenant, they have special needs that a typical airport tenant does not have such as the need for a facility with office space, flight planning and coordination areas, medical equipment storage, restrooms, crew rest/sleeping quarters, and a kitchen for food preparation. They operate on an “as-needed” basis from the Airport.

Angel Aircraft: is an aircraft manufacturing company located in northwest Iowa that has been considering relocating to the Harrisonville area. Angel Aircraft produces special use, short field takeoff and landing (STOL), twin-prop aircraft. A member of the company’s Board of Director’s, who also resides in the local Harrisonville area, has strong interest in moving the company to LRY. According to recent discussions, the company would eventually employ a total of 300 people and require a building approximately 60,000 square feet in size on about a 10 acres lot; however, this area is not currently served by sewer or water.

Church & Dwight Co., Inc.: is part of an international company located in Harrisonville, that produces household and personal care products under the *Arm & Hammer* trademark. They fly to the Harrisonville area several times a year for corporate/client visits.

Wal-Mart Inc., is an international company that owns a distribution center adjacent to the Airport. Wal-Mart owns multiple business jets and flies to the Kansas City Metro Region twice weekly, on average.

Quik Trip Corporation: operates a Cessna Bravo, Ultra and Citation II between Tulsa, Oklahoma and the Kansas City area. One of their corporate offices is located in Belton, Missouri, which is only 18 miles north of Harrisonville, adjacent to Highway 71. Quik Trip flies to Johnson County Executive (OJC) Airport 36-40 times a year since Jet-A fuel and better instrument approaches are available.

Universal Forest Products (UFP): is the nation’s leading manufacturer and distributor of wood and wood-alternative products with locations throughout the U.S. and Canada, with a major plant located in Harrisonville. UFP relies on several different business jet aircraft, depending on their need, for travel between its regional offices and plant locations. They currently use New Century Airport as their main landing area due to the short runway length and lack of facilities to accommodate their aircraft at LRY. Discussions with the Chief Pilot of UFP revealed their preference to use the company owned Cessna Citation X (750); however, this aircraft requires additional runway length (at least 5,000 feet), Jet-A fuel, and larger parking facilities. UFP visits their Harrisonville location approximately 10-12 times a year with the smaller Cessna Citation II or BeechJet 400, since these aircraft require less runway length than the Citation X.



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Flying J Incorporated: owns a network of travel plazas in 41 states across the nation to provide fuel stops for highway users. The company flies to the Harrisonville area periodically in a Cessna Citation II from their Ogden, Utah corporate headquarters for site visits and business meetings. Discussions with the Chief Pilot revealed that the Airport is in a convenient location for their business needs when visiting the Flying J Travel Plaza in Peculiar, Missouri. The company used the Richards-Gebaur Airport, which closed in 2001; they now fly to other airports in the area. The Chief Pilot said LRY is a good airport, but needs Jet-A fuel and a longer runway during inclement or hot weather. Otherwise, they are required to reduce fuel and passenger loads in order to take off within the existing 4,000 feet at Harrisonville.

R-O-M Corporation: is an international company which engineers, manufactures, and distributes custom products for the fire service, food distribution, and building security industries. R-O-M is located just off Highway 71 in Belton, and has flown a Beechjet 400 to the Lawrence Smith Memorial Airport in the past; however, the company declined to speak with us regarding their aviation needs.

Vista Productions: is a production company located in Harrisonville that provides video, lighting and equipment for producing live events. The company charters aircraft from other airports for pick-ups in Harrisonville in order to get to their intended destination. They have specified the need for Jet-A fuel and 24-hour access to flight planning facilities and restrooms. Their future plans are to purchase a light cargo aircraft to transport equipment to various sites in the Midwestern region. Vista employs about 26 local employees.

Air Associates: is an FBO from Olathe, Kansas, who provides flight instruction and aircraft rental at the Airport. Air Associates, under agreement with the City of Harrisonville, have based an aircraft at LRY for rental and flight training purposes. Flight training is coordinated through Air Associates with an independent contract certified flight instructor (CFI) to conduct flight training at the Airport. This agreement was made in an effort to increase the licensed pilots in the Harrisonville area and to provide local flight instruction.



OVERVIEW OF SURVEY FINDINGS

In order to identify the current and long-range needs of the airport users, an airport survey questionnaire was created and distributed to all based aircraft owners, area pilots and local businesses. Airport surveys are used to quantify the individual needs and interests of the airport users in order to establish the future facility requirements. Approximately 180 surveys were mailed out to identified individuals or businesses within the airport service area with a rate of return at 12 percent. Normally, we would expect a rate of return of 15 to 20 percent; however, given the composition of the metropolitan area, a lower return rate is anticipated.

The survey respondents were asked to rate or grade various airside and landside facilities based on their individual needs. The following lists the airside needs as a result of the survey questionnaires:

- 1) Taxiway system
- 2) Airport communications
- 3) Taxiway lighting
- 4) Airfield pavement

The most important needs on the landside are:

- 1) Aircraft maintenance and repair
- 2) Terminal building accommodations
- 3) Hangar space / availability
- 4) Ground transportation

The following summarizes the areas that the airport users would like the City to address regarding existing and future airport needs. Additional comments and concerns are also outlined from the survey questionnaires.

The taxiway system was the largest area of concern for the airport users. Additional comments support this fact as the current position of the LifeFlight Eagle helipad creates conflict with taxiing aircraft, to and from the T-hangar area. The helipad was constructed inside the taxiway object free area (OFA); therefore, when the LifeFlight Eagle helicopter is present, it creates conflict with passing aircraft. The second area of concern for the airport users is the current airport communications with air traffic control while on the ground. Since the Lawrence Smith Memorial Airport is an uncontrolled airfield, there are no communications with air traffic control until the aircraft is airborne or a telephone call is made while on the ground. Taxiway lighting is the third area of concern. The taxiway currently uses a marker system along the edges of the taxiway to delineate the taxiway between the runway and aircraft parking apron. Taxiway lighting is used to assist pilots during hours of darkness and low visibility conditions to keep the aircraft on the taxiway centerline. The fourth area of concern is the condition of the airfield pavement. The aircraft parking apron pavement is in need of repair to prevent further deterioration of the pavement. In addition, the pavement in the T-hangar area is in poor



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condition and heavier aircraft create ruts or sink in the asphalt pavement during hot weather conditions.

Overall, the largest area of concern is the landside facilities (terminal area). Airport users indicated their biggest concern here is the lack of maintenance facilities and qualified aircraft mechanics located on the Airport. The last aircraft mechanic left about two years ago. An aircraft mechanic is available if prior arrangements are made to needing these services; however, a full-time, on-demand mechanic is important to the airport users. The terminal building and accommodations are the second area of concern for the airport users. Users have indicated the need for 24-hour access to restrooms, telephone, and a place to get out of the weather. These needed facilities are inside the terminal building office and these services can only be accessed during business hours. The third area of concern is the availability of dry hangar space. Hangar space availability is always a concern at many airports around the nation, but it is especially critical around the Harrisonville area since the closure of Richards-Gebaur Airport in 2001. Aircraft owners want to keep their aircraft in a dry, secure location to maintain the condition of the aircraft and to prevent possible vandalism or theft of their airplane. Further comments have been received indicating hangar floors become flooded during substantial rain storms. The fourth item of interest is the lack of an airport courtesy car available to itinerant pilots while visiting the area. A courtesy car is made available by an airport to provide transportation to visiting pilots who have come for business or to find a restaurant for lunch or dinner.

General comments were invited by the survey recipients and are highlighted as follows:

“Nice facilities, nice people, good service, but need Jet-A fuel”

“The airport receives Jet-A fuel requests for about 2,000 gal./month, but no Jet-A available to the public”

“A grass strip...would be appreciated for ultralight operations”

“No one there on weekends or evenings”

“The terminal building needs to be accessible for computer weather access...and for use of the toilets”

“LifeFlight helicopter parks with blades extending over only taxiway to hangars”

“Jet fuel sales need to happen ASAP”

“Generally, this is a very practical, user-friendly airport for private pilots!!”

“Fuel is dispensed by a credit card operated pump with no pricing information given per gallon or total purchase”

“Need full-time FBO”

“Length of runway inadequate for corp. jets...”

“Need a (flight) planning room with computer, radar (weather) screen”

“Terminal building should be left open or accessible after hours”



CLIMATIC CHARACTERISTICS

Regional climate patterns can affect the ultimate design of the airport such as future operational requirements by type of aircraft as well as primary and secondary runway orientation. For example, temperature affects the runway distance (balanced field length) required for an aircraft to safely land and take off and the prevailing wind direction dictates the optimal runway alignment since aircraft generally take off and land into the wind.

The Lawrence Smith Memorial Airport is located near the geographical center of the United States and experiences a modified continental climate. Since this area contains no natural topographic obstructions to prevent or modify weather patterns, there is a wide variation of weather systems experienced here. The influx of moist tropical air from the Gulf of Mexico and the semi-arid continental air from the regions to the southwest determine whether wet or dry conditions will prevail, resulting in an annual average rainfall of 35.85 inches and approximately 64 days with 1/10th inch or more precipitation. Summer is characterized by warm days and mild nights with periods of moderate humidity levels. The warmest month is July, which sees the mean maximum temperature of 90.1° F. Fall is typically mild with sunny days and cool nights. Winters here are fairly mild with the lowest average temperature in January at 17.8° F and the season averages 16.3 inches of snowfall. Spring brings frequent and rapid fluctuations in weather which result in the most turbulent weather with severe thunderstorms and tornadoes.

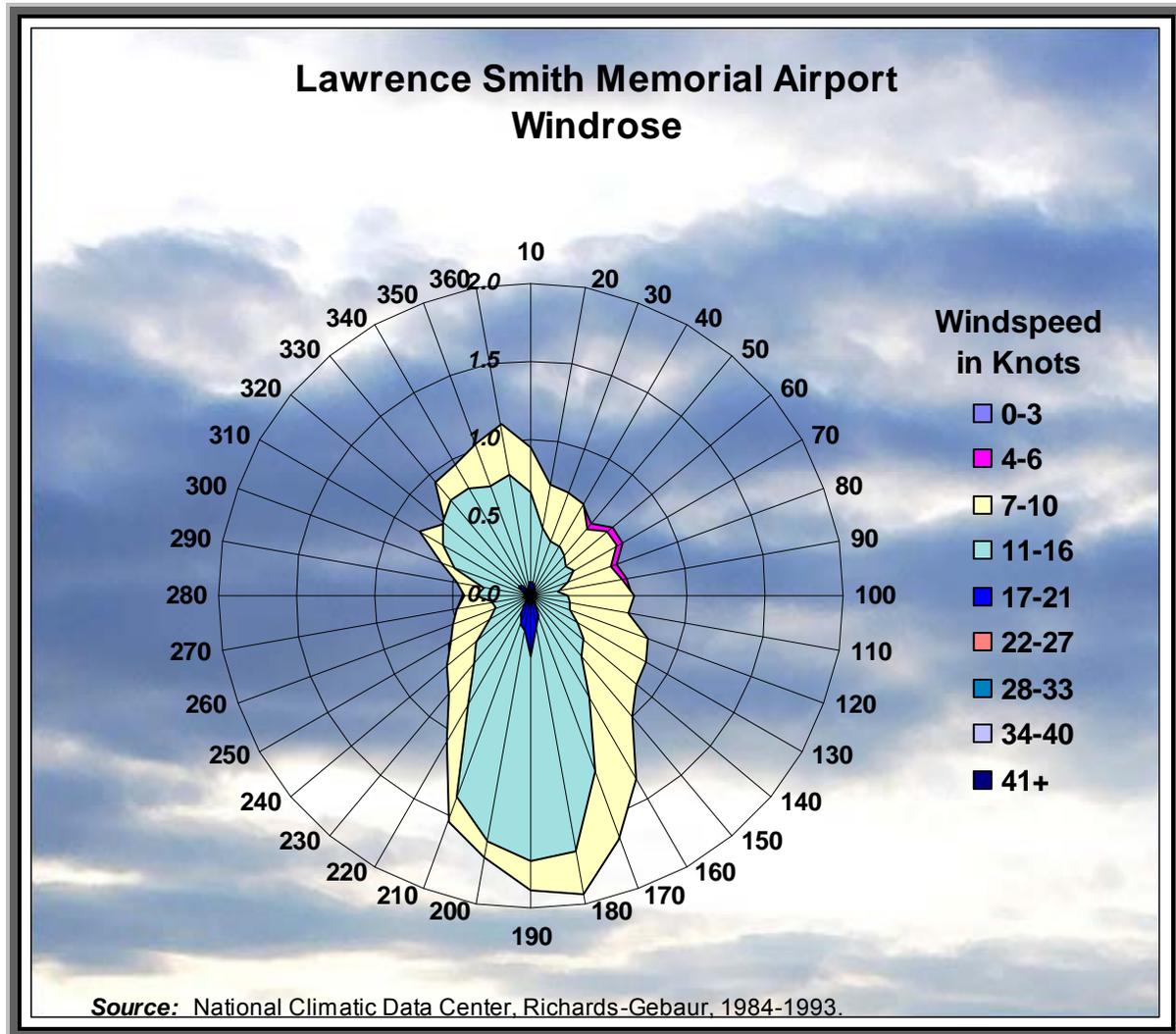
AIRPORT WIND ANALYSIS

Information was gathered from the National Oceanic and Atmospheric Administration (NOAA) weather reporting station (Whiteman AFB, 1992-2001) in order to determine the impacts of crosswinds on the existing runway alignment. All-weather wind conditions were used and expressed as the percentage of time the crosswind component is at or below an acceptable velocity. The crosswind component is determined by measuring wind speed and relative direction acting at right angles to the runway.

The *desirable* wind coverage is 95 percent, or better, for the primary runway, and is computed on the basis of the crosswind component not exceeding 10.5-knots (12 miles per hour) for ARC A-I and B-I (small) aircraft, 13.0-knots for ARC A-II and B-II aircraft, and 16.0-knots for ARC A-III to D-II aircraft. By airport design standards, a small aircraft (less than 12,500 pounds) should be able to operate on a runway 95 percent of the time without experiencing a crosswind component greater than 10.5-knots. **Exhibit 2.3** is a graphical depiction of the winds at the Lawrence Smith Memorial Airport.



EXHIBIT 2.3: GRAPHICAL WIND REPRESENTATION



ALL-WEATHER WIND CONDITIONS

Table 2.10 shows the percent of all-weather wind coverage for the 10.5-knot, 13.0-knot and 16.0-knot wind velocities. Runway 17-35 provides a wind coverage of **94.06 percent** at 10.5-knots for ARC A-I and B-I. Using the wind data as a reference, it was concluded that Runway 17 is utilized nearly 45 percent of the time (southerly winds), while Runway 36 is utilized about 55 percent of the time (northerly winds).



INSTRUMENT (IFR) WIND CONDITIONS

Runway 17-35 has a 94.88 percent wind coverage at 10.5 knots, which does fall below the recommended 95 percent wind coverage by airport design standards. **Table 2.10** shows the instrument wind coverage (600-foot ceilings/1-mile visibility) for the 10.5 and 13.0-knot wind velocities. A crosswind runway serving A-I and B-I aircraft is recommended for conditions less than visual meteorological conditions (VMC).

STRONG ALL-WEATHER WIND CONDITIONS

Strong wind characteristics (greater than 10.5-knots) during all-weather conditions are listed in **Table 2.10**. Approximately 47 percent of the strong wind conditions are within 30 degrees of Runway 17-35 centerline alignment. Runway 17 experiences 61 percent of the total strong wind activity while Runway 35 only experiences 39 percent.

Table 2.10 Percent Crosswind Runway Wind Coverage for All-Weather and IMC Wind Conditions Lawrence Smith Memorial Airport			
Runway Alignment (True Bearing)	Crosswind Component Wind Speed & Corresponding ARC	All-Weather Wind Coverage	IFR/IMC Wind Coverage
Runway 17-35 (357.16°/177.16°)	10.5 knots (A-I and B-I)	94.06%	94.88%
	13.0 knots (A-II and B-II)	97.34%	97.79%
	16.0 knots (A-III to D-II)	99.53%	99.64%
Total – Calm and Light Winds (0-10 Knots)		79.29%	
Total – Strong Winds		24.71%	
Optimum All-Weather Primary Runway Alignment Wind Coverage		3.0° 94.13% (10.5-knots)	
Range of All-Weather 95% Wind Coverage Alignment		95% all-weather wind coverage cannot be achieved at 10.5-knots for (ARC A-I & B-I)	
Note 1: The percentage (%) indicates the percent of time wind coverage is provided for a particular velocity. The greater the percent, the more desirable the wind coverage. Note 2: True runway bearing(s) are used to calculate wind calculations. Note 3: IFR/IMC Conditions measured with ceilings = 600' (AGL)/visibility = 1.0 miles.			

Source: National Oceanic & Atmospheric Administration (NOAA)/ Federal Aviation Administration (FAA);
 First-Order Wind Observing Station (VFR/IFR Winds) – Richards-Gebaur AFB, 1984-1993 (10-year period).



SOCIO-ECONOMIC CHARACTERISTICS

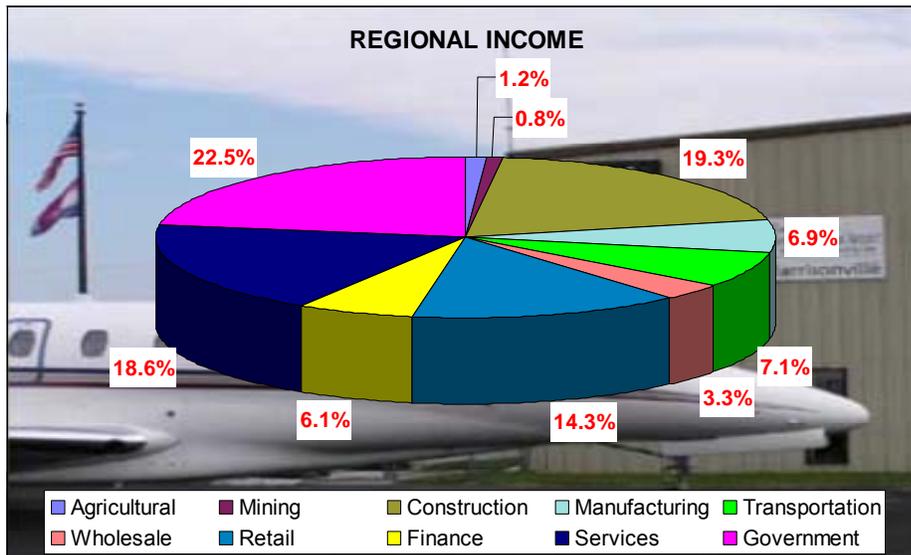
REGIONAL ECONOMIC INDICATORS

One of the first steps to forecasting future aviation activity is analyzing the existing socio-economic and available regional activity indicators. This information is used to gather an overall assessment of the airport and its role for the community. Furthermore, this information is coupled with the airport survey responses, to obtain a clear direction for airport development.

THE CITY OF HARRISONVILLE AND CASS COUNTY REGIONAL ECONOMY

The use of employment and earnings information is used in identifying recent trends and patterns related to major shifts in industries within the County, and are a good measure of a community's economic vitality. This information is used to gauge the economic stability of the area, which correlates to expected aviation activity and demand.

Between 1991 and 2001, earnings by place of work in Cass County increased from \$670,996,000 in 2000 to \$745,810,000 in 2001, an increase of 11.1 percent. The 2000-2001



state change was 2.4 percent and the national change was 2.5 percent. The per capita personal income (PCPI) for Cass County was \$26,493 in 2001. This PCPI ranked 11th in the state and was 94 percent of the state average, \$28,221. These numbers indicate that income growth is occurring in Cass County, which reflects an increase in

the employment rates and total family wealth. The major employers in the Harrisonville region are Wal-Mart, Wal-Mart Distribution Center, Cass R-IX Schools, Cass County Government, and Cass Medical Center.

Harrisonville and the Lawrence Smith Memorial Airport are both located along Highway 71, which provides quick and easy access for transportation of goods and services to anywhere in the U.S. Recently, Wal-Mart Stores Inc., placed a new 875,000 S.F. food distribution facility along Highway 71, near the Airport. In addition, the City has several industrial parks located throughout the area to promote and maintain economic growth for the community. Programs



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are available to provide financial assistance to businesses looking to locate in the Harrisonville area.

POPULATION

Table 2.11 provides population information for City, County and State. Population trends and rates of change provide insight into a region's economic potential. Past population tendencies can be compared to State and national population for comparison as an indicator of future general aviation trends. Over the past 30 years, the Harrisonville-to-County population ratio has decreased. This is reflective of the growth of the suburban cities of Raymore and Belton, and for many the desire to move to rural locations rather than reside within the denser populated areas. Using the County-to-State population ratio, the County is one of the faster growing counties in the State of Missouri. In fact, according to the Missouri Economic Research and Information Center, over the past 10 years, Cass County has been one of the faster growing counties in the Kansas City Metro Region, as well.

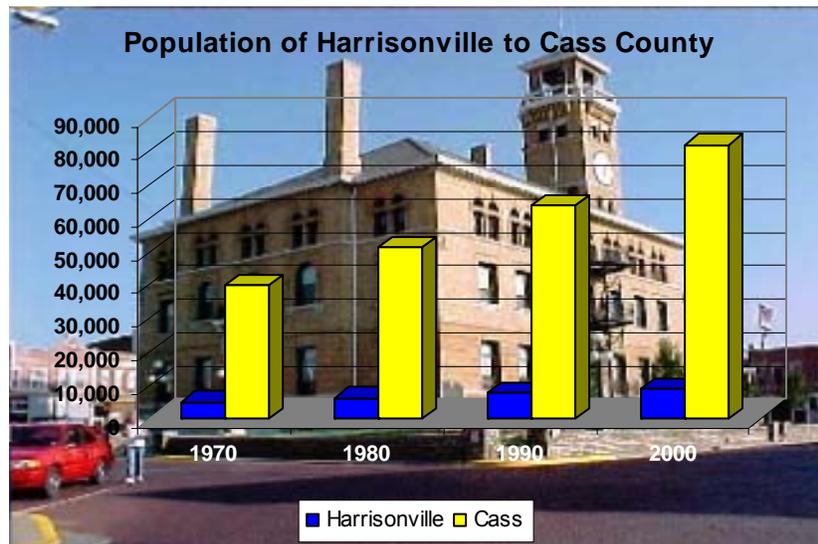


Table 2.11 Historic and Forecast Population Levels Lawrence Smith Memorial Airport					
Year	City of Harrisonville Population	Cass County Population	State of Missouri Population	City to County Population Ratio	County to State Population Ratio
Historic Population Levels					
1970	4,928	39,853	4,684,768	12.4%	0.8%
1980	6,372	51,290	4,921,966	12.4%	1.04%
1990	7,683	63,808	5,117,073	12.0%	1.24%
2000	8,946	82,092	5,595,211	10.8%	1.47%

Sources: U.S. Department of Commerce, Bureau of Economic Analysis.
Office of Community Development, Harrisonville, 2003.



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INCOME

Per Capita Income (PCI) is a widely used indicator for gauging the economic performance and changing fortunes of local economies. PCI is the total personal income of an area divided by its resident population. **Table 2.12** compares the PCI of Cass County to that of the State of Missouri and the U.S. In 2001, the Cass County PCI ranked 11th in the State, at 93.3% of the State average but only 87.1% of the national average. The average annual growth rate for the County was 5.1%, which was slightly below the national average of 5.3%.

Table 2.12 Per Capita Income Lawrence Smith Memorial Airport					
Year	Cass County Per Capita Income (PCI)	State of Missouri Per Capita Income (PCI)	County Percent of State (PCI)	United States Per Capita Income (PCI)	County Percent of United States (PCI)
1980	\$14,867	\$14,894	99.8%	\$16,152	92.0%
1985	\$16,211	\$16,845	96.2%	\$17,862	90.7%
1990	\$16,264	\$17,743	91.7%	\$19,572	83.0%
1995	\$17,354	\$18,759	92.5%	\$19,944	87.0%
2000	\$19,367	\$20,867	92.8%	\$22,588	85.7%
2001	\$19,552	\$20,827	93.9%	\$22,445	87.1%

Note 1: Studies conducted by the U.S. Department of Commerce, and confirmed by U.S. Department of Transportation Studies have demonstrated that the likelihood of taking a trip by air increases as family income increases. Accordingly, the propensity to own a general aviation aircraft is directly related to the amount of "real dollar" disposable family income.

Note 2: Per Capita Income levels are adjusted to reflect 1982-84=100.

Source: U.S. Department of Commerce, Bureau of Economic Analysis (2003)



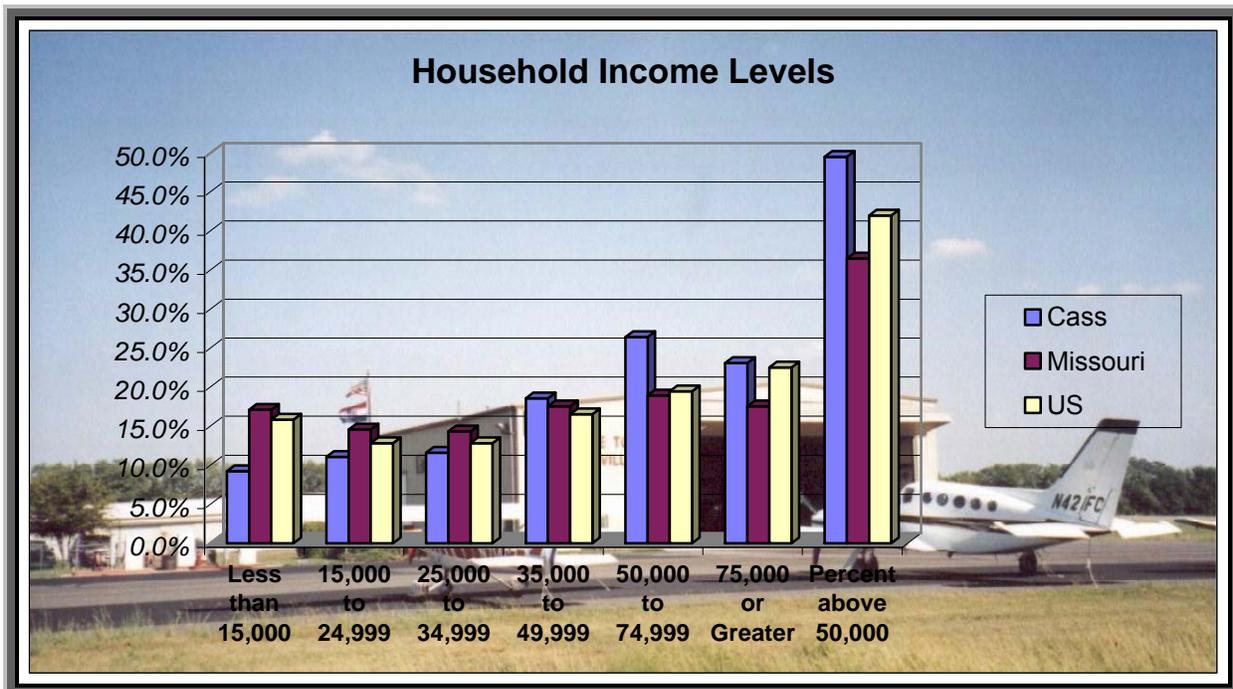
INCOME DISTRIBUTION

Table 2.13 displays the distribution of household income for Cass County, the State of Missouri, and the United States. Using income as a gauge of aviation activity, it is assumed that approximately 49.5 percent of the County households earn income of \$50,000 or more, a segment of the local population considered capable of participating in general aviation activity (rental, ownership, flight training, etc.).

Table 2.13 Household Income Distribution Lawrence Smith Memorial Airport							
Locale	Less Than \$15,000	\$15,000-\$24,999	\$25,000 - \$34,999	\$35,000 - \$49,999	\$50,000 - \$74,999	\$75,000 +	Percent Above \$50,000
Cass County	9.2%	11.1%	11.6%	18.6%	26.4%	23.1%	49.5%
State of Missouri	17.1%	14.6%	14.3%	17.5%	18.9%	17.6%	36.5%
United States	15.8%	12.8%	12.8%	16.5%	19.5%	22.5%	42.0%

Note: Based on the dollar value of the 2000 Census Data.

Source: U.S. Bureau of the Census, Census 2000.





INVENTORY SUMMARY/FINDINGS

Several findings were identified in the inventory section that are significant to the future use and development of aviation facilities at the Lawrence Smith Memorial Airport. As an overview, these findings include:

Airport Role/Regional Facts:

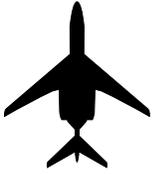
- The Lawrence Smith Memorial Airport is an ARC B-II facility with a runway length and width of 4,000' x 75'. This facility is used primarily by single and twin-piston aircraft, with the occasional operation by a small cabin business jet.
- The Airport is conveniently located just off Highway 7, with good access to Highway 71 three miles south of the Harrisonville central business district.
- Flight instruction and aircraft rental is provided through special arrangements made with Air Associates, based in Olathe, KS.
- The Airport is located just outside the Kansas City Metropolitan Area; however, some of the existing traffic and ultimate demand stems from regional firms conducting business in and around the Harrisonville area.

Airfield/Navigational Aids:

- The runway at the Lawrence Smith Memorial Airport is not large enough to accommodate existing demand by larger business jets. Given the proximity of the Airport to the Kansas City Metropolitan (Metro) Area, coupled with the closing or Richards-Gebaur Airport in 2001, there is a need for an airport on the southeast side of the Metro with business jet capabilities.
- An automated weather observation system (AWOS) was installed recently for receiving current airport weather information by arriving and departing aircraft.
- The north apron area contains poor pavement due to extensive cracking.
- A remote communications outlet (RCO) is needed to increase communication coverage with air traffic control and aircraft at the Airport.
- Wind coverage for the primary Runway 17-35 is 94.88% (95% recommended).

Terminal Area/Landside:

- A full-time fixed based operator (FBO) is in high demand at the Airport. The FBO would provide 24-hour access to restrooms, telephone, and shelter from inclement weather in addition to a flight planning area and pilot lounge.
- Jet-A fuel is needed for turbine powered aircraft.



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- Inadequate taxiway safety area separation leads to conflicts with taxiing aircraft and the helipad on the southeast corner of the terminal hangar when a helicopter is present.
- Poor drainage leads to flooding of the T-hangar area and individual T-hangars during high rainfall events.
- There is demand for a maintenance facility to be permanently located on the airfield. Currently, maintenance can be performed by a mobile qualified aircraft mechanic if prior arrangements are made.
- Additional hangar space is needed to satisfy regional demands by aircraft owners to store their aircraft in a dry, safe, and secure environment.

Chapter Three

Aviation Demand Forecasts



Lawrence Smith
Memorial Airport

Harrisonville, Missouri



3

AVIATION DEMAND FORECASTS

AIRPORT FORECAST METHODOLOGY

The purpose of forecasting aviation activity is to estimate future airport facility and equipment needs. The *preferred* demand forecasts are used to identify the type, extent, and timing of aviation development. In addition, the forecasts are instrumental in identifying airport-related infrastructure and capacity needs, potential environmental effects, and estimating the financial feasibility of airport development alternatives. Aviation demand forecasts have been prepared for the following areas of activity¹:

- ◆ Based aircraft
- ◆ Aircraft operations
- ◆ Critical aircraft family
- ◆ Air taxi / charter operations
- ◆ Actual instrument approaches
- ◆ Fleet mix by aircraft type

Assumptions of these forecasts are based on analysis and professional judgement to realize the highest level of forecast confidence. The general aviation demand forecasts are developed in accordance with national trends, and in context with the inventory findings, including local population and airport survey information. National general aviation trends and forecasts, which are used to provide a baseline of growth rates, are provided by the publication *FAA Aviation Forecast (FY 2003-2015)*.

LOCAL-AREA BASED AIRCRAFT FORECAST FACTORS AND ASSUMPTIONS

Based on business and pilot surveys, and local area information, the following factors and assumptions have been incorporated into the forecasts of based aircraft and annual operations at the Lawrence Smith Memorial Airport:

- Improvements such as the expansion of the runway and construction of additional terminal area facilities lead to an “unconstrained” forecast of aviation demand. Assumptions include greater aircraft utilization resulting from airfield and terminal area improvements that would support this increase in activity.

¹ Aviation activity is often influenced by the types of airport services offered for transient and based aircraft, and by the general business environment. In addition, factors such as vigorous local airport marketing, gains in sales and services, increased industrialization, changes in transportation mode preferences, or fluctuations in the national or local economy all influence aviation demand.



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- Existing and future operational levels are attributed to the needs of local businesses, flight training and recreational interests. The current airport facilities will accommodate smaller single-engine and some medium sized twin-engine aircraft; however, regional needs indicate the need for airport improvements that will facilitate larger twin-engine and business jet aircraft.

- The aviation industry remains strong due to steady growth of new production of turbojet aircraft each year. The steady growth is attributed to the overall strength of the U.S. economy (despite the current economic slowdown), and the growing popularity of fractional ownership of corporate jets by business owners.

- Due to its proximity to the Kansas City metropolitan area, the City of Harrisonville and the Lawrence Smith Memorial Airport has the opportunity to meet the needs of business interests that rely on having a “jet facility” nearby to accommodate their air transportation requirements.

- As shown by the interviews and surveys, a need exists to accommodate the larger aircraft that were displaced with the closing of Richards-Gebaur Airport in 2001. The location of the Lawrence Smith Memorial Airport and quick access to Highway 71 puts the Airport in position to attract business jets from the Kansas City metropolitan area as a home base.



GENERAL AVIATION DEMAND FORECASTS

FORECAST OF BASED AIRCRAFT

The forecast of based aircraft is summarized in **Table 3.1** for the 20-year planning period. Overall, the forecast methodologies resulted in a range of 64 to 115 additional based aircraft by the end of the planning period (2023).

Table 3.1 Summary of Based Aircraft Forecasts – Total Aircraft Lawrence Smith Memorial Airport				
Year	FAA Percentage Growth Rate	Modified FAA Growth Rate	Based Aircraft Trend Analysis (“Preferred”)	Linear Trend
2003	53	53	53	53
2008	55	68	61	61
2013	58	83	71	68
2018	61	98	82	77
2023	64	115	93	85
Total Gain	(+) 11	(+) 59	(+) 40	(+) 32

Note: No forecasts were prepared for ultralights, gyrocopters, balloons, sailplanes.

Source: BWR, Summary Forecast of Based Aircraft – August 2003.

The "preferred" forecast was based on the County per capita income and population growth levels. A regression analysis was conducted to determine the correlation between the number of based aircraft and per capita income and population levels which indicated a growth of 40 additional aircraft over the next 20 years at the Lawrence Smith Memorial Airport. The results of the “preferred” forecast indicated a high degree of correlation between the variables (95% confidence level, and 96% R-square).

The range of additional aircraft varied from 11 to 59, with the low end reflecting a "no action" alternative based on the “FAA Percentage Growth Rate” where the Airport does not go forward with improvements to the airfield. On the other hand, the “Modified FAA Growth Rate” was used to include additional airfield and terminal area facility improvements by the City. This growth rate incorporates the published FAA Growth Rate by type of aircraft in addition to the construction of more hangar space. Furthermore, it incorporates regional companies investing in business aircraft to be based at the Lawrence Smith Memorial Airport throughout the 20-year planning period. The “Linear Trend” forecast shows a linear trend of 32 additional aircraft based on the previous 20-year history of the Airport.



BASED AIRCRAFT FORECAST (PREFERRED)

Table 3.2 provides a detailed breakdown, by aircraft category, of the “preferred” forecast of based aircraft for the Airport and was developed using the regression analysis and FAA parameters for single-engine piston, multi-engine piston, multi-engine turboprop, jet, and rotor wing aircraft. Fleet mix information was applied to the baseline number of aircraft identified at the Lawrence Smith Memorial Airport and adjusted during the planning period based on FAA percentages, the airport survey, and interview information collected during the inventory process. Details regarding the forecast of based aircraft can be referenced in the appendix.

Table 3.2 Preferred Based Aircraft Forecast - Total Based Aircraft Lawrence Smith Memorial Airport						
Year	Single-Engine Aircraft (A-I)	Multi-Engine Piston (A-I to B-I)	Multi-Engine Turbo Prop (B-II)	Business Jets (B-II to C-II)	Helicopters	Total Based Fixed-Wing Aircraft
2003	48	5	0	0	1	53
2008	51	6	1	1	2	61
2019	61	6	1	1	2	71
2018	69	7	2	2	2	82
2023	78	7	3	3	2	93

Note 1: Ultralight aircraft and gyrocopters are not counted as part of total based aircraft.

Source: BWR, Forecast of Based Aircraft – August 2003.



AIRCRAFT OPERATIONS FORECAST (PREFERRED)

The operations forecast was projected using the utilization rate¹, which is expected to reflect FAA forecast levels for aircraft categories during the short to mid-term planning period and a linear trend for the long-range planning period. The typical local to itinerant operations relationship is normally 70 percent and 30 percent, respectively. Current operational levels indicate this to be opposite (30% itinerant/70%local). However, with airport improvements, the local vs. itinerant relationship is expected to reverse toward typical levels during the 20-year planning period. Details regarding the forecast of annual operations can be referenced in the appendix.

Overall, the 20-year forecast is reasonable for the Lawrence Smith Memorial in regard to its location, size and growth potential. The forecast of total civilian operations shows an increase of 24,880 operations, which represents an annual growth rate of nearly 5.4 percent. **Table 3.3** summarizes the forecast of annual aircraft operations for the Airport for each forecast period.

Table 3.3 Preferred Aircraft Operations Forecast Lawrence Smith Memorial Airport							
Year	Total Based Aircraft	Utilization Rate	Total Local Operations	Total Itinerant Operations			Total Civilian Forecast Operations
				Military *	Air Taxi	Other Itinerant	
2003	53	250	9,140	200	400	3,710	13,250
2008	61	283	8,632	200	400	8,231	17,263
2013	71	320	9,088	300	450	13,182	22,720
2018	82	362	10,389	350	550	18,745	29,684
2023	93	410	11,439	400	700	25,991	38,130

Note: *Other* itinerant operations include transient general aviation operations.
 Note: 2003 level of based aircraft – BWR airport inspection, July 2003.

Forecasts for itinerant and local traffic were calculated as follows:
 * *Military Activity*: Not included in total civilian forecast of operations.
Total Civilian Operations = Local Operations + Itinerant Operations

Source: BWR, Preferred Aircraft Operational Forecast – August 2003.

¹ **Utilization Rate** - Ratio of annual operations to the number of based aircraft, providing a gauge of total activity relative to the number of based aircraft.



Air Taxi Operational Forecast: Air-taxi operations, which are generally linked to business rather than leisure travel, include on-demand passenger and freight operations for non-published (nonscheduled) routes. The demand for air-taxi service is a function of the general business climate of the airport service area and the cost effectiveness of flying versus driving. The forecast increase in air-taxi service is due to the anticipation of growth in corporate business activity and the potential for a based on-demand charter service at the Lawrence Smith Memorial Airport.

ANNUAL INSTRUMENT APPROACH (AIA) FORECAST

The forecast of annual instrument approaches (AIA's) provides further guidance in determining requirements for the type, extent, and timing of future navigational (NAVAID) equipment. The Airport currently offers only one published instrument procedure. **Table 3.4** summarizes the forecast of annual civilian instrument approaches throughout the planning period.

Table 3.4 Annual Instrument Approach Forecast (AIAs) Lawrence Smith Memorial Airport					
Year	Local Operations	Business Operations	Air Taxi	Practice	Actual Itinerant AIA Civilian Operations
2003	48	6	9	8	71
2008	106	80	9	9	204
2013	181	212	10	9	412
2018	261	302	13	10	586
2023	367	392	17	11	787

Note 1: The percent of IFR Rated Pilots is based on FAA Forecasts (2003-2014), and trend line (2015-2023).

Note 2: Forecasts are based on unconstrained conditions. IFR flight plans are completed and canceled after executing the full instrument approach. An instrument approach is defined as an approach to an airport, with intent to land in accordance with an instrument flight rule (IFR), when visibility is less than three nautical miles and/ or the cloud ceiling is at or below 1,000 feet above the ground. Military operations are not included in the AIA forecast.

Source: BWR, Actual Instrument Approach Forecast – August 2003.
NOAA, International Station Meteorological Climate Summary (Version 4.0, September, 1996).



AIRCRAFT MIX FORECAST

The forecast of aircraft mix is used to determine future airfield design, structural and material needs, and the configuration of terminal area facilities. These forecasts are developed by applying the future activity levels to aircraft use patterns and trends obtained during the inventory analysis. **Table 3.5** displays the aircraft fleet mix forecast at the Lawrence Smith Memorial Airport throughout the 20-year planning period.

Three principal categories of aircraft are forecast to use the Airport in the future: **1)** light single-engine aircraft weighing less than 12,500 pounds, **2)** small twin-piston and twin-turbine business aircraft weighing less than 12,500 pounds, and **3)** small to large cabin business jets, mostly weighing less than 30,000 pounds. This type of business aircraft generally includes pressurized twin-engine planes used for regional “business” travel.

Table 3.5 Forecast Aircraft Mix by FAA Design Groups Lawrence Smith Memorial Airport				
Aircraft Approach Category (AAC) - This grouping is based on 1.3 times the stall speed of the aircraft at the maximum certified landing weight in the landing configuration.				
Aircraft Approach Category	Existing	Phase 1 Short-Term	Phase 2 Mid-Term	Phase 3 Long-Term
Category A (Less than 91 Knots)	13,118	15,529	18,178	29,716
Category B (92 – 120 Knots)	132	1,380	3,408	5,715
Category C (121 – 140 Knots)	0	354	1,022	2,286
Category D (141 – 165 Knots)	0	0	112	413
Airplane Design Group (ADG) - A grouping of aircraft based on wingspan dimension (feet).				
Airplane Design Group	Existing	Phase 1 Short-Term	Phase 2 Mid-Term	Phase 3 Long-Term
Group I (Less than 49')	13,118	15,529	18,178	29,716
Group II (49' to 78')	132	1,734	4,542	8,414
Note 1: The aircraft approach category (AAC) is classified from A to E, and the airplane design group (ADG) is classified from I to IV. Combined, the two classifications produce an Airport Reference Code (ARC) which yields specific characteristics about the type of airplane (family) that the airport is designed to accommodate.				

Source: FAA Advisory Circular 150/5300-13 (Change #7), *Airport Design*, BWR Aircraft Mix Forecast – August 2003.



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Table 3.6 lists common business and corporate aircraft, separated by aircraft reference code (ARC), that can be expected to use the Lawrence Smith Memorial Airport on a regular basis throughout the 20-year planning period.

Table 3.6 Common General Aviation Aircraft By Airport Reference Code Lawrence Smith Memorial Airport		
Airport Reference Code (A-I/B-I)	Airport Reference Code (B-II)	Airport Reference Code (C-I / D-II)
Twin-Engine (Piston) Beech (Baron Series) Cessna 404 (Titan) Beechcraft (Duke Series) Beech (King Air B100) Cessna 414 (Chancellor) Cessna 402 (Businessliner) Cessna 421 (Golden Eagle) Piper PA-30-310 (Navajo) Piper PA-60-602P (Aerostar)	Twin-Propeller Piper PA-42 (Cheyenne III) Beechcraft (King Air C90/100/200) Beechcraft (Queen Air) Rockwell (Shrike) Mitsubishi (MU-II) Marquis ARC B-II+10 Beechcraft (B300/350) Cessna 425 (Conquest II)	Med. Business Jets (ARC C-I) Learjet 24/25/31A/45/54/55/60 Hawker-Siddley 600/ 700 IAI Westwind I/ II Saberliner 75A
Small-Cabin Business Jets Lear (Various Models) Dassault (Falcon 10) Rockwell (Sabre 40/60)	Small-Medium Business Jets Cessna Citation 550/560 Series Dassault Falcon 20/ 50 Dassault Falcon 900/ 900EX Westwind Astra SP/SPX	Large Business Jets (ARC C-II) Cessna Citation VII (650 Series) Cessna Citation X (750 Series) Canadair Challenger 600/604 Raytheon/Hawker 800XP/1000 Gulfstream Aerospace G-III IAI Galaxy
		Large Business Jets (ARC D-I) Lear 35/36/60

Source: BWR Aircraft Performance Files; *FAA Advisory Circular 150/5300-13, Change #7, Airport Design.*

FUTURE AIRCRAFT ACTIVITY

Small aircraft will continue to represent the majority of based aircraft and operations at the Airport. Furthermore, the Lawrence Smith Memorial Airport can expect to experience an increase in based aircraft and operations from higher performance, more complex aircraft, including a moderate growth of single-engine experimental and single and twin-piston personal business aircraft. Operations by ARC B-I and B-II aircraft, which are typically used for personal business travel and charter operations, will achieve greater utilization. These aircraft are expected to increase beyond current activity levels as a result of operators upgrading from their existing single-engine aircraft. The ARC B-I category generally includes unpressurized twin-engine piston aircraft used for regional business travel, while the ARC B-II category includes aircraft used for regional “corporate” travel with some weighing over 30,000 lbs. SWG.

Operations conducted by ARC B and C aircraft will represent a significant increase in the frequency of business aircraft at Harrisonville (turboprop and jet). With improvements to the airfield, it is expected that a business aircraft as large as an ARC C-II would be based at the Airport during the 20-year planning period. Seating capacity in advanced turbine cabin-class business aircraft are reasonably comparable to turboprop aircraft, but with significantly higher performance capabilities.



FORECAST SUMMARY

The forecasts, combined with the inventory data, will be used to identify and develop the facility requirements for the Lawrence Smith Memorial Airport. The following chapter, Facility Requirements, will identify the types and extent of facilities required to adequately accommodate the demand levels identified in this chapter. The various forecast elements are displayed in **Table 3.7**.

Table 3.7 Aviation Forecast Summary Lawrence Smith Memorial Airport					
	Existing (2003)	2008 (5 year)	2013 (10 year)	2018 (15 year)	2023 (20 year)
Total Based Aircraft					
Single-Engine Aircraft (A-I & B-I)	47	51	61	69	78
Piston Multi-Engine Aircraft (B-I)	5	6	6	7	7
Turbine Multi-Engine Aircraft (B-II)	0	1	1	2	3
Business Jet Aircraft (B-II to C-II)	0	1	1	2	3
Helicopters/Rotorcraft	1	2	2	2	2
Total Based Aircraft	53	61	71	82	93
Other (Sailplanes and Ultralights)	0	0	0	0	0
Total Annual Aircraft Operations					
Local Operations	9,140	8,632	9,088	10,389	11,439
Itinerant Operations	3,710	8,231	13,182	18,745	25,991
Air Taxi Operations	400	400	450	550	700
Military Operations	200	200	300	350	400
Total Annual Civilian Operations	13,250	17,263	22,720	29,684	38,130
Total Annual Operations	13,450	17,463	23,020	30,034	38,530
Annual Instrument Approaches	71	204	412	586	787
<p>Note: Annual instrument operations are counted as part of total annual operations; instrument operations include local and itinerant operations, but not military operations. The AIAs include only a projection of actual instrument approaches during IMC.</p> <p>Note: Civilian operations do not include military activity levels.</p>					

Source: BWR, Forecast Summary – August 2003.



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Chapter Four

Airport Facility Requirements



Lawrence Smith
Memorial Airport

Harrisonville, Missouri



4

AIRPORT FACILITY REQUIREMENTS

AIRPORT DESIGN FACTORS

The Facility Requirements chapter outlines the future airport needs based on the evaluation of the existing facilities and the forecast of aviation demand over the 20-year planning period at the Lawrence Smith Memorial Airport. Once the required facilities have been identified, FAA and MoDOT airport design standards will be applied in order to maintain safe separation distances and heights between airport facilities as well as surrounding natural and man-made structures. It should be noted that identification of needed facilities does not constitute a “requirement” in terms of design standards or goals; however, this information provides an “option” for facility improvements to resolve various types of facility and operational inadequacies and to accommodate future aviation activity.

In order to organize the future needs of the Airport, this chapter is divided into two sections – *Airfield* and *Terminal Area*. *Airfield* facility components include runways, taxiways, navigational aids, airfield marking/ signage, and lighting. *Terminal Area* facilities include hangars, terminal building, aircraft parking apron, fuel quantity and dispensing units, public vehicle parking, and airport access requirements.

FUTURE CRITICAL AIRCRAFT

In order to proceed with the facility requirements, the first step is to determine the future critical aircraft that will be operating at the Lawrence Smith Memorial Airport. The critical aircraft is typically the most demanding airplane within a composite family of aircraft conducting at least 500 itinerant operations (combination of takeoffs and landings) per year at the Airport. Since the future critical aircraft is evaluated with respect to size, speed and weight, it plays an important role for determining airport design, structural, and equipment needs for the airfield and terminal area facilities.

The future critical aircraft selected for the Airport is the **Citation X**, which is a medium cabin business jet capable of carrying up to 12 passengers and classified as an ARC C-II aircraft. This aircraft was selected based on survey information collected during this study, and interviews with local businesses in the region. In addition, we considered the various types of aircraft operating at airports with similar roles in the airport service area and the Kansas City Metropolitan region. Furthermore, this aircraft is owned and operated by the parent company of



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a local business that uses it to fly to and from the Harrisonville area. **Table 4.1** provides information about the ultimate critical aircraft for the Airport.

Table 4.1 Critical Aircraft Information – Future Aircraft Lawrence Smith Memorial Airport							
Aircraft Type & ARC	Wing Span	Aircraft Length	Aircraft Height	Seating	Max. Takeoff Weight	Take Off Distance	Approach Speed
Cessna Citation X ARC C-II	63.6'	72.3'	19.2'	12	36,100	5,310	131 (knots)

Note 1: Takeoff weight indicates maximum takeoff and ramp weight, respectively.
Note 2: Takeoff distance computed using local pressure altitude, and the following operating conditions:
59°F - no wind - normal aircraft operating takeoff conditions, 15° flaps (no runway grade).

Source: BWR, Aircraft Performance File, 2003.

FUTURE CRITICAL AIRCRAFT: CESSNA CITATION X



Source: BWR Aircraft Library



AIRFIELD REQUIREMENTS

RUNWAY LENGTH STANDARDS

FAA Advisory Circular 150/5325-4A, *Runway Length Requirements, Computer Program Version 4.1.*, was used to determine the recommended runway length requirements for the Lawrence Smith Memorial Airport. Typically, the primary runway has the longest length, most favorable wind coverage, greatest pavement strength, and lowest straight-in instrument approach minimums. For aircraft weighing less than 60,000 pounds, the runway design length is determined from the greater of the takeoff or landing performance characteristics required by the composite family of airplanes, as represented by the critical aircraft's airport reference code (ARC). For aircraft weighing more than 60,000 pounds, the runway length is calculated based on the design characteristics of a specific aircraft.

The runway design lengths are determined given the local weather conditions and illustrated in **Table 4.2**. These conditions were considered as follows: **1)** the airport elevation (915 feet mean sea level - compensating for the affects of density altitude¹ and no wind); **2)** the average mean maximum daily temperature (90.1°F) for the hottest month (July); **3)** the effective runway gradient between runway ends (40.8' elevation difference between runway ends); **4)** dry versus wet runway pavement (utility runway); and **5)** the corresponding critical aircraft family of airplanes forecast to use the runway.

¹ Density Altitude – is the adjusted altitude for non-standard air density caused by the effects of increased altitude, temperature and humidity. In other words, density altitude reduces aircraft operating performance.

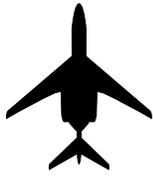


Table 4.2
Airport Runway Length Data – FAA Advisory Circular 150/5325-4A
Lawrence Smith Memorial Airport

Airport and Runway Data	Input	Input
Airport elevation	915'	915'
Mean daily maximum temperature of the hottest month	90.1° F	90.1° F
Maximum difference in runway centerline elevation	40.8'	40.8'
Recommended Primary Runway Length/Corresponding ARC	Length - Dry	Length – Wet
<i>Small airplanes with less than 10 passenger seats:</i>		
75 percent of these small airplanes (ARC A-I)	2,830'	2,830'
95 percent of these small airplanes (ARC B-I)	3,360'	3,360'
100 percent of these small airplanes (ARC B-II)	3,980'	3,980'
Small airplanes with 10 or more passenger seats (ARC B-II+10)	4,440'	4,440'
<i>Large airplanes less than 60,000 pounds:</i>		
75 percent of these large airplanes at 60 percent useful load (ARC C-II)	5,220'	5,500'
Recommended Ultimate Runway Design/Corresponding ARC	Design Length	Design Width
Primary Runway (ARC C-II)	5,500'	100'

Note 1: Wet & slippery apply to landing distance; runway end elevation applies to takeoff distance.
 Note 2: "Useful load" – includes all usable fuel, passengers, and cargo.

Source: AC 150/5325-4A (FAA Computer Model), Runway Length Requirements For Airport Design.

Using the FAA Computer Model as a reference, the ultimate design length for the primary runway is 5,500 feet based on ARC C-II aircraft. This length will accommodate 75 percent of the large aircraft at 60 percent useful load. The current 4,000-foot runway length will accommodate small cabin business jets with load restrictions at higher than standard temperatures (59° F). However, operational forecasts indicate that ARC C-II business jets will be conducting over 2,000 annual operations at the Airport during the 20-year planning period.

CROSSWIND RUNWAY LENGTH REQUIREMENTS

Crosswind runways are designed to accommodate wind conditions and/or increase airfield capacity and safety. Crosswind runway design requirements are calculated using AC 150/5325-4A, Runway Length Requirements, Computer Program Version 4.1. The existing Primary Runway 17-35 wind coverage was determined to be 94.06% (Chapter 2) at 10.5 knots. Although FAA design requirements recommend 95.0% crosswind coverage by the primary runway, the small shortfall of less than 1% does not justify the additional land acquisition and earthwork costs to construct a crosswind runway.



AIRPORT REFERENCE CODE (ARC) CLASSIFICATION

Table 4.3 illustrates the airport reference code (ARC) for the Lawrence Smith Memorial Airport during each of the planning periods. The FAA has established airport design criteria appropriate to an airport's role and ARC designation. This criterion provides minimum safety standards with respect to the performance characteristics represented by the airport's *critical* aircraft.

Table 4.3 Existing and Ultimate Airport Reference Code (ARC) Lawrence Smith Memorial Airport				
Runway	Existing ARC	Phase 1 ARC (0-5 Years)	Phase 2 ARC (6-10 Years)	Phase 3 ARC (11-20 Years)
Primary Runway	B-II	B-II+10	C-II	C-II
<p>Note 1: The most demanding (greatest) runway ARC per planning phase indicates the airport's ARC.</p> <p>Note 2: Aircraft Approach Category groups have the following performance characteristics: <i>Aircraft Approach Category A</i> = approach speed less than 91 knots. <i>Aircraft Approach Category B</i> = approach speed of 91 knots or more, but less than 121 knots. <i>Aircraft Approach Category C</i> = approach speed of 122 knots or more, but less than 141 knots. Airplane Design Groups are based on aircraft wingspans as follows: <i>Airplane Design Group I</i> = wingspan up to but not including 49 feet. <i>Airplane Design Group II</i> = wingspan of 49 feet up to but not including 79 feet.</p> <p>Note 3: The designation "+10" refers to aircraft that have 10 or more passenger seats.</p>				

Source: BWR, *Designated Airport Reference Code (ARC) Forecast – August 2003*

The ARC B-II+10 has been included as an interim ARC designation for the Airport between the existing ARC B-II and the ultimate ARC C-II. **Table 4.2** shows this length to be 4,500 feet



TAXIWAY REQUIREMENTS

Taxiways provide airfield and terminal area access to enhance airport operational safety and capacity (delay) by minimizing the time an aircraft is on an active runway. Any future runway should include a planned parallel taxiway system serving at least the primary runway. Requirements for a parallel taxiway system are 10,000 annual operations for a partial-parallel and 20,000 annual operations for a full-parallel. Existing and planned taxiway systems are shown on the Airport Layout and Terminal Area Drawings.

Primary Taxiway System (5,500' x 35'): Based on FAA design standards for Design Group II aircraft, a 35-foot taxiway width with 75-foot turning radii is required for the primary runway system. The minimum runway to taxiway separation distance for an ARC C-II, non-precision instrument runway with greater than 3/4-mile visibility is 300 feet, with aircraft holding positions at 200 feet perpendicular from the runway centerline.

Taxiway Safety Standards: All entry taxiways must provide acceptable hold-short locations in compliance with threshold siting surface (TSS) and obstacle free zone (OFZ) criteria. All non-aeronautical objects must also be located beyond the taxiway object free area (TOFA), which is a total of 89 feet wide (Design Group I) and 131 feet wide (Design Group II) along the taxiway centerline. Existing and planned taxiways are shown on the Airport Layout and Terminal Area Drawings per FAA airport design standards.

TAXILANE REQUIREMENTS

Taxilanes provide access to airplane parking areas, fueling areas, and hangars. Typically, taxilanes at general aviation airports are 20-35 feet wide. Taxilane locations are shown on the Airport Layout and Terminal Area Drawings.



RUNWAY AND TAXIWAY PAVEMENT STRENGTH STANDARDS

Pavement design, strength, and condition are critical planning considerations that represent a major capital investment and maintenance responsibility to the airport sponsor. All pavements must have sufficient stability to continuously withstand, without damage, adequate support from the loads exerted by aircraft, the abrasive action of traffic, adverse weather conditions, and other deteriorating influences. Pavement strength is primarily determined with respect to the projected aircraft types (wheel gear type), operating frequency, and operating conditions (aircraft weights). Pavement strength is normally determined during the initial design and periodic overlays. Pavement integrity is maintained through routine crackseal, slurry seal maintenance, and upkeep projects.

AIRCRAFT PAVEMENT STRENGTH DEMANDS

Pavements designed in accordance with the standards set forth in FAA AC 150/5320-6D are intended to provide a structural life of 20 years without major maintenance, provided that aviation demand is not significantly greater than forecast levels.

At a minimum, the design pavement strength should accommodate the existing and future mix of aircraft expected to use the Airport. The existing pavement strength at Lawrence Smith Memorial Airport is 12,500 lbs. single wheel gear (SWG) and 15,000 lbs. dual wheel gear (DWG). This pavement strength is sufficient for the type and size of aircraft currently using the Airport; however, future runway and taxiway pavements should be designed to accommodate the future critical aircraft.

The new primary runway is expected to accommodate 75 percent of the large aircraft fleet operating at 60 percent useful load. Therefore, a pavement strength of 30,000 lbs. is recommended for the ultimate primary runway. Since taxiways and aircraft parking aprons are considered critical areas, they should be constructed to the same strength as the runway being served.



AIRFIELD SAFETY AREA REQUIREMENTS

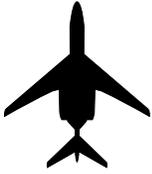
Compliance with airport design standards is required to maintain a minimum level of operational safety. The major airport design elements, as follows, are established from FAA Advisory Circular 150/5300-13, *Change #7, Airport Design* and FAR Part 77, *Objects Affecting Navigable Airspace*, and should conform with FAA airport design criteria without modification to standards.

Runway Safety Area (RSA): The RSA is a two-dimensional area surrounding and extending beyond the runway and taxiway centerlines. This safety area is provided to reduce the risk of damage to airplanes in the event of undershoot, overshoot, or excursion from the runway. In addition, it must be cleared and free of objects except those required for air navigation and graded to transverse and longitudinal standards to prevent water accumulation, as consistent with local drainage requirements. Under dry conditions, the RSA must support an airplane without causing structural damage to the airplane or injury to the occupants. The airport must own the entire RSA in "fee simple" title.

Object Free Area (OFA): The OFA is a two-dimensional area surrounding runways, taxiways and taxilanes. It must remain clear of objects except those used for air navigation or aircraft ground maneuvering purpose, and requires clearing of above-ground objects protruding higher than the runway safety area edge elevation. An object is considered any ground structure, navigational aid, people, equipment, terrain or parked aircraft. The airport must own the entire OFA in "fee simple" title.

Building Restriction Line (BRL): The BRL represents the boundary that separates the airside and landside facilities, and identifies suitable building area locations based on airspace and visibility criteria. The BRL, recommended to provide a 35.0-foot minimum clearance, is established with reference to the FAR Part 77 primary and transitional surfaces, as well as the airfield safety areas.

Runway Protection Zone (RPZ): The RPZ is a two-dimensional trapezoid area beginning 200 feet beyond the paved runway end, and extends along the runway centerline. The purpose of the RPZ is to enhance the protection of people and property on the ground, and to prevent obstructions potentially hazardous to aircraft. RPZ dimensions are determined by the type of aircraft expected to operate at the airport (small or large) and the type of approach planned for the runway ends (visual, precision, or non-precision).



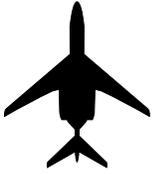
The recommended visibility minimums for the runway ends were determined with respect to approach procedures, the ultimate runway ARC, airfield design standards, instrument meteorological wind conditions, and physical constraints (approach slope clearance) beyond the extended runway centerline. The FAA recommends that airports own the entire RPZ in "fee simple" title and that the RPZ be clear of any non-aeronautical structure or object that would interfere with the arrival and departure of aircraft. At a minimum, aviation easements should be maintained to control the use of the airspace within the RPZ when "fee simple" ownership is not possible (beyond natural and man-made barriers such as roads). Typically, aviation/aviation easements vary on the extent to which they restrict structures, control right-of-way entry, and limit electromagnetic interference.

Obstacle Free Zone (OFZ): The OFZ is airspace above a surface centered on the runway centerline, and precludes taxiing and parked airplanes, and object penetrations except for frangible post-mounted NAVAIDs expressly located in the OFZ by function. Due to the facilities required, only the *Runway* OFZ is applicable.

Runway Approach Slope/Surface: The approach slope is a three-dimensional trapezoidal FAR Part 77 imaginary surface extending beyond each runway end and has a defined slope requiring clearance over structures and objects beyond the runway threshold. The purpose of the approach surface/slope is to provide proper clearance for the safe approach and landing of aircraft. Trees and brush currently penetrate the runway approach surfaces on both runway ends at the Airport.

Runway Visibility Zone (RVZ): The RVZ is used to establish an acceptable line-of-sight that permits mutually visible points to be seen from along the runway centerline, based on the distances between runway ends, taxiway locations, and the nearest runway intersection. By design standards, the area within the RVZ should be owned by the airport in "fee simple." The airport sponsor should restrict or minimize crop/vegetation heights based on elevation differences, so they will not interfere with the runway line-of-sight requirements.

Runway Line of Sight: An acceptable runway profile permits any two points five (5) feet above the runway centerline to be mutually visible for the entire runway length. The sight distance along a runway from an intersecting taxiway needs to be sufficient to allow a taxiing aircraft to enter safely or cross the runway, in addition to vehicles, wildlife, and other hazardous objects. There are no line-of-sight requirements for taxiways.



LAWRENCE SMITH MEMORIAL AIRPORT

AIRPORT MASTER PLAN UPDATE

Crop Restriction Line (CRL): The CRL is used to control agricultural areas on the airport in order to maintain proper safety and clearance standards. Restricting agricultural operations to areas outside the RSA, ROFA, TOFA, OFZ and RVZ will normally provide the minimum object clearances. Agricultural operations are also excluded from critical areas associated with the establishment of navigational and visual approach aids. The CRL is depicted on the Airport Land Use Drawing.

All safety areas are depicted on the Airport Layout Drawing. **Exhibit 4.1** depicts the RPZ, OFA, RSA and BRL. **Exhibit 4.2** depicts the FAR Part 77 imaginary airspace surfaces, including the primary and transitional surface and approach slopes.

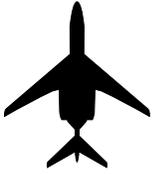
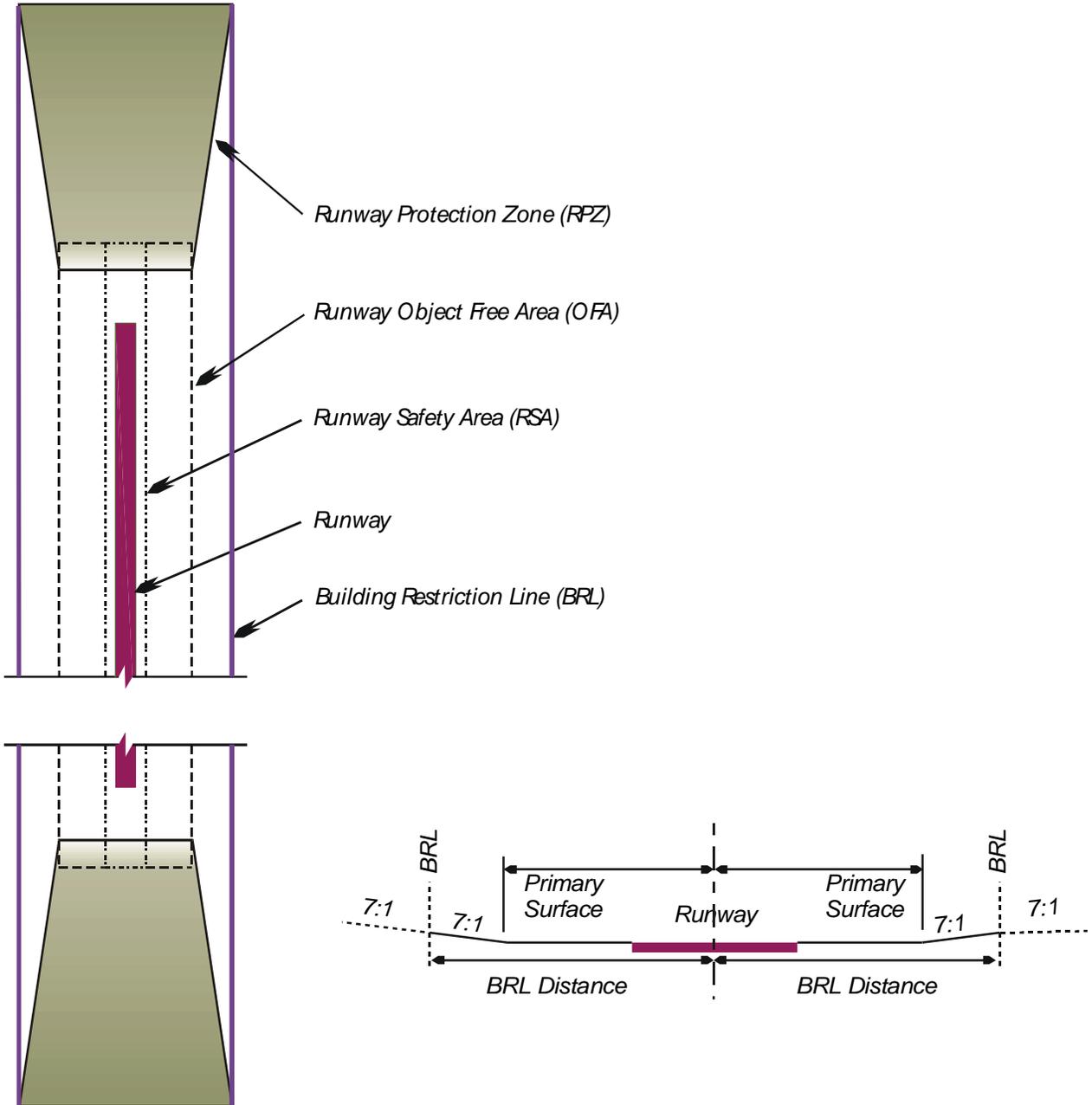


EXHIBIT 4.1: RUNWAY SAFETY AREA REQUIREMENTS



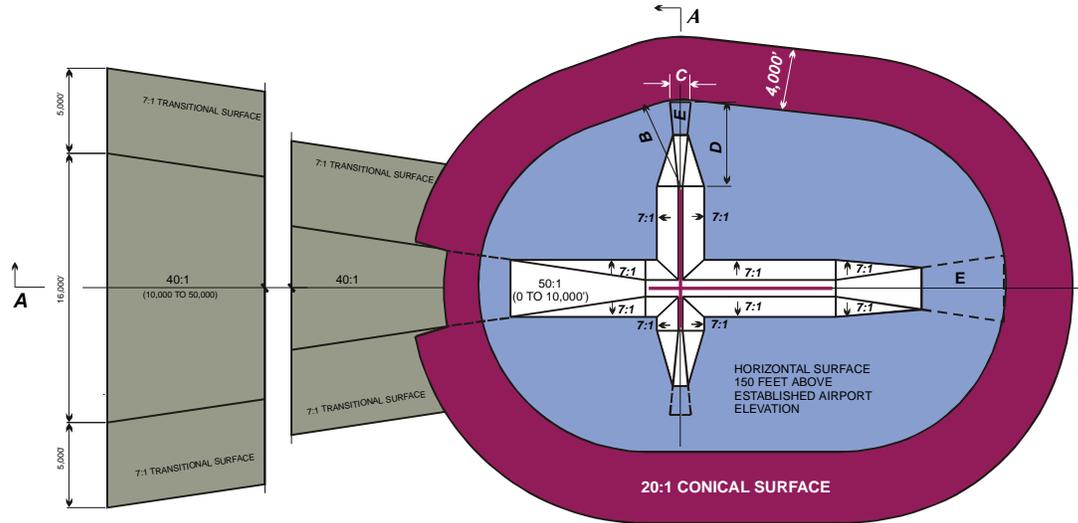
Source: FAA FAR Part 77, Objects Affecting Navigable Airspace, 1978



LAWRENCE SMITH MEMORIAL AIRPORT

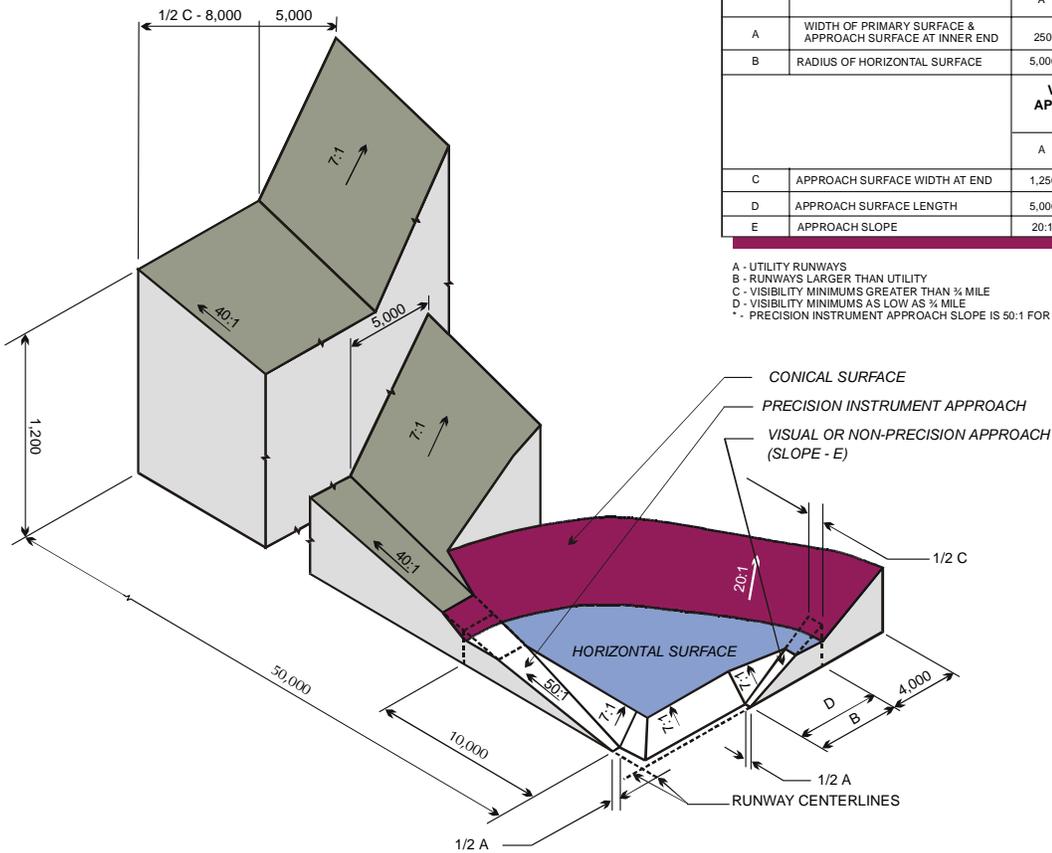
AIRPORT MASTER PLAN UPDATE

EXHIBIT 4.2: FAR PART 77 - IMAGINARY AIRPORT SURFACES



DIM	ITEM	DIMENSIONAL STANDARDS (FEET)					
		VISUAL RUNWAY		NON-PRECISION INSTRUMENT RUNWAY		PRECISION INSTRUMENT RUNWAY	
		A	B	A	B		
A	WIDTH OF PRIMARY SURFACE & APPROACH SURFACE AT INNER END	250	500	500	500	1,000	1,000
B	RADIUS OF HORIZONTAL SURFACE	5,000	5,000	5,000	10,000	10,000	10,000
C	APPROACH SURFACE WIDTH AT END	1,250	1,500	2,000	C	D	16,000
D	APPROACH SURFACE LENGTH	5,000	5,000	5,000	10,000	10,000	-
E	APPROACH SLOPE	20:1	20:1	20:1	34:1	34:1	-

- A - UTILITY RUNWAYS
- B - RUNWAYS LARGER THAN UTILITY
- C - VISIBILITY MINIMUMS GREATER THAN 1/4 MILE
- D - VISIBILITY MINIMUMS AS LOW AS 1/4 MILE
- - PRECISION INSTRUMENT APPROACH SLOPE IS 50:1 FOR INNER 10,000 FEET AND 40:1 FOR AN ADDITIONAL 40,000 FEET



Source: FAA FAR Part 77, Objects Affecting Navigable Airspace, 1978



AIRPORT LIGHTING AND MARKING REQUIREMENTS

Airport lighting is used to help maximize the utility of the airport during day, night and adverse weather conditions. FAA Order 7021.2C, Airport Planning Standard Number One - Terminal Air Navigation Facilities and Air Traffic Control Services specifies minimum activity levels to qualify for visual and electronic navigational aids and equipment. Recommended lighting systems for the Lawrence Smith Memorial Airport, with some already in place, include:

Medium Intensity Approach Lighting System (MALS): Visual guidance lighting systems are used to provide pilots with a reference to the runway environment while operating an aircraft during approach to landing. These systems employ a series of signal lights symmetrically aligned about the centerline of the approach end of the runway. The MALS consists of a threshold bar and seven five-light bars located on the extended runway centerline with the first bar located 200 feet from the runway threshold, and the remaining bars at each 200-foot interval out to 1,400 feet from the threshold.

Runway Lighting/Pavement Marking (MIRL): Pilot-controlled medium intensity runway lighting (MIRL) is recommended as the standard lighting system to define the lateral and longitudinal limits of the runway system. The pavement markings at the Lawrence Smith Memorial Airport are in fair condition. Runway pavement markings should follow requirements as prescribed in FAA Advisory Circular 150/5340-1H, Standards for Airport Markings.

Taxiway Lighting/Pavement Marking (MITL): Medium intensity taxiway lights (MITL) are the recommended lighting system for all taxiway sections and turning radii associated with the primary runway. MITL can also be pilot-controlled and wired to the same remote system as the runway lights. The Lawrence Smith Memorial Airport has MITLs on the taxiway radii; otherwise, taxiway edge markers are used as a less expensive lighting alternative. In addition, all paved taxiways should be painted with standard taxiway markings as prescribed in FAA Advisory Circular 150/5340-1H, Standards for Airport Markings.

Runway End Identifier Lights (REIL): This lighting system provides rapid and positive identification of the runway approach end, consisting of a pair of synchronized (directional) flashing white strobes located laterally along the runway threshold. REILs are not currently installed at the Lawrence Smith Memorial Airport.



LAWRENCE SMITH MEMORIAL AIRPORT

AIRPORT MASTER PLAN UPDATE

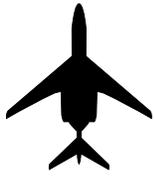
Visual Guidance Indicators (PAPI/VASI): This lighting system emits a sequence of colored light beams providing continuous visual descent guidance information along the desired final approach descent path (normally at 3 degrees for 3 nautical miles during daytime, and up to 5 nautical miles at night) to the runway touchdown point. The system normally consists of two (PAPI-2) or four (PAPI-4) lamp housing units installed 600 to 800 feet from the runway threshold and offset 50 feet to the left of the runway edge. The Lawrence Smith Memorial Airport installed 4-box PAPIs in 1997 and they are in good condition.

Airport Signs: Standard airport signs provide runway and taxiway location, direction, and mandatory instructions for aircraft movement on the ground. A system of standard signs is recommended to indicate runway, taxiway, and aircraft parking destinations. FAA Advisory Circular 150/5345-44F, Specifications for Taxiway and Runway Signs and FAA Advisory Circular 150/5340-18C, Standards for Airport Sign Systems, should be followed for proper implementation of airport signs.

Wind Cone/Segmented Circle/Airport Beacon: A segmented circle with a lighted wind cone is recommended as the standard wind indicator and airport traffic pattern. The Lawrence Smith Memorial Airport currently has a segmented circle and lighted wind cone on the west side of the Airport.

The airport beacon is used for visual airport identification during nighttime hours and weather that is less than VFR. The rotating beacon is located on top of the main terminal hangar and is in fair condition.

Main Ramp Lighting: The existing apron/ramp area lighting is inadequate for illuminating the main aircraft parking, fueling, and auto parking areas. It is recommended that additional lighting fixtures be installed. Numerous economical light fixtures are available that offer adequate lighting.



NAVIGATION SYSTEMS AND WEATHER AIDS

Airport navigation aids (NAVAIDs) are installed on or near an airport to increase the airport's reliability during night and inclement weather conditions, and to provide electronic guidance and visual references for executing an instrument approach to the airport or runway. FAA Order 7021.2C, Airport Planning Standard Number One - Terminal Air Navigation Facilities and Air Traffic Control Services specifies minimum activity levels to qualify for instrument approach equipment and approach procedures. At present, the Lawrence Smith Memorial Airport experiences approximately 71 actual instrument approaches, and is forecast to reach approximately 367 during the 20-year planning period. The following describes the status of existing and new NAVAIDs used at general aviation airports.

Global Positioning System (GPS): GPS is a highly accurate worldwide satellite navigational system that is unaffected by weather and provides point-to-point navigation by encoding transmissions from multiple satellites and ground-based datalink stations using an airborne receiver. GPS is presently FAA-certified for en-route and non-precision instrument approach navigation. The current program provides for GPS stand-alone and overlay approaches (GPS overlay approaches published for runways with existing VOR/DME, RNAV and NDB approaches). Recently, the selective availability segment of the channel was decommissioned, thereby enhancing the accuracy of the GPS signal. The Lawrence Smith Memorial Airport has a GPS approach to Runway 35.

Automated Weather Observing System (AWOS): An AWOS consists of various types of sensors, a processor, a computer-generated voice subsystem, and a transmitter to broadcast minute-by-minute weather data from a fixed location directly to the pilot. The information is transmitted over the voice portion of a local NAVAID (VOR or DME), or a discrete VHF radio frequency. The transmission is broadcast in 20-30 second messages in standard format, and can be received within 25-nautical miles of the AWOS site. AWOS is significant for non-towered airports with instrument procedures to relay accurate and valuable weather information to pilots. At airports with instrument procedures, an AWOS weather report eliminates the remote altimeter setting penalty, thereby permitting lower minimum descent altitudes (lower approach minimums). The Lawrence Smith Memorial Airport has an AWOS sited on the western edge of the Airport.



OTHER AIRFIELD REQUIREMENTS

LAND ACQUISITION REQUIREMENTS

The acquisition of airport property is largely defined by the location of the building restriction line (BRL) and runway protection zones (RPZ). The FAA mandates "fee simple" title ownership by the Airport Sponsor for the runway safety area (RSA), object free area (OFA), obstacle free zone (OFZ), and runway visibility zone (RVZ). Acquiring a property interest in the RPZ areas beyond natural property boundaries (roads, streams, etc.) is sometimes more practical through the conveyance of aviation/aviation easements. However, it is strongly recommended that clearance easements controlling air rights be purchased for these areas out to the limits of the ultimate building restriction line (BRL).

AIRFIELD FENCING REQUIREMENTS

Perimeter fencing, gates, and terminal fencing between airport property and public areas are recommended to discourage access by people and wildlife to the runways and taxiways. For general aviation airports such as Lawrence Smith, the specific location, type and height normally depend on local security requirements and fencing established by adjacent property owners; otherwise, the fence line normally follows the property line. Existing and ultimate fencing locations are shown on the Airport Layout and Terminal Area Drawings.

AIRFIELD/TERMINAL AREA DRAINAGE

The airfield design should be planned to utilize existing drainage patterns and not increase storm-water runoff onto adjacent properties. On-airport farming practices should be managed to limit the accumulation of silt and other debris in and around storm-water inlets. Storm-water holding basins are not recommended because they create a waterfowl attraction, which is undesirable near an airport. The Lawrence Smith Memorial Airport experiences drainage problems in the terminal area during rain storms, which creates minor flooding in the area around the aircraft hangars.



SUMMARY OF AIRSIDE FACILITY REQUIREMENTS

Table 4.4 provides a summary of runway facility requirements to accommodate the level of activity projected for the Lawrence Smith Memorial Airport for each of the three planning phases spanning the 20-year planning period.

Table 4.4 Summary of Airside Facility Requirements Lawrence Smith Memorial Airport				
Airport Component	Existing (Runway 17-35)	Phase 1 Short-Term (0-5 Years)	Phase 2 Mid-Term (6-10 Years)	Phase 3 Long-Term (11-20 Years)
Primary Runway	4,000' X 75'	4,500' x 100'	5,500' x 100'	5,500' x 100'
Runway Strength	12,500 SWG	30,000 SWG	30,000 DWG	30,000 DWG
Runway Marking	Non-precision	Non-Precision	Non-Precision	Non-Precision
Runway Lights	MIRL	MIRL	MIRL	MIRL
Visual Guidance	PAPI-4L	REIL/PAPI-4L	REIL/PAPI-4L	REIL/PAPI-4L
Taxiway System	Partial-parallel	Partial-parallel	Full-parallel	Full-parallel
Airport Navigational & Weather Aids	VOR/DME/GPS AWOS	VOR/DME/GPS AWOS	VOR/DME/GPS AWOS	VOR/DME/GPS AWOS
Acronyms: (AWOS) automated weather observation system (GPS) global positioning system (MIRL) medium intensity runway lights (NDB) non directional beacon (PAPI) precision approach path indicators (REIL) runway end identifier lights (MITL) medium intensity taxiway lights (NPI) non-precision instrument (MALS) medium intensity approach lighting system				

Source: BWR, Airport Facility Requirement Summary – August 2003.
 FAA Advisory Circular 150/5300-13, Change #7, *Airport Design*.

TERMINAL AREA REQUIREMENTS

The landside facility requirements for the Lawrence Smith Memorial Airport throughout the 20-year planning period are summarized in Table 4.5. A copy of the terminal area calculations are provided in the Appendix. The key terminal area requirements have been developed in consideration of the following general landside design concepts:

- Terminal area development for general aviation airports serving business jet aircraft should be centralized and allow for linear expansion of facilities and services along an established flightline. Major design considerations involve minimizing earthwork/grading, avoiding flood-prone areas, and integrating existing paved areas to reduce pavement (taxilane) costs



- Future terminal expansion should allow sufficient maneuverability and accessibility for appropriate types (mix) of general aviation aircraft within secured access areas
- Terminal area development should enhance safety, visibility and be aesthetically pleasing

TERMINAL BUILDING REQUIREMENTS

Table 4.5 lists the existing and future terminal building space requirements over the 20-year planning period. The terminal building serves a functional and social capacity central to the operation, promotion, and visible identity of the airport. Based on an assessment of general aviation demands, the following individual terminal building components were identified to accommodate the average peak-hour activity forecast during the planning period:

- Management-administrative office area
- Fixed base operator office area
- Foyer/waiting area
- Communications area
- Concessions/restrooms
- Pilot lounge/flight planning room

FIXED BASE OPERATOR (FBO) REQUIREMENTS

Although the Lawrence Smith Memorial Airport does not currently have an FBO operator, the following items are reasonable expectations for future FBO space and facility requirements:

- Aircraft hangar storage
- Terminal building office space with 24-hour public-access, restrooms, and phone
- Jet-A and 100LL fueling facilities/vehicles
- Aircraft apron space to accommodate larger transient business aircraft
- Aircraft maintenance hangar that will house medium business aircraft

These basic services are used to accommodate based and itinerant aircraft as well as develop customer loyalty. Similar to a private enterprise, FBO services, equipment and facilities are determined based on financial analysis. In addition, each FBO must balance its partnership with the airport sponsor, shared-risk for existing and future investments, and the effect of competing interests of private investment. For Lawrence Smith Memorial Airport, future FBO development might include the following:

- Balance FBO expansion with growth in airport activity, which is expected to increase moderately for single-engine and multi-engine aircraft, including business jets.
- Maintain separation of services, as well as provide additional provisions as demand warrants.



- Provide airport line services and become an important asset for the promotion and identity of the airport. Airfield and terminal area visibility of FBO services is critical.

AIRCRAFT HANGAR REQUIREMENTS

Table 4.5 lists the existing and future hangar space requirements for the Lawrence Smith Memorial Airport throughout the 20-year planning period. Future hangar development should be in concert with future airport needs. For planning purposes, hangars should accommodate at least 95 percent of all based general aviation aircraft. Typically, single-engine aircraft demand 1,000 to 1,200 square feet, twin-propeller aircraft require 1,200 to 3,000 square feet, and small to medium cabin business jets require 4,000 to 6,000 square feet. General hangar design considerations include the following:

- Construction of aircraft hangars should occur beyond the established building restriction line (BRL) surrounding the runway and taxiway areas. Moreover, they *must* be built beyond the runway obstacle free zone (OFZ), runway and taxiway object free area (OFA), the runway visibility zone (RVZ), and remain clear of the FAR Part 77 Surfaces (Transitional, Approach, and Primary).
- Maintaining the minimum recommended clearance between T-hangars - 79 feet for one-way traffic, and 125 feet for two-way traffic. Taxilanes supporting T-hangars should be no less than 25 feet wide. Individual paved approaches to each hangar stall are typically less costly, but not preferred to paving the entire T-hangar access/ramp area.
- Construction of additional hangar space to accommodate existing and forecast based aircraft. Refurbishment of older existing hangar units may be a planning option to maintain the structural integrity as well as extend the functional life of each unit.
- Interior and exterior lighting and electrical connections are typically recommended on new hangar construction.
- Block-style straight-unit T-hangars occupy more space, but are generally preferred over nested T-hangars, and can be extended more easily. Totally enclosed hangar storage is recommended.
- Adequate drainage with minimal slope differential between the hangar door and taxilane. A hard-surfaced hangar floor is recommended, with less than one percent downward slope to the taxilane/ramp.



- Segregate hangar development based on the hangar type and function. From a planning standpoint, hangars should be centralized in terms of auto access, and located along the established flight line to minimize costs associated with access, drainage, utilities and auto parking expansion.

AIRCRAFT APRON FACILITY REQUIREMENTS

Table 4.5 lists the existing and future apron space requirements for the Lawrence Smith Memorial Airport throughout the 20-year planning period. Paved aircraft parking and tie-down areas should be provided for approximately 40 percent of the peak/design day itinerant aircraft, plus approximately 25 percent of the based aircraft. FAA airport planning criteria recommends 360 square yards (3,240 square feet) per itinerant aircraft space, and approximately 300 square yards (2,700 square feet) per based aircraft. Other site specific apron planning and design considerations include:

- Maintaining the apron area beyond all airfield safety areas per airport design requirements (RSA, OFA, RPZ, OFZ and RVZ).
- Preserving the minimum runway centerline to aircraft parking apron separation of 200 feet for ARC A-I, and 400 feet for ARC C-II runways with approach visibility minimums not lower than $\frac{3}{4}$ -mile.
- Planning for sufficient aircraft taxiing and maneuvering space for entering and exiting the aircraft parking apron without risk of structural damage and to allow two-way passing of aircraft leading to the connecting taxiway. It is preferable for the main aircraft apron to be located near the mid-section of the primary runway with sufficient space to allow for a continuation of building and hangar expansion adjacent to the terminal area flight line.

FUEL STORAGE REQUIREMENTS

Fuel storage requirements are based on the forecast of annual operations, aircraft utilization, average fuel consumption rates, and the forecast mix of general aviation aircraft. These requirements are listed in **Table 4.5** for the 20-year planning period. On average, the typical single-engine piston aircraft consumes 12.0 gallons of fuel per hour and flies approximately 190 nautical miles (1.6 to 2.0 hours) per flight. On the other hand, turbine powered business aircraft (jets) are assumed to operate between 1.8 and 2.2 hours per operation. The following guidelines should be implemented when planning future airport fuel facilities:

- Aircraft fueling facilities should remain open continually, remain visible, and be within close proximity to the terminal building or FBO to enhance security and convenience.



- Fuel storage capacity should be sufficient for average peak-hour month activity, which normally occurs during the summer months.
- Fueling systems should permit adequate wing-tip clearance to other structures, designated aircraft parking areas (tie-downs), frequently used maneuvering areas, and object free areas (OFA) associated with taxiway and taxiway centerlines.
- The FAA recommends locating the fuel facilities beyond the runway safety areas (RSA) and the building restriction line (BRL). All fuel storage tanks should be equipped with monitors to meet current State and Federal EPA regulations, and sited in accordance with local fire codes.
- A dedicated fuel truck is typically used for Jet-A due to the liability associated with towing and maneuvering aircraft around fuel islands.

AUTO PARKING, CIRCULATION AND ACCESS REQUIREMENTS

Table 4.5 lists the existing and future auto parking requirements for the Lawrence Smith Memorial Airport throughout the 20-year planning period. Parking space requirements are calculated using 1.4 spaces per design hour passenger, which is typical for smaller, non-towered general aviation airports. Based aircraft owners commonly park in their individual hangars while flying. Other recommended facility planning and design considerations include:

- Expanding the dedicated public auto parking lot with close proximity to future terminal building expansion or relocation. Any future public auto parking areas should include fully paved and marked auto parking areas.
- A system of airport directional/guidance signs should be located along Highways 7 and 71 to provide additional assistance in locating the Lawrence Smith Memorial Airport. Additionally, signage at the entrance to identify any future based businesses and their location on the Airport should be added to assist airport customers.
- Maintain a separation between auto traffic and aircraft traffic with the use of guidance signs near the aircraft parking apron and taxiways.



TERMINAL/AIRPORT UTILITY REQUIREMENTS

It is anticipated that increasing general aviation traffic and possible on-site development will demand a greater use of existing facilities. Existing utilities will be adequate for the initial planning period; however, as the Airport grows over the forecast period, higher demands will be placed on the existing water supply and the sewer/septic tank system.

TERMINAL AREA FENCING/SECURITY REQUIREMENTS

Perimeter security fencing, access gates, and terminal fencing between airport property and public areas is recommended to control access by people and wildlife to the runway, taxiways, and terminal area. The specific terminal area fence location, type and height normally depends on FAA security requirements, and fencing previously established by adjacent property owners. Recommended facility planning and design considerations include:

- Perimeter fencing specifically designed for exclusion of wildlife;
- Restrictive access gates and fencing should be maintained in appropriate locations to prevent auto-aircraft conflicts; and
- Routine security patrol checks should be conducted by the Airport staff.



SUMMARY OF TERMINAL AREA FACILITY REQUIREMENTS

Table 4.5 summarizes terminal area facility requirements to accommodate activity projected for the Lawrence Smith Memorial Airport for each of the three phases spanning the 20-year planning period.

Table 4.5 Summary – Landside/Terminal Facility Requirements Lawrence Smith Memorial Airport				
Facility	Existing	Phase 1 (0-5) Short-Term	Phase 2 (6-10) Mid-Term	Phase 3 (11-20) Long-Term
Based Aircraft	53	61	71	93
Annual Operations	13,250	17,263	22,720	38,130
Peak Hour Passengers	8.8	12.1	18.5	36.0
Apron Tie-Down Area: Apron Tie-Downs	7,177 S.Y. 17	10,920 S.Y. 28	14,652 S.Y. 38	24,864 S.Y. 65
T-Hangars: Common/Corporate Hangars: Maintenance Hangar: Total Hangar Space	41,970 S.F. 5,040 S.F. 3,600 S.F. 50,610 S.F.	65,800 S.F. 17,760 S.F. 5,200 S.F. 88,760 S.F.	77,800 S.F. 17,760 S.F. 5,200 S.F. 100,760 S.F.	99,400 S.F. 42,000 S.F. 10,800 S.F. 152,200
Terminal Building Size	1,140 S.F.	1,390 S.F.	1,700 S.F.	2,590 S.F.
Fuel Storage: Total Annual Fuel Sales Average Monthly Fuel Sales	36,000 Gal. 3,000 Gal.	70,000 Gal. 5,900 Gal.	153,000 Gal. 12,800 Gal.	455,000 Gal. 37,900 Gal.
Storage Volume (100LL): Storage Volume (Jet A): Total Fuel Storage Volume	10,000 Gal. *10,000 Gal. 20,000 Gal.	10,000 Gal. 10,000 Gal. 20,000 Gal.	10,000 Gal. 20,000 Gal. 30,000 Gal.	10,000 Gal. 30,000 Gal. 40,000 Gal.
Paved Auto Parking Area Auto Parking Spaces	1,305 S.F. 6	1,455 S.F. 7	2,220 S.F. 10	4,330 S.F. 20
<p>Note: Apron tie-downs based on small aircraft (single and light twin-propeller aircraft less than 12,500 lbs). Note: Hangars assume ownership by both public and private entities. Note: *The existing Jet-A tank is privately owned, and not available to the public. Note: Annual fuel sales rounded to the nearest '000. Monthly fuel sales rounded to nearest '00.</p>				

Source: BWR, Facility Requirement Summary – August 2003.



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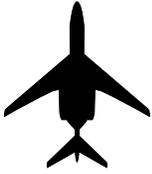
Chapter Five

Airport Alternatives Analysis



Lawrence Smith
Memorial Airport

Harrisonville, Missouri



5

AIRPORT ALTERNATIVES ANALYSIS

ALTERNATIVE EVALUATION ANALYSIS

The airport alternatives chapter examines various airfield and terminal area alternatives designed to meet future aviation demand at the Lawrence Smith Memorial Airport. Each alternative, including associated impacts, will be evaluated by the Planning Advisory Committee (PAC) to determine a *preferred* alternative, or course of action. This preferred alternative will be the basis for the ultimate development strategy as illustrated in the Airport Layout Plan (ALP).

The Plan should be regarded as the formulation of a development policy rather than the presentation of a design recommendation. While the assessment of alternatives is based on technical judgement, the most favorable airport improvement option should conform to the local planning policies as outlined in the comprehensive plan and remain consistent with social, economic, political and environmental guidance. In order to determine the best possible course of action, the following factors are strongly considered in the development *and* evaluation of potential design options:

- *Compliance with FAA airport standards and airspace criteria - without modification;*
- *Maintain compatibility with existing and proposed on and off-airport land uses;*
- *Consider short and long-term development costs;*
- *Minimize the consequences of environmental impacts and potential mitigation.*

ALTERNATIVE DESIGN CONCEPT

The primary focus for the City of Harrisonville will be the improvements to the Lawrence Smith Memorial Airport that will allow the Airport to accommodate existing and future user demand levels. This will involve converting the existing facilities from an ARC B-II general aviation facility to an ARC C-II airport that will accommodate medium to large cabin business jet aircraft. The following discussion will outline the primary issues that revolve around each development alternative.

The need for improvements to the existing airport facilities stems from user surveys and personal interviews with potential airport users. In addition, aviation forecasts were applied to assist in the determination of usage levels by different types of aircraft. This research resulted in the need for the construction of a runway 5,500' x 100' with pavement strength of 30,000 lbs.



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single wheel gear (SWG) to accommodate the larger cabin business jets. This design length and width will be the main focus of all the airfield alternatives presented in this Study.

The existing Runway 17-35 is 4,000' x 75' with pavement strength of 12,500 lbs. SWG. In order to facilitate the necessary runway expansion, it will be necessary to relocate the existing north end (RW17) threshold to allow for the larger runway safety area and runway protection zone (RPZ) required for each runway end. Since the Airport is bounded by Missouri Highway 7 to the north and Missouri Highway 71 to the west, the only option available is to relocate the north threshold to the south.

The existing aircraft parking apron is too small to accommodate existing and future airport users. The existing aircraft parking apron should be expanded to facilitate the larger business aircraft that intend to use the Airport. Furthermore, hangar space is needed to provide additional aircraft storage for based aircraft. Terminal area expansion and growth is limited at the existing site due to terrain and drainage issues as well as the proximity of Missouri Highway 7; therefore, a new terminal area location will be shown on the west side of the Airport as part of the development alternatives. Given the terminal area will be located on the west side of the runway, the full-length parallel taxiway will also be shown on the west side of the runway.

The existing automated weather observation system (AWOS) is located on the west side of the Airport. With the relocation of the terminal area, the AWOS will need to be moved to a site that is not affected by the construction of the terminal building, aircraft hangars, and other terminal area structures.

Each alternative will affect at least one residence located to the south of the existing airport property. Complete removal of the residence will be required to facilitate the runway, taxiway and associated safety areas and building set-backs.

The City of Harrisonville has expressed interest in creating additional commercial and industrial development adjacent to the Lawrence Smith Memorial Airport. Developable space will be available in each alternative to accommodate this type of land use and will be compatible with the existing and future airport environment.

The following discussion introduces each airfield development alternative, details each design consideration, and ends with a conclusion. This discussion examines wind coverage, total required acreage, minimum runway safety area, RPZ, and the building restriction line (BRL). This information is presented with the goal of establishing a "preferred" airfield development alternative which will be the basis for the completion of this Study.



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The major airfield design alternatives will include the following:

ALTERNATIVE A – Construct new runway with optimum wind coverage

ALTERNATIVE B – Construct new runway that minimizes impacts on surrounding residents

ALTERNATIVE C – Construct new runway along existing runway centerline

Option 1 – Approach visibility minimums as low as 1-mile

Option 2 – Approach visibility minimums as low as 3/4-mile

Option 3 – Approach visibility minimums as low as 1/2-mile

ALTERNATIVE A – Construct a new runway that optimizes wind coverage for small aircraft.

Alternative A is considered as a design alternative that optimizes wind coverage for small aircraft and with instrument approach visibility minimums as low as 1-mile.

Design Considerations: The construction of a 5,500' x 100' runway with an orientation of 3.00° would have a slight northeast-southwest orientation. This alignment would place a portion of the runway safety area and RPZ over the existing terminal area. The FAA recommends a minimum crosswind coverage of 95.0% for a single runway that is expected to accommodate ARC A-I, (small aircraft) at 10.5 knots (12.0 MPH). The current alignment of Runway 17-35 (357.16°) provides 94.06% wind coverage at 10.5-knots. The maximum achievable wind coverage in the Harrisonville region is 94.13% with a runway orientation of 3.00°. (It should be noted that in this region of the Midwest, 95% crosswind coverage at 10.5-knots is not achievable with a single runway system).

This alignment will require the removal of the existing terminal area and one residence located to the south of the existing airport property. In addition, a barn belonging to a farmstead west of the Airport will need to be removed from the BRL. The BRL will extend 495 feet on each side of the runway centerline and the RPZ dimensions will be 500' x 1,700' x 1,010'. The City will be required to purchase an additional 122 acres in fee simple to facilitate the ultimate runway length, runway safety areas, BRL, and RPZ. This alignment also includes the closure of 283rd Road, burial of approximately 1,000 feet of powerline, and immediate closure of the entire terminal area and removal of most of the structures. In addition, this alternative may adversely impact jurisdictional waters to the east of the airport property line.

Conclusion: This orientation translates to a crosswind of 10.5-knots or less on average of 343 days a year with 94.13% crosswind coverage versus 347 days with 95% crosswind coverage which is a difference of four days annually. This alternative places the RPZ and runway safety area over a large portion of the terminal area that will require its immediate closure.



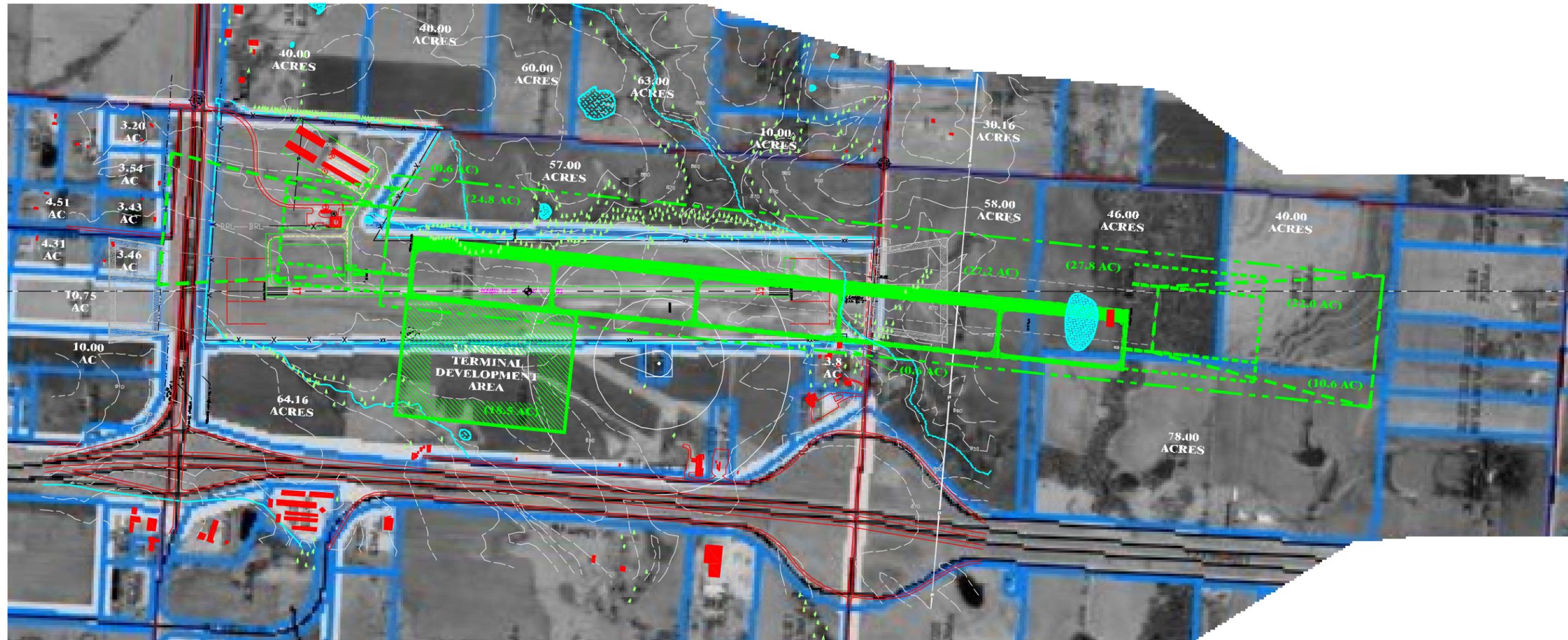
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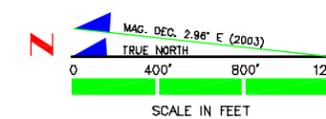
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DECLARED DISTANCE TABLE									
EXISTING					ULTIMATE				
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17	4,000'	4,000'	4,000'	4,000'	17	5,500'	5,500'	5,500'	5,500'
35	4,000'	4,000'	4,000'	4,000'	35	5,500'	5,500'	5,500'	5,500'

DECLARED DISTANCE INFORMATION OBTAINED FROM FAA DATA SHEET INFORMATION (11/05/99), AND GEORSA GEODETIC CALCULATOR IN NORTH AMERICAN DATUM (NAD83). DECLARED DISTANCES IN ACCORDANCE WITH AC 150/5300-13, CHANGE #7.



LEGEND		
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[Symbol]	[Symbol]	RUNWAY SAFETY AREA (RSA)/OBJECT FREE AREA (OFA)
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[Symbol]	[Symbol]	OBSTACLE FREE ZONE (OFZ)
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[Symbol]	[Symbol]	AIRPORT REFERENCE POINT (ARP)
[Symbol]	[Symbol]	ROTATING BEACON
[Symbol]	[Symbol]	PRECISION APPROACH PATH INDICATORS (PAPI)
[Symbol]	[Symbol]	GUIDANCE/DIRECTIONAL/HOLD POSITION SIGN
[Symbol]	[Symbol]	HOLD POSITION MARKING
[Symbol]	[Symbol]	WIND CONE & SEGMENTED CIRCLE
[Symbol]	[Symbol]	RUNWAY THRESHOLD LIGHTS
[Symbol]	[Symbol]	RUNWAY END IDENTIFIER LIGHTS (REIL)
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[Symbol]	[Symbol]	STORM SEWER/DRAINAGE INLET SYSTEM
[Symbol]	[Symbol]	ROAD CLOSURE BARRICADES
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[Symbol]	[Symbol]	MEDIUM INTENSITY APPROACH LIGHTING SYSTEM (MALS)
[Symbol]	[Symbol]	POND/BODY OF WATER
[Symbol]	[Symbol]	SECTION CORNER



HARRISONVILLE, MISSOURI
 LAWRENCE SMITH MEMORIAL AIRPORT
ALTERNATIVE A

JOB NO. 2003191.06	DESIGNED BY: RWC	DATE:	REVISIONS
DRAWING NO.	DRAWN BY: MFL	DATE:	
SCALE AS SHOWN	CHECKED BY: BCW	DATE:	
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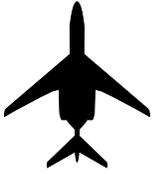
AIRPORT MASTER PLAN UPDATE

ALTERNATIVE B – construct a new runway with an alignment that attempts to minimize adverse impacts on the surrounding property owners.

Alternative B utilizes a runway alignment that attempts to minimize the adverse impacts to adjacent land owners while providing a runway that will satisfy the future needs of the Airport and with instrument approach visibility minimums as low as 1-mile.

Design Considerations: The construction of a 5,500' x 100' runway with an orientation of 355.10° true bearing provides crosswind coverage of 94.01% at 10.5-knots (343 days). The BRL will extend 495 feet on each side of the runway centerline and the RPZ dimensions will be 500' x 1,700' x 1,010'. The City will be required to purchase an additional 126 acres in fee simple to accommodate the ultimate runway length, runway safety area, BRL, and RPZ. This alternative also requires the removal of a barn on the west side of the Airport, closure of 283rd Road, and burial of 1,000 feet of power lines.

Conclusion: This design provides a runway orientation similar to the existing runway. The crosswind coverage for this alignment is 94% which provides nearly the maximum wind coverage for small aircraft in this region (approximately 343 days). The removal of a barn on the west side of the Airport will be required to facilitate the BRL and taxiway grading requirements.



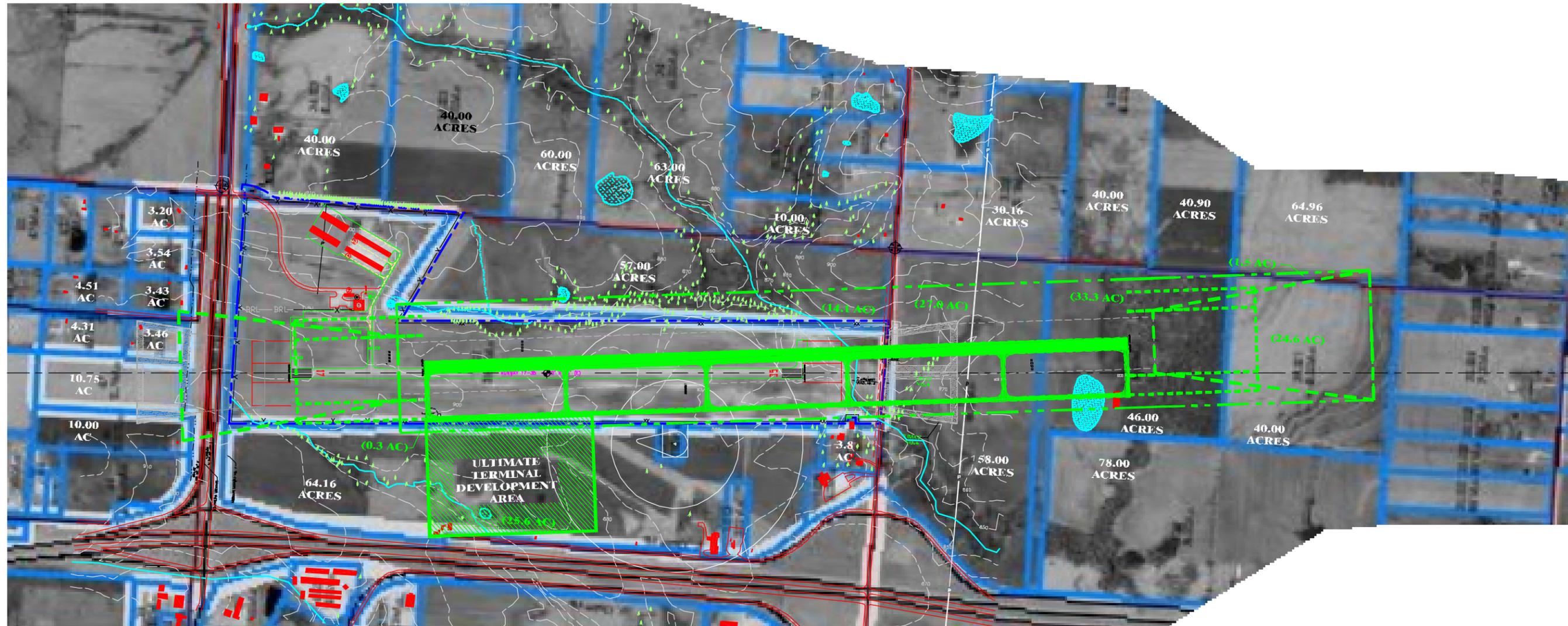
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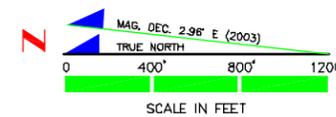
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DECLARED DISTANCE TABLE									
EXISTING					ULTIMATE				
RUNWAY	TORA	TODA	ASDA	LDA	RUNWAY	TORA	TODA	ASDA	LDA
17	4,000'	4,000'	4,000'	4,000'	17	5,500'	5,500'	5,500'	5,500'
35	4,000'	4,000'	4,000'	4,000'	35	5,500'	5,500'	5,500'	5,500'

DECLARED DISTANCE INFORMATION OBTAINED FROM FAA DATA SHEET INFORMATION (11/05/99), AND GEOSHA GEODETIC CALCULATOR IN NORTH AMERICAN DATUM (NAD83). DECLARED DISTANCES IN ACCORDANCE WITH AC 150/5300-13, CHANGE #7.



LEGEND		
EXISTING	ULTIMATE	
		FACILITIES
		BUILDINGS/STRUCTURES
		AIRPORT PROPERTY LINE
		AVIATION EASEMENTS
		BUILDING RESTRICTION LINE (BRL)
		RUNWAY SAFETY AREA (RSA)/OBJECT FREE AREA (OFA)
		RUNWAY PROTECTION ZONE (RPZ)
		OBSTACLE FREE ZONE (OFZ)
		RUNWAY VISIBILITY ZONE (RVZ)
		AIRPORT REFERENCE POINT (ARP)
		PRECISION APPROACH PATH INDICATORS (PAPI)
		GUIDANCE/DIRECTIONAL/HOLD POSITION SIGN
		HOLD POSITION MARKING
		WIND CONE & SEGMENTED CIRCLE
		RUNWAY THRESHOLD LIGHTS
		RUNWAY END IDENTIFIER LIGHTS (REIL)
		GROUND CONTOUR (USGS MAP)
		FENCING
		PAVED/DIRT ROAD
		CREEK/INTERMITTENT DRAINAGE
		POWERLINES/POLES
		TREES/WOODDED AREA
		AUTOMATED WEATHER OBSERVING SYSTEM (AWOS)
		ABOVE GROUND OIL/GAS WELL/PUMP STATION
		STORM SEWER/DRAINAGE INLET SYSTEM
		ROAD CLOSURE BARRICADES
		AUTO ACCESS GATE
		MEDIUM INTENSITY APPROACH LIGHTING SYSTEM (MALIS)
		POND/BODY OF WATER
		SECTION CORNER



HARRISONVILLE, MISSOURI
 LAWRENCE SMITH MEMORIAL AIRPORT
ALTERNATIVE B

JOB NO. 2003191.06	DESIGNED BY: RWC	DATE: 01/29/03	REVISIONS
DRAWING NO. TWO	DRAWN BY: MFL	DATE: 05/13/03	
SCALE AS SHOWN	CHECKED BY: BCW	DATE: 05/15/03	
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ALTERNATIVE C – construct a new runway along the existing runway alignment.

Alternative C: examines the ultimate runway utilizing the existing runway alignment and orientation.

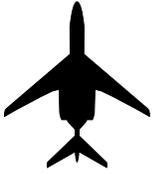
Design Considerations: This design involves the relocation of the Runway 17 end approximately 1,170 feet south along the runway centerline and extending the runway to a total length of 5,500 feet. This alignment utilizes the existing runway and would minimize the earthwork required for the ultimate runway and safety area development. This design requires the burial of the power line (1,000') and the closure of 283rd Road. In addition to the runway orientation, this alternative has three different options according to the instrument approach visibility minimums as follows:

OPTION 1 – This option is a non-precision instrument approach that allows the visibility minimums to be as low as 1-mile when landing in instrument meteorological conditions (IMC). The BRL will extend 495 feet on each side of the runway centerline and the RPZ dimensions will be 500' x 1,700' x 1,010'. This option requires a total of 105 additional acres of land to accommodate the runway safety area, RPZ, and BRL.

OPTION 2 – This option examines the alternative if the non-precision instrument approach visibility minimums were as low as ¾-mile. The BRL will extend 745 feet on each side of the runway centerline and the RPZ dimensions will be 1,000' x 1,700' x 1,510'. This option requires a total of 216 additional acres of land to accommodate the runway safety area, RPZ, and BRL. This approach employs the use of a medium-intensity approach lighting system (MALS) to provide additional runway and approach environment information.

OPTION 3 – This option investigates the possibility of the runway development alternative with a precision instrument approach with visibility minimums as low as ½-mile. The BRL will extend 745 feet on each side of the runway centerline and the RPZ dimensions will be 1,000' x 2,500' x 1,750'. This option requires a total of 245 additional acres of land to accommodate the runway safety area, RPZ, and BRL. This approach also employs the use of a glideslope, localizer and medium-intensity approach lighting system with runway alignment indicator lights (MALSR) to provide additional approach environment information.

Conclusion: This runway design minimizes the amount of earthwork required for the ultimate runway and taxiway development. The closure of a road and burial of power lines is a central theme to all the alternatives presented. The various options with Alternative C involve the runway alignment along the existing runway centerline with the only variable based on the instrument approach visibility minimums and minimum land requirements.



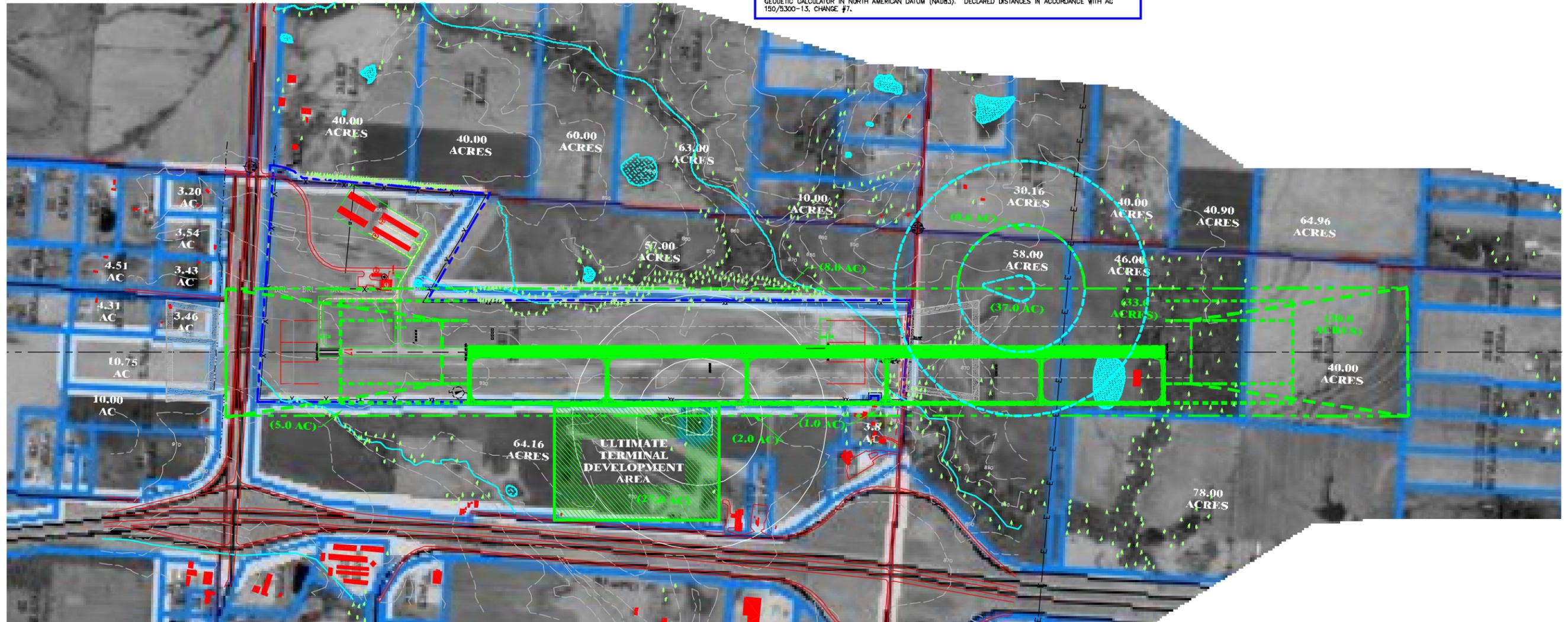
LAWRENCE SMITH MEMORIAL AIRPORT

AIRPORT MASTER PLAN UPDATE

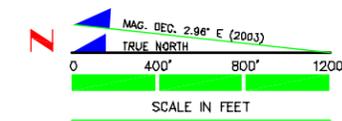
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DECLARED DISTANCE TABLE									
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35	4,000'	4,000'	4,000'	4,000'	35	5,500'	5,500'	5,500'	5,500'

DECLARED DISTANCE INFORMATION OBTAINED FROM FAA DATA SHEET INFORMATION (11/05/99), AND GEODATA GEODETIC CALCULATOR IN NORTH AMERICAN DATUM (NAD83). DECLARED DISTANCES IN ACCORDANCE WITH AC 150/5300-13, CHANGE #7.



EXISTING		ULTIMATE		LEGEND
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HARRISONVILLE, MISSOURI

**LAWRENCE SMITH MEMORIAL AIRPORT
ALTERNATIVE C1**

JOB NO. 2003191.06	DESIGNED BY: RWC	DATE: 01/29/03	REVISIONS
DRAWING NO. TWO	DRAWN BY: MFL	DATE: 05/13/03	
SCALE AS SHOWN	CHECKED BY: BCW	DATE: 05/15/03	
SHEET: 2	BUR BUCHER, WILLIS & RATLIFF CORPORATION		
OF 10			



Table 5.1 lists the four design alternatives for each runway alignment which includes the pricing difference between the major elements to be considered. A site selection rating scale was used (1=least favorable, 5=most favorable) based on the monetary, social and potential environmental impacts related to each alternative and option.

Table 5.1 Airport Alternatives Site Factor Comparison Lawrence Smith Memorial Airport					
Alternative	A	B	C1	C2	C3
Visibility Minimums	1-Mile	1-Mile	1-Mile	¾-Mile	½-Mile
Road Closure	3	3	3	3	3
Residence Relocation	4	4	4	2	1
On-Airport Structure Removal	1	5	4	4	4
Wind Coverage	4	3	3	3	3
Property Acquisition	4	4	4	3	3
Powerline Burial/Removal	4	4	4	4	4
Terminal Area Development	5	5	5	5	5
Environmental Impacts	4	4	4	4	4
Airport Utility/Safety	3	3	3	4	5
Overall Design	1	1	3	4	5
Rating Total	33	36	37	36	37

Note: Site Selection Rating (1=Least Favorable, 5=Most Favorable)

Source: BWR Alternative Analysis, October 2003.

“PREFERRED” ALTERNATIVE DESIGN

Each design alternative was presented to the PAC along with the various design considerations and site factors as given in **Table 5.1**. The PAC weighed each option against the existing and future needs of the City of Harrisonville and the Lawrence Smith Memorial Airport. As a result, the PAC chose **Alternative C, Option 1** as the future design for the Airport. This design was selected since it provided the much needed runway length with adequate instrument approach visibility minimums for the types of aircraft intending to use the Airport. This design also enables the City to leave the existing terminal area at its present location during the construction of the new terminal area on the west side of the Airport. Furthermore, this design also



minimizes the total amount of earthwork that will be required to construct the new primary runway.

TERMINAL AREA ALTERNATIVES

Expansion of the airport terminal area involves additional aircraft hangar space, aircraft parking apron, a new maintenance hangar, and a dedicated terminal building.

The major components of the new terminal area expansion design are based on the following needs:

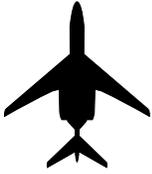
- Site for new airport terminal building;
- Additional T-hangars;
- Corporate hangars;
- Large maintenance hangar;
- Aircraft tie-down space; and
- Auto access to the terminal facilities.

The development of the terminal area focuses on the following design concepts:

Future Terminal Building Site: A new terminal building is recommended to provide services to airport users and passengers. The primary focus of the new terminal building should include:

- Maintaining a centralized general aviation terminal area concept;
- Adequate line-of-sight for the airfield and terminal area;
- Minimizing new pavement;
- Unobstructed and unobtrusive open-space;
- Adequate provisions for aircraft fueling (fuel system and aircraft clearance);
- Access to existing utilities and consideration of drainage patterns;
- Maintaining a linear flightline;
- Adequate public auto parking adjacent to the terminal building; and
- Providing for FBO expansion of operations and service.

Future Hangar Development: Forecast aviation activity indicates the need for additional hangar storage, including a combination of T-hangars, private common hangars, and a maintenance hangar. Because the economic life of the existing T-hangars is expected to be reached during the 20-year planning period, it is recommended that the existing T-hangars be replaced as demand warrants.



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Future T-hangars: The expansion of T-hangars is proposed in an area with a similar mix of aircraft. Hangars should be aligned in a north-south fashion to allow easier access during the winter months to reduce the chance of blowing snow blocking the hangar doors.

Future Private Common Hangars: It is recommended that terminal space be reserved for construction of private common hangars. The arrangement of hangars should be sited to provide pavement area fronting the hangars with ample auto access. Expansion of the taxiway and apron areas may be necessary depending on the arrangement and size of the hangars.

Future Large Maintenance Hangar: A new maintenance hangar is needed at the Lawrence Smith Memorial Airport. Maintenance hangars in the Midwest are typically oriented to face south to allow the prevailing breeze to provide airflow through the hangar.



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Chapter Six

Environmental Review



Lawrence Smith
Memorial Airport

Harrisonville, Missouri



6

ENVIRONMENTAL REVIEW

PURPOSE

The purpose of the Environmental Review (ER) is to collect and document environmental information obtained during the course of the Master Plan Update. It is intended to identify any significant environmental impacts of the proposed development that may require additional analysis, such as the need for a full Environmental Assessment prior to initiating ultimate airport improvements. In addition, copies of all response letters received from each agency listed in this chapter will be available in the appendix. The data contained in this review is primarily for informational purposes and to highlight areas of environmental concerns as expressed by local, state and federal agencies from which correspondence was received. The ER process involves two primary steps:

- 1) Review existing conditions to establish a baseline for any subsequent environmental or permitting requirements; and
- 2) Identify development recommendations that may require further environmental study along with possible mitigation strategies.

The need for improvements at the Lawrence Smith Memorial Airport has been identified based on an assessment of existing and future demand for aviation facilities. As a public transportation facility, the Airport is an integral part of the community, providing access for business travel, agricultural use, and emergency medical services, as well as flight training and recreational flying. In order to accommodate current and future aviation activity, physical improvements are needed at the Airport. The major improvements include: land acquisition; extension of the primary runway; construction of a parallel taxiway; relocation of the terminal area including a new terminal building; construction of new aircraft hangars; paving additional aircraft parking apron; and relocation of the AWOS.



SPECIFIC IMPACT CATEGORIES

The Categorical Exclusion Checklist (CE) is used by the MoDOT, Aviation Section to determine whether the proposed project will violate guidelines set forth by the *Endangered Species Act*, the *Historic Preservation Act*, or *Section 404 of the Clean Water Act*. This CE was used as a basis for the ER during the study for the Lawrence Smith Memorial Airport to determine if further analysis will be required prior to the extension of Runway 17-35 and resulted in the following findings.

(1) NATIONAL HISTORIC PRESERVATION ACT OF 1966 AND ARCHAEOLOGICAL AND HISTORIC PRESERVATION ACT OF 1974

The *National Historic Preservation Act of 1966* and the *Archeological and Historic Preservation Act of 1974* address cultural resources and the thresholds for cultural and historic properties. As described in *FAA Order 5050.4A, Paragraph (e)(8)*, a review of the National Register of Historic Places is necessary to list any state historic or archeological sites in the airport project area.

This project includes the purchase of property and removal of an abandoned farm house and associated structures to the west side of the existing Airport. Furthermore, an existing inhabited house is located directly south, on the extended runway centerline, that will require either removal or relocation.

A review of the proposed airport development from the **Missouri Department of Natural Resources, State Historic Preservation Office** has indicated a “*medium to high probability for archaeological sites in the project area due to its location with a water source in close proximity.*” Therefore, the project area should undergo an archaeological survey prior to the initiation of project-related activities. In addition the project will need to undergo an architectural survey prior to the initiation of project-related activities.”

(2) SECTION 4(F) OF DOT ACT

FAA Order 5050.4A stipulates that activities which require the use of “...any publicly-owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, state or local significance or land of an historic site of national, state or local significance...” shall not be approved unless it can be shown that no other reasonable alternative exists and all possible mitigation measures will be taken. No such land or activity will be affected by the proposed airport development; therefore, no action will be necessary.



(3) FARMLANDS

The *Farmland Protection Policy Act* (FPPA) addresses the impacts for conversion of farmland to non-agricultural use based on the proposed Airport project. The *Natural Resource Conservation Service* (NRCS) assesses the proposed land conversion utilizing a *Farmland Conversion Impact Rating Form AD-1006*. Site assessment points are determined based on criteria in the *Code of Federal Regulations 658.5(b)* in recognition that land immediately surrounding the Airport is primarily agricultural. The significance of the farmland impact is based on a score derived from comments received from the NRCS (Title 7 of the Code of Federal Regulation, Part 658 Farmland Protection Policy; Final Rule, July 5, 1984) as follows:

- Less than 160 total points - no further action is necessary
- Above 160 total points - potential adverse impact, with consideration of the following:
 - ◆ Acquire land that is not farmland protected by the FPPA.
 - ◆ Use existing airport-owned land instead of acquiring new land.
 - ◆ Alternative sites or airport layouts that would serve the proposed purpose but convert either fewer acres of farmland or other farmland with a lower relative value.

Calculations of the *Relative Value of Farmland to be Converted* totaled 76 out of 100 points, and *Total Site Assessment* equaled 68 out of 160 points. The total sum of the *Farmland Conversion Impact Rating* is 144 out of 260 points. Since the total sum (144 points) is well below the minimum impact rating threshold (260 points), no further review is necessary for this project.

(4) ENVIRONMENTAL CONTROVERSY

The proposed project is not highly controversial from an environmental standpoint. Opposition has not been received from federal, State, or local governmental agencies, or by persons affected by the proposal. The following areas are addressed:

Planning Advisory Committee (PAC): Through public meetings, the PAC has indicated their approval of the proposed airport improvements for the Lawrence Smith Memorial Airport.

Public Objection: To date, no significant public objection, oral or written, has been received as part of the Lawrence Smith Memorial Airport Master Plan Update.



(5) NATURAL ENVIRONMENT

The proposed project is not anticipated to have a significant impact on natural, ecological, or scenic resources of national, State, or local significance. The *Endangered Species Act of 1973* protects listed species against killing, harming, harassment or any action that may damage their habitat. *FAA Order 5050.4A, Paragraph (e)(10)* describes the procedures to determine the impacts on endangered or threatened species from the proposed construction project. The *United States Fish & Wildlife Service (USFWS)*, *Missouri Department of Conservation* and *USDA Natural Resources Conservation Service (NRCS)* were contacted for comments and information regarding potential impacts to the population and location of wildlife, waterfowl resources, and aquatic life in the vicinity of the proposed airport site.

The USFWS has reviewed the project area and has determined that *“no federally listed species or designated critical habitat occurs within the project area; consequently, this concludes Section 7 consultation.”*

Correspondence from the Missouri Department of Conservation indicated that *“a review of our records shows that sensitive species or communities are not known to exist on or near the above referenced site. Please be advised that this is **not a site clearance letter**. Rather, this letter provides an indication of whether or not public lands and sensitive resources are known to be (or are likely to be) located close to the proposed project.”* The area is described as a region of karst geology and is characterized by subterranean water movement with features like caves, springs, and sinkholes. *“Cave fauna are influenced by water pollution and other changes to water quality. Every effort should be made to protect groundwater in the project area.”*

Response from the NRCS recommends contacting the MDC prior to any tree removal as certain tree habitats in Missouri are critical to the existence of the Indiana Bat, which is on the endangered species list.



(6) RELOCATION OF HOUSING

Relocation of housing is an induced socioeconomic impact on a community that can create controversial outcomes as a result of proposed airport development. The proposed project will directly impact a single residence currently located due south of the Airport along the extended Runway 17-35 centerline. Any residence relocation is subject to Advisory Circular 150/5100-11, *Land Acquisition & Relocation Assistance under the Airport Development Aid Program* which is part of the *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970*. These provide guidance for the provision of moving and related expenses, replacement housing payments, relocation assistance advisory services, and Federal share of the cost of such payments and services. As a result of the protection afforded the property owner by the Relocation Act, the socioeconomic impact to the community is expected to be minimal.

(7) COMMUNITY DISRUPTION

Impacts are associated with relocation or other community disruptions that may be caused by the development of an airport. The key impacts include population shifts to the established community, disruption of planned development, or a significant increase in surface traffic congestion.

The improvement of airfield and terminal area facilities creates the potential for direct and indirect social impacts in the local community. However, the impacts are expected to be minimal to the urban population of the City of Harrisonville and Cass County since much of the land adjacent to the Lawrence Smith Memorial Airport is in active agricultural production. Small clusters of rural residences do exist in this area; however, none will be significantly impacted by the Airport expansion.

The ultimate airport improvements require that 283rd Road be closed east of Missouri Highway 71, just east of the existing frontage road. 283rd Road intersects Missouri Highway 71 with an “at-grade” crossing for access to and from the highway. Correspondence from the Missouri Department of Transportation indicated that an “at-grade” crossing is not in concert with current regulations regarding this major thoroughfare and this highway access would be removed in order to create safer access to Missouri Highway 71.

Ultimate airport development plans show the frontage road continuing north around the end of Runway 17-35 for access to Missouri Highway 7, where the airport entrance road is currently located. This development will provide safer access to both Missouri Highways 7 and 71.



In addition, the City of Harrisonville has submitted a *Letter of Assurance* (attached in Appendix) as required by Section 511(a)(5) of the *Airport and Airway Improvement Act of 1982*, to emphasize their commitment toward encouraging the continuation of compatible land use in the Airport vicinity.

(8) NOISE

In general, noise exposure from operating aircraft in the airport environment is the most objectionable interference to the surrounding area. FAA Order 5050.4A indicates that a *"noise analysis is needed for proposals involving Airport Reference Code (ARC) Airplane Design Group I and II aircraft on utility or transport type airports whose forecast operations in the period covered by the environmental assessment exceeds 90,000 annual adjusted propeller operations or 700 annual adjusted jet operations."* The current acceptable level of excessive noise is defined by the 65 DNL (day-night average sound level) noise contour, which is determined from a cumulative exposure of sound (time and level), measured in decibels, averaged over a one year time period. Long-term forecasts (Chapter 3) for the Lawrence Smith Memorial Airport were estimated at approximately 38,130 annual civilian operations by the end of the 20-year planning period. Of those 38,130 operations, nearly 1,400 of the forecast operations will be completed by business jet aircraft which exceeds the jet threshold of 700 adjusted operations annually; therefore, a Noise Exposure Map (NEM) will be required.

(9) AIR QUALITY

Air Quality assessments for proposed federal actions are required for compliance with the National Environmental Policy Act (NEPA), the Clean Air Act and other environment-related regulations and directives. FAA's Air Quality Handbook, Paragraph 2.1.2 states that *"certain airports must comply with federal and state regulations which set air quality standards for certain airborne pollutants including ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide and suspended particles."*

FAA Order 5050.4A *Airport Environmental Handbook* outlines the criteria regarding the necessity for an air quality analysis, based on existing and forecast levels of annual airport operations. The *Handbook* states that *"no air quality analysis is needed when the proposed project is a general aviation airport with less than 180,000 operations forecast annually."* Given the forecast for the Lawrence Smith Memorial Airport will approximate 38,130 annual operations by the end of the 20-year planning period, an air quality analysis is not anticipated.



(10) WATER QUALITY

FAA Order 5050.4A requires a water quality certification for approval of an application project including a new airport location, a major runway extension, or a major runway relocation. Water impacts from airport construction for on and off-airport water quality are usually in the form of nonpoint source pollution or surface runoff, construction alterations in natural drainage patterns, disturbance of wetland habitat, discharge from certain types of industrial sites, and storage of petroleum and pesticide products.

A proposed activity is considered to affect wetlands when it involves development in a wetland (hydrophytic vegetation, hydric soils and wetland hydrology), or "dredging, filling, draining, channeling, dividing, impounding waters of the United States" or direct impact of a wetlands area. The *Department of the Army, Corps of Engineers* has regulatory jurisdiction over all waters of the United States. Discharges of dredged or fill material in waters of the United States, including wetlands, requires prior authorization from the Corps of Engineers under *Section 404 of the Clean Water Act* (33 CFR 320-330). Should the proposed improvements require the discharge of dredged or fill material in any waters of the United States, including wetlands, a Department of the Army (DA) permit may be required. For this study, the Kansas City District Corps of Engineers and the U.S. Fish and Wildlife Service (USFWS) were notified concerning the possible impact to wetlands in or near the Lawrence Smith Memorial Airport.

The response letter from the USFWS did not list any species or designated critical habitat occurring in the project area and no further action is required on their behalf. Information received from the Corps of Engineers indicated that a delineation of the affected impacts to the East Fork, South Grand River impacts will be required to further evaluate permit requirements. A review of the flood insurance rate maps indicate that the East Fork area is in the 100-year floodplain. In addition, a preliminary jurisdictional wetland determination for the residential pond, located on the centerline of the proposed runway improvements, should be submitted to the Kansas City District Corps of Engineers for DA permit requirements.

CONCLUSION

The result of this ER identified that further analysis of potential impacts to environmental resources will be required at the Lawrence Smith Memorial Airport. The review revealed that additional archeological, wetland, and flood plain study will be needed as part of an Environmental Assessment for a potential runway extension.



LIST OF REQUIRED PERMITS/AUTHORIZATIONS

Table 6.1 lists the authorizations, permits and certifications necessary prior to construction at the Lawrence Smith Memorial Airport.

Table 6.1 Necessary Authorizations, Permits and Certificates Lawrence Smith Memorial Airport		
Item	Issuing Agency	Obtainment
Storm Water Permit - Land Disturbance Activities	Missouri Department of Natural Resources (DNR)	No Anticipated Problems
Application for General Permit (Form E)	DNR/Erosion Control Plan	
Application for Storm Water Permit Under the General Permit (Form G)	DNR	
Storm Water Runoff - Operating Permit	DNR	
Land Disturbance Activities - Operating Permit	DNR/Erosion Control Plan	
Spill Prevention Control or Countermeasure Plan	DNR	No Anticipated Problems
Department of Army (DA) Permit	Department of the Army Corps of Engineers	Wetlands Inventory FAME/SEMA Floodway Study
Contact the DNR for an updated threatened and endangered species list if construction hasn't occurred in 5 years	DNR	No Anticipated Problems
If cultural materials are encountered during construction of any airport project, the DNR must be contacted for further site investigation and review.	DNR and Historic Preservation Program	Archeological Survey

Source: BWR, Environmental Review Checklist – January 2004.



AGENCIES CONTACTED AND REQUIRED PERMITS/AUTHORIZATIONS

Table 6.2 lists the government agencies contacted. The state and federal agencies listed below were contacted to assess and evaluate the environmental aspects of the projected projects

Table 6.2 State/Federal Agencies Contacted Lawrence Smith Memorial Airport	
Agency Contacted/Address	Agency Contacted/Address
✓ Mr. Rick L. Hansen Acting Field Supervisor U.S. Department of Interior Fish and Wildlife Service 608 East Cherry Street Columbia, Missouri 65201	✓ Ms. Shannon Cave Public Involvement Coordinator Missouri Department of Conservation P.O. Box 180 Jefferson City, Missouri 65102-0180 Response: Gene Gardner, Policy Coordinator
✓ Mr. Brian T. Donahue Regulatory Specialist Department of Army Kansas City District Office Corps of Engineers 700 Federal Building Kansas City, Missouri 64106-2896	✓ Mr. David K. Kacirek Resource Soil Scientist Natural Resource Conservation Service P.O. Box 1220 1209 Branch Street Platte City, Missouri 64079
✓ Mr. Mark A. Miles, Director Historic Preservation Officer Department of Natural Resources P.O. Box 176 Jefferson City, Missouri 65102	✓ Mr. Steven Hamadi, P.E. Transportation Project Manager Missouri Department of Transportation District 4 – Kansas City Area 600 NE Colbern Road Lee's Summit, Missouri 64806
Note: "✓" denotes a response letter has been received from the agency. Note: BWR environmental coordination letter and agency responses included in appendix.	

Source: BWR Environmental Response List, January 2004.



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Chapter Seven

Airport Development Plan



Lawrence Smith
Memorial Airport

Harrisonville, Missouri



7

AIRPORT DEVELOPMENT PLAN

INTRODUCTION

This chapter integrates the aviation demand forecasts (Chapter 3) and facility requirements (Chapter 4) for the Lawrence Smith Memorial Airport into a 20-year phased development plan based on the “preferred” future alternative discussed in Chapter 5. The purpose of the airport development plan is to provide a strategic approach for implementing and continuing facility maintenance, upgrade, and expansion in accordance with the ultimate role of the Airport.

Most future projects have been organized in chronological order to preserve the integrity of the Airport and to meet airport design standards. Each development stage consists of a series of projects as part of the ultimate development concept. The scheduling of projects within each development stage is prioritized to permit improvements in a logical and coordinated fashion. Each project is prioritized with respect to existing and future requirements, as identified by **1)** airport safety-related requirements, **2)** demand levels, **3)** environmental compatibility, **4)** potential revenue sources, including MoDOT, Aviation Section programming and funding levels, and **5)** recognition of other airport improvements and major public works programs and projects. The development plan is structured as a dynamic process so projects can be re-prioritized, if needed, to meet changes to design and funding considerations.

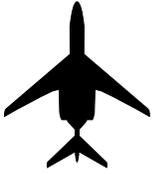
It should be noted that the development plan does not obligate State (MoDOT), local, or federal funds, nor does it require a funding commitment without justification of demand levels. Additionally, the expressed desire, intent, and ability of the City of Harrisonville to achieve airport land use compatibility, coupled with favorable community and business support of the Airport, remains an important funding consideration.

Each development stage consists of projects and improvements categorized by four primary airport project areas as follows: 1) Property and Easements; 2) Runway and Taxiway; 3) Terminal Area; and 4) Other. The phases are listed as follows:

Phase I (0-5 Years) – Short-Term Development

Phase II (6-10 Years) – Mid-Term Development

Phase III (11-20 Years) – Long-Term Development



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The goal of this 20-year development program is to focus on the improvements required for the Lawrence Smith Memorial Airport to meet existing and future aviation demands in this area. The major objective in Phase I (0-5 years) involves the design, land acquisition, and site preparation for the new ARC C-II, Runway 17-35. The Phase I design length will be 4,400' x 100' which is a ARC B-II+10 design. This runway length will be used for the interim period and will allow some of the larger cabin business aircraft with restricted payloads to use the Airport until the full 5,500 foot ultimate design length can be constructed. The relocation of the terminal area to the west side of the Airport will comprise the major task in the Phase II development period. Key components to the terminal area are the construction of a new terminal building, aircraft parking area, and hangar storage facilities. Phase III (11-20 years) focuses on the extension of Runway 17-35 from 4,400 feet to 5,500 feet. This period is also expected to see further expansion of the terminal area with common hangars and additional T-hangar units.



PHASE I (0-5 YEAR PERIOD)

PROPERTY AND EASEMENTS

- ◆ Land Acquisition – 265 Acres (fee simple)

RUNWAY AND TAXIWAYS

- ◆ Construct Runway 17-35 (4,400' x 100'; 30,000 lbs SWG)
 - ◆ Earthwork and Excavation (750,000 C.Y.)
 - ◆ Clearing and Grubbing (40 Acres)
 - ◆ Pavement Removal (17,500 S.Y.)
- ◆ Construct Connecting Taxiway (938' x 35'; 30,000 lbs SWG)
- ◆ Close 283rd Road
- ◆ Remove Bridge/ Install Box Culvert for Storm Drainage (800 L.F.)
- ◆ Bury 7200 Volt Powerline (1,000 L.F.)
- ◆ Remove Abandoned Farm House and Associated Structures
- ◆ Relocate/Remove Residence
 - ◆ Fill in Pond

TERMINAL AREA

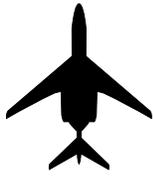
- ◆ Crack Seal Main Aircraft Parking Apron (7,472 S.Y.)
- ◆ Install Jet-A Fuel Tank and Pump

OTHER PROJECTS (CAPITAL)

- ◆ Conduct Environmental Assessment
- ◆ Purchase Airport Courtesy Car
- ◆ Install 24-Hour Access Restrooms
- ◆ Conduct Airport Commercial/Industrial Development Plan

OTHER PROJECTS (NON-CAPITAL)

- ◆ Implement Nonpoint Source Pollution Control Plan
- ◆ Adopt Standard Airport Operating and Hangar Lease Agreements
- ◆ Develop Airport Website
- ◆ Adopt "Airport Height and Hazard Zoning"



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Table 7.1 Phase I Development Plan (0-5 Year) Lawrence Smith Memorial Airport			
Project Description	Local/Private Cost	MoDOT/FAA Cost	Total Cost
Property and Easements			
Fee Simple (265 Acres)	\$212,000	\$4,028,000	\$4,240,000
Total			\$4,240,000
Runways and Taxiways			
Construct Runway 17-35	\$207,658	\$3,945,505	\$4,153,163
Construct Connecting Taxiway	\$44,855	\$852,239	\$897,094
Close 283 rd Road	\$175	\$3,325	\$3,500
Remove Bridge/Install Box Culvert for Storm Drainage	\$13,250	\$251,750	\$265,000
Bury 7200 Volt Powerline	\$1,200	\$22,800	\$24,000
Remove Abandoned Farm House and Structures	\$350	\$6,650	\$7,000
Remove/Relocate Residence	\$15,500	\$294,500	\$310,000
Total			\$5,659,757
Terminal Area			
Crack Seal Main Aircraft Parking Apron	\$650	\$12,350	\$13,090
*Install Jet-A Fuel Tank and Pump	\$50,000	\$0	\$50,000
Total			\$63,090
Other Projects – Capital			
Conduct Environmental Assessment	\$2,000	\$38,000	\$40,000
*Purchase Airport Courtesy Car	\$3,000	\$0	\$3,000
*Install 24-Hour Access Restrooms	\$2,000	\$0	\$2,000
Conduct Airport Commercial/Industrial Development Plan	\$1,250	\$23,750	\$25,000
Total			\$70,000
Subtotal Project Costs	\$553,892	\$9,478,955	\$10,032,847
Engineering, Administrative and Legal Costs	\$106,673	\$1,765,539	\$1,872,212
Total Phase I Project Costs	\$660,565	\$11,244,494	\$11,905,059
<p>Note 1: Eligible projects reflect funding at 95% State / 5% Local, unless otherwise noted.</p> <p>Note 2: “*” indicates local/private funding.</p> <p>Note 3: Recommend site preparation for the ultimate runway length of 5,500 feet, including the parallel taxiway, be accomplished in the Phase I period.</p>			

Source: BWR Cost Estimates – February 2004.



PHASE II (6-10 YEAR PERIOD)

PROPERTY AND EASEMENTS

- ◆ Acquire Easement for AWOS (17.8 Acres)

RUNWAYS AND TAXIWAYS

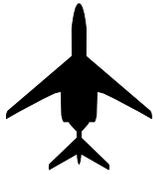
- ◆ Construct Parallel Taxiway (4,400' x 35'; 30,000 lbs SWG) and Connectors (300' x 35')

TERMINAL AREA

- ◆ Construct Terminal Building (2,625 S.F.)
- ◆ Construct Aircraft Parking Apron (47,084 S.Y.) and Install Aircraft Tie-Downs (18 each)
- ◆ Construct Maintenance Hangar (12,150 S.F.)
- ◆ Relocate 100LL (AVGAS) Fuel Tank and Pump
- ◆ Relocate Jet-A Fuel Tank and Pump
- ◆ Relocate AWOS
- ◆ Construct Terminal Access Road and Parking Area (4,900 S.Y.)
- ◆ Construct Two 10-Unit T-Hangars (15,840 S.F.)
- ◆ Install Airport Rotating Beacon
- ◆ Construct Two Common Hangars (3,600 S.F.)
- ◆ Install Terminal Area Fencing (3,011 L.F.)
- ◆ Install Auto Access Gates (2 each)

OTHER PROJECTS (CAPITAL)

- ◆ Construct North End Airport Access Road (6,036 L.F.)

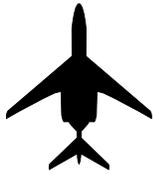


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Table 7.2 Phase II Development Plan (6-10 Year) Lawrence Smith Memorial Airport			
Project Description	Local/Private Cost	MoDOT/FAA Cost	Total Cost
Property and Easements			
Acquire Easement for AWOS	\$1,780	\$33,820	\$35,600
Total			\$35,600
Runways and Taxiways			
Construct Parallel Taxiway	\$43,657	\$829,479	\$873,136
Total			\$873,136
Terminal Area			
*Construct Terminal Building	\$180,450	\$0	\$180,450
Construct Aircraft Parking Apron and Tie-Downs	\$75,467	\$1,433,880	\$1,509,347
*Construct Maintenance Hangar	\$372,600	\$0	\$372,600
*Relocate 100LL (AVGAS) Fuel Tank and Pump	\$5,000	\$0	\$5,000
*Relocate Jet-A Fuel Tank and Pump	\$5,000	\$0	\$5,000
Relocate AWOS	\$1,000	\$19,000	\$20,000
*Construct Terminal Access Road and Parking Area	\$120,885	\$0	\$120,885
*Construct Two 10-Unit T-Hangars	\$754,760	\$0	\$754,760
Install Airport Rotating Beacon	\$1,140	\$21,660	\$22,800
*Construct Two Common Hangars	\$211,800	\$0	\$211,800
Install Terminal Area Fencing	\$752	\$14,292	\$15,044
Install Auto Access Gates	\$100	\$1,900	\$2,000
Total			\$3,219,686
Other Projects – Capital			
Construct North End Airport Access Road	\$12,896	\$245,029	\$257,925
Total			\$257,925
Subtotal Project Costs	\$1,787,288	\$2,599,060	\$4,386,348
Engineering, Administrative and Legal Costs	\$446,555	\$644,692	\$1,091,247
Total Phase I Project Costs	\$2,233,843	\$3,243,752	\$5,477,594
Note 1: Eligible projects reflect funding at 95% State / 5% Local, unless otherwise noted. Note 2: “*” indicates local/private funding.			

Source: BWR Cost Estimates – February 2004.



PHASE III (11-20 YEAR PERIOD)

PROPERTY AND EASEMENTS

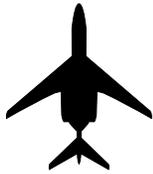
- ◆ None

RUNWAYS AND TAXIWAYS

- ◆ Extend Runway 17-35 (1,100' x 100'; 30,000 lbs SWG)
 - ◆ Install Medium Intensity Approach Lighting System (MALS)
 - ◆ Relocate PAPI-4L
 - ◆ Crackseal/Overlay Runway 17-35
 - ◆ Crackseal/Overlay Parallel Taxiway
- ◆ Extend Parallel Taxiway (1,100' x 35'; 30,000 lbs SWG)

TERMINAL AREA

- ◆ Expand Aircraft Parking Apron (32,375 S.Y.)
- ◆ Construct Two 10-Unit T-Hangars (15,840 S.F.)
- ◆ Construct One Common Hangar (3,600 S.F.)
- ◆ Construct Common Hangar Auto Access (900 S.Y.)



LAWRENCE SMITH MEMORIAL AIRPORT

AIRPORT MASTER PLAN UPDATE

Table 7.3 Phase III Development Plan (11-20 Year) Lawrence Smith Memorial Airport			
Project Description	Local/Private Cost	MoDOT/FAA Cost	Total Cost
Property and Easements			
None	\$0	\$0	\$0
Total			\$0
Runways and Taxiways			
Extend Runway 17-35	\$32,555	\$618,539	\$651,094
Extend Parallel Taxiway	\$10,363	\$196,897	\$207,260
Total			\$858,354
Terminal Area			
Expand Aircraft Parking Apron	\$53,425	\$1,025,083	\$1,068,508
*Construct Two 10-Unit T-Hangars	\$753,910	\$0	\$753,910
*Construct One Common Hangar	\$87,900	\$0	\$87,900
*Construct Common Hangar Auto Access	\$37,157	\$0	\$37,157
Total			\$1,947,475
Subtotal Project Costs		\$975,310	\$1,830,519
Engineering, Administrative and Legal Costs		\$243,828	\$457,630
Total Phase I Project Costs		\$1,219,138	\$2,288,148
<p>Note 1: Eligible projects reflect funding at 95% State / 5% Local, unless otherwise noted. Note 2: "*" indicates local/private funding.</p>			

Source: BWR Cost Estimates – February 2004.



LAWRENCE SMITH MEMORIAL AIRPORT

AIRPORT MASTER PLAN UPDATE

Table 7.4 shows the development costs for all three phases of the ultimate airport improvements. These costs are estimated in FY 2003 dollars and are not adjusted to show any sort of inflation over the 20-year phased development period.

Table 7.4			
0-20 Year Development Plan Totals			
Lawrence Smith Memorial Airport			
Phased Development Costs	Local/Private Cost	MoDOT/FAA Cost	Total Cost
Phase I	\$533,892	\$9,478,955	\$10,032,847
Phase II	\$1,787,288	\$2,599,060	\$4,386,348
Phase III	\$975,310	\$1,830,519	\$2,805,829
Subtotal Development Costs	\$3,316,490	\$13,908,534	\$17,225,024
Engineering, Administrative and Legal Costs	\$797,056	\$2,867,860	\$3,664,916
Total Project Costs	\$4,113,546	\$16,776,394	\$20,889,940

Note 1: Eligible projects reflect funding at 95% State / 5% Local, unless otherwise noted.

Source: BWR Cost Estimates – February 2004.



LAWRENCE SMITH MEMORIAL AIRPORT

AIRPORT MASTER PLAN UPDATE

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Chapter Eight

Airport Financing Program



Lawrence Smith
Memorial Airport

Harrisonville, Missouri



8

AIRPORT FINANCING PROGRAM

INTRODUCTION

This chapter focuses on the airport development revenue sources and the relationship between airport revenues and expenditures, and lease structures. The success of the Lawrence Smith Memorial Airport hinges on support from the City of Harrisonville and its local citizens regarding the airport development as it relates to other public works projects. Overall, the financial analysis chapter, in conjunction with the Airport Development Plan, outlines methods to assist the sponsor in phased implementation of the Airport Master Plan program. For the City of Harrisonville, a combination of federal, state, and local funding, with assistance from private sources, would be required over the 20-year planning period to implement the proposed airport development program.

This chapter is organized in the following manner:

- Funding Sources and Options
- Projected Airport Revenue and Expenditures

FUNDING SOURCES AND OPTIONS

The Lawrence Smith Memorial Airport is listed in the FAA National Plan of Integrated Airport Systems (NPIAS) and included in the Missouri State Aeronautical Facility Plan, which qualifies it for federal and state airport funding. The current system of federal airport funds is distributed by formula and discretion in accordance with provisions contained in the *Airport and Airway Improvement Act of 1982*, as amended. In Missouri, airport entitlement and discretion grants for general aviation airports are administered through the MoDOT, Aviation Section, as part of the State Block Grant Program.

FEDERAL AVIATION ADMINISTRATION (FAA) FUNDING

The *Airport Improvement Program (AIP)* provides federal planning and development grants to public-use airports included in the NPIAS. The *Airport and Airway Trust Fund* is the source of AIP funds which are collected through aviation user-generated taxes (airline passenger tax, aircraft parts and fuel), and appropriated by Congress for eligible airport construction and improvement projects (none of the AIP money originates from general tax dollars). FAA Order



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5100.38A, *Airport Improvement Program (AIP) Handbook*, provides guidance and describes policies and administrative procedures for funding AIP projects. The AIP is authorized at \$3.4 billion for fiscal year (FY) 2004 and increases to \$4.0 billion by the year FY2007 however, it remains susceptible to changes in annual appropriation resulting from legislative initiatives.

General Aviation Entitlement Funds: As mentioned previously, the Lawrence Smith Memorial Airport is listed in the FAA's NPIAS, and is eligible to receive entitlement funds as authorized under the *Vision 100 – Century of Aviation Reauthorization Act*. The maximum entitlement level is \$150,000 per year through FY2007, as dependent on the total allotted AIP funding level as annually established by Congress. The entitlement funds can be dedicated for AIP-eligible projects per MoDOT approval.

STATE OF MISSOURI FUNDING AND PROGRAMMING

The MoDOT, Aviation Section administers federal and multiple state-local programs for funding airport planning, construction and maintenance projects. The following is a description of each MoDOT, Aviation Section funding program:

State Block Grant Program (SBGP): In Missouri, airport entitlement and discretion grants for general aviation airports are administered through the MoDOT, Aviation Section, as part of the State Block Grant Program (SBGP). Under this program, Airport Improvement Program (AIP) funds are distributed to the State of Missouri in accordance with FAA provisions. A priority system is used to distribute funds in accordance with the degree of need. The AIP funds for eligible airport development projects are currently funded at 90% federal and 10% local. However, eligible airport projects that are funded in FY2005 and beyond will be funded at 95% federal and 5% local.

Additionally, under previous State and federal funding programs, revenue-producing projects were not eligible for funding. These projects typically included the purchase, construction, remodeling, installation, or relocation of: fuel tanks, fuel pumps, hangars, terminal building, flight training facilities, auto parking, and other revenue-producing facilities. Under the *Vision 100*, these previously ineligible projects are now eligible for State and federal funding. However, before these types of projects can become appropriated for State and federal participation, the airport sponsor must first have satisfied all safety and/or maintenance deficiencies, including those noted on the State inspection form (FAA 5010).

MoDOT Capital Improvement Program (CIP): This program assists eligible sponsors in the planning, purchase, construction or improvement of public use airports. Funding comes from the state aviation trust fund through a portion of the sales tax on jet fuel sold



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in the state. Grant funds are issued on a cost sharing grant basis, which is currently funded at 90% state and 10% local. The program is open to all publicly owned airports and privately owned airports that are designated by the FAA as reliever airports.

MoDOT Airport Maintenance Program: This program assists sponsors with the maintenance and restoration of airfield pavements and repairs to visual navigation and landing aid systems. Funding comes from the state aviation trust fund through a 9 cent per gallon tax on aviation gasoline. Grant funds are issued on a cost sharing grant basis, which is 90% state and 10% local. The program is open to all publicly owned airports and privately owned airports that are designated by the FAA as reliever airports.

Safety Program: This program assists eligible sponsors by providing turf runway markers, segmented circle markers, and taxiway reflectors. Funding for this program comes from the state aviation trust fund and there is no local match for the items. Turf runway and segmented circle markers are located and installed by aviation section personnel. Taxiway reflectors are provided and located by aviation section personnel, but are installed by local forces.

MoDOT STAR Lending Program: The State Transportation Revolving Loan Program provides low interest loans to publicly owned airports for airport improvement projects that are not eligible under AIP funding. These loans can be used for revenue producing projects such as T-hangars and fuel facilities.

Contact the MoDOT, Aviation Section for further information regarding individual funding programs and program applications.

LOCAL FUNDING

The local funding requirement for appropriated airport projects varies between 5% and 10% of the total project cost, depending on how the project is allocated (State or federal). On the other hand, local funding may be used for non-appropriated airport projects at 100%. In many cases, airport sponsors acquire needed improvement funds from various types of locally imposed taxes, which include personal property and sales taxes. In the past, local property tax has been a popular method for funding airport projects, which is determined by the rate against the assessed value of various types of property (including some types of aircraft).



PRIVATE FINANCING

When State or federal funding is not available, general aviation airports must often rely on private sector financing for less intensive capital improvements and airfield projects. This type of funding has traditionally been used to construct hangar facilities, terminal buildings, install pilot equipment, and, in some instances, support the costs associated with runway and taxiway maintenance and repair projects. Bank loans are considered short-term financing and are typically used for hangar development and less intensive terminal area improvements. Build-and-lease-back agreements can be used for hangar development either as pledge-revenues to support bond issues, or against mortgages on facilities constructed for a particular tenant.

For individual T-hangar development, some airports have allowed a “condominium style” ownership agreement for aircraft storage space. The ownership fee (mortgage) is paid up front and is normally priced to cover only the construction costs of each individual hangar space. This arrangement allows the individual to purchase space to store their aircraft for a 10 to 20-year period at a reasonable price. Then, at the expiration of the specified agreement, the hangars will become the property of the airport sponsor. The advantage to this arrangement allows the aircraft owner to purchase space for a number of years with the guarantee that monthly hangar rates will not increase over the life of the agreement.

OTHER AVIATION RELATED SOURCES

Additional revenue sources or financial assistance have been employed, or are potential sources for less intensive airport capital improvement projects. These funds are sometimes generated through public agencies in the form of donations, grants, leases or other means:

- Regional funds
- County aircraft tax
- Non-profit authorizations
- Industrial revenue bonds
- Sale of land for industrial purposes
- Residence lease/rental
- Business license tax
- Display rental
- Investment of residual funds



PROJECTED AIRPORT REVENUE AND EXPENDITURES

The goal of any airport should be financial independence to provide funds for general upkeep and maintenance through the application of reasonable airport lease and rental rates. This self-sufficiency provides the necessary funds for facility maintenance and certain capital development projects which are important to meeting demand levels, but may not be eligible for federal or State project grants. Although self-sufficiency is difficult to attain for many general aviation airports, the application of fair and reasonable lease and rental rates will aid the airport in gaining a more positive position in the community.

As the airport sponsor, the City of Harrisonville is responsible for the day-to-day management of the Lawrence Smith Memorial Airport. Airport duties are accomplished through a city-employed airport manager. The City's responsibilities include establishing the airport lease rates, setting fuel prices, and maintaining and operating the Airport in a safe and efficient manner. The City also has the responsibility for maintaining the airport fund through the collection of revenues and supplementing the expenditures incurred for the operation of the Airport.

AIRPORT OPERATING REVENUE

Table 8.1 details the financial status for the Lawrence Smith Memorial Airport since 2001. The City of Harrisonville utilizes a dedicated Airport Fund to operate the Lawrence Smith Memorial Airport. Over the past four years, the Airport averaged \$105,951 in *Operating Revenues* versus an average of \$104,858 in *Operating Expenses* which gives a *Net Operating Income* of \$1,093. The amortization for the hangar construction was separated to illustrate the vivid affect on annual incomes for the Airport. When the hangar amortization is included in the airport operating expenses, the *Total Operating Income* decreases to (-)\$51,010 over the four year period. The table illustrates that operating losses are not unusual at general aviation airports such as the Lawrence Smith Memorial Airport. Expenses associated with large capital improvement projects, such as hangars, can have a dramatic affect on airport revenues. Typically, there are limited revenue producing services available and small changes in operations or leased facilities may significantly impact either revenues or expenses from year to year.

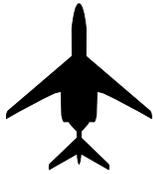


Table 8.1 Airport "Operating" Budget - Net Income (2001-2004) Lawrence Smith Memorial Airport							
Year	Operating Revenues	% Change	Operating Expenses	% Change	Net Operating Income/(Loss)	Hangar Amort.	Total Operating Income/(Loss)
FY 2001	\$69,707	-	\$42,184	-	\$27,524	(\$49,953)	(\$22,429)
FY 2002	\$106,707	0.35%	\$112,373	0.62%	(\$5,526)	(\$49,953)	(\$55,479)
FY 2003	\$120,490	0.11%	\$145,571	0.22%	(\$25,081)	(\$49,953)	(\$75,034)
FY 2004 (Budget)	\$126,760	0.05%	\$119,306	(-)0.22%	\$7,454	(\$53,100)	(\$45,646)
Average (2001-2004)	\$105,951		\$104,858		\$1,093	(\$50,762)	(\$51,010)

Note: All figures are "actual" amounts.

Source: Lawrence Smith Airport Budget Information (2001-2004).

It is expected that major revenue components from future activities at the Lawrence Smith Memorial Airport would be similar to financing sources provided for non-towered general aviation airports. These financing mechanisms include fuel sales, hangar rent, ground lease revenues, operating fees, and other income commission on merchandise sales. The following identifies areas of potential revenue for the Airport in terms of realistic fee structures to help meet operating expenses, as well as enhancing support for the projected capital improvement program.



LEASE AGREEMENTS

Lease agreements are used by airports to make use of those areas which are not specifically required for aeronautical purposes. The primary purpose of these lease agreements is to supplement the income the airport receives to help offset annual airport operating expenses. Property leases range from ground leases for the construction of private hangars¹ on the airport, to agricultural farming leases, to renting general space in the terminal building. The following are available lease areas and suggested leasing rates based on similar role general aviation (GA) airports in the region.

Terminal Building Area – The future recommended terminal/administration building is planned to be approximately 2,590 square feet in size. On average, a terminal building at a GA airport contains approximately 40% leasable space for office space/air taxi activities. For 2003, average rent for office space would be about \$7.20 per square foot annually, including utilities. The following rental rates should be used:

2003	– \$7.20/square foot/year
2008	– \$7.50/square foot/year
2013	– \$8.00/square foot/year
2018	– \$8.50/square foot/year
2023	– \$9.00/square foot/year

Private T-Hangar Ground Lease Areas – Future terminal area development shows the construction of additional T-hangar space for based aircraft. User rates should be lower than City-owned space to encourage private hangar development. The following suggested lease rates assume that a 3,600 square foot hangar is constructed:

2003	– \$0.25/square foot/year
2008	– \$0.30/square foot/year
2013	– \$0.35/square foot/year
2018	– \$0.40/square foot/year
2023	– \$0.45/square foot/year

¹ Most private hangars on airport property include a “reversion clause” in the contract which stipulates the hangar becomes the property of the airport sponsor at the end of the specified agreement period, which is normally 20 years.



LAWRENCE SMITH MEMORIAL AIRPORT

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City-Owned T-Hangars – The number of T-hangars on the Airport is expected to double throughout the planning period. Rental rates for City-owned facilities must be sufficient to cover the majority of amortization and construction costs, assuming an average of 1,200 square feet per hangar. This cost analysis is based on current lease rates on hangars with bi-fold doors, concrete pad and electrical service. The following suggested revenue rates for T-hangars are:

2003 – \$2.33/square foot/year = \$233/month
2008 – \$2.50/square foot/year = \$250/month
2013 – \$2.75/square foot/year = \$275/month
2018 – \$3.00/square foot/year = \$300/month
2023 – \$3.25/square foot/year = \$325/month

City-Owned Conventional Hangars – Any hangars constructed by the City should provide sufficient returns on investment (rents) to fund construction costs. The following suggested hangar rates are:

2003 – \$2.80/square foot/year
2008 – \$3.00/square foot/year
2013 – \$3.50/square foot/year
2018 – \$4.00/square foot/year
2023 – \$4.50/square foot/year

Tie-Downs – With increased apron and tie-down areas planned throughout each phase of the development period, it is anticipated that aircraft tie-down fees for based aircraft could provide significant yearly income. The current tie-down rate of \$30 per month or \$5 per night was used in this analysis and incrementally adjusts as follows:

Based Aircraft:

2003 – \$30.00/space/month
2008 – \$35.00/space/month
2013 – \$40.00/space/month
2018 – \$45.00/space/month
2023 – \$50.00/space/month

Itinerant Aircraft:

2003 – \$ 5.00/night
2008 – \$ 6.00/night
2013 – \$ 7.00/night
2018 – \$8.00/night
2023 – \$9.00/night

Concessions and Miscellaneous – There are other sources of income that would likely be applicable to the Airport including royalties from vending machines, car rental, and pay telephones.



Fuel Sales – Fuel sales have grown significantly over the past few years at the Airport. In the future, if based aircraft increase, additional revenue from fuel sales will be expected. If fuel costs remain between 70%-80% of fuel revenues, then revenue from fuel sales will likely increase as a result of the growth in based aircraft and operations.

OPERATING EXPENSES

For the most part, operating expenses at general aviation airports fall into four main categories: administration, maintenance, utilities, and supplies and miscellaneous. Normally, the number of based aircraft at an airport and level of activity is a rough indicator of levels of operating expenses; that is, as the numbers of based aircraft increase, operating expenses increase at relatively the same proportion.

Administration – Administrative costs include items such as employee salaries, benefits, liability insurance, dues, etc. Normally, administrative costs range from 30 to 35 percent of the total operating expense. During the past four years, these costs have averaged approximately 39 percent of the overall operating expense for the Lawrence Smith Memorial Airport.

Maintenance – General maintenance costs include the day-to-day upkeep of the airfield and terminal area facilities. These costs include runway and apron crack sealing, mowing, snow removal, solid waste disposal, and repairs to all airport-owned equipment and facilities. Maintenance costs usually account for 35 to 40 percent of the total operating expense. These maintenance costs have averaged about 39 percent over the past four years.

Utilities – Electricity for airfield lighting -- runway and taxiway lights, the rotating beacon, terminal building requirements, etc. -- account for the primary utility expense at the Airport. Other utilities for the terminal building include gas, sewage treatment, water, and phones. Utilities to privately-owned buildings are normally paid by the tenants. Typically, utilities account for 15 to 20 percent of the operating expense; however, at Lawrence Smith Memorial Airport, they have averaged only 11 percent over the past four years.

Supplies and Miscellaneous – This general category includes those items and commodities required for the day-to-day operation of an airport. These include office supplies, solvents, equipment, postage, etc. At general aviation airports, these costs are normally about 11 percent of other operating expenses, which is right where they have been (11%) for Harrisonville over the past four years.



LAWRENCE SMITH MEMORIAL AIRPORT

AIRPORT MASTER PLAN UPDATE

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Chapter Nine

Airport Plans



Lawrence Smith
Memorial Airport

Harrisonville, Missouri



9

AIRPORT PLANS

AIRPORT PLANS

A set of *Airport Layout Plan* (ALP) drawings has been prepared for the Lawrence Smith Memorial Airport, which graphically depict the proposed facilities for the Airport through the 20-year planning program. The set includes:

Airport Layout Drawing (ALD) – This is a scaled single-page drawing illustrating existing and phased airport development based on the proposed alternative approved by the Planning Advisory Committee (PAC). In addition, the ALD displays minimum clearance and separation distances in accordance with current airport design regulations for existing facilities and ultimate airport development. The ALD is the result of a series of discussions with the PAC to determine the desired course of action in an effort to create a safe and cost-effective facility. The proposed improvements include projects needed to meet the projected aviation demands of the airport service area throughout the 20-year planning period.

Airport Airspace Drawing – This includes a graphical depiction of the imaginary airspace surfaces based on FAR Part 77 - *Objects Affecting Navigable Airspace*. This regulation is used as a guideline to determine whether existing or proposed structures represent obstructions or penetrations to the FAR Part 77 imaginary surfaces. Once approved by the FAA, the FAR Part 77 airspace is reserved for aeronautical purposes. Therefore, it is recommended that the controlling government agencies adopt *Height and Hazard* zoning to reflect the updated Airspace Drawing, and to the extent reasonable, restrict and enforce the height of structures and objects of natural growth as appropriate within the airspace boundaries.

Runway Inner Portion of the Approach Surface Drawing – This large-scale drawing shows the plan and profile views of the inner approach surfaces and runway protection zones (RPZs). The plans are designed to identify current and potential structures (roadways, power lines, trees, etc.) in relation to the existing and ultimate runway threshold through determination of the object height (clearance or violation) along the extended runway centerline approach slope. Any violation, or obstruction, is identified with appropriate future mitigation measures.



LAWRENCE SMITH MEMORIAL AIRPORT

AIRPORT MASTER PLAN UPDATE

Airport Terminal Area Drawing – This drawing is divided into two sheets – one depicts the existing terminal area on the east side of the Airport, and the second shows the ultimate terminal area on the west side of the ultimate Runway 17-35. These large-scale drawings show the existing and recommended proposed facilities to meet future terminal area requirements. The primary feature of this plan includes improvements and new development of facilities and equipment. The ultimate planned design for the terminal area is to provide adequate functional layout for aircraft parking, maneuvering, hangar and building development, and other types of airport-related development planned for the Airport.

Airport Land Use Drawing - This single-page drawing identifies on-airport uses as well as land use recommendations for adjacent properties. The objective of the Land Use Drawing is to coordinate uses of airport property that maintain a functional design and are compatible with the airport facility. Airport land use planning is important for the orderly development and efficient use of space. This drawing depicts surrounding land uses, identifies adjacent land users, and shows the location of major utilities (water, sewer, electric lines, etc.) in the vicinity of the airport site. This drawing also shows the crop restriction line that delineates areas that can be used for agricultural uses.

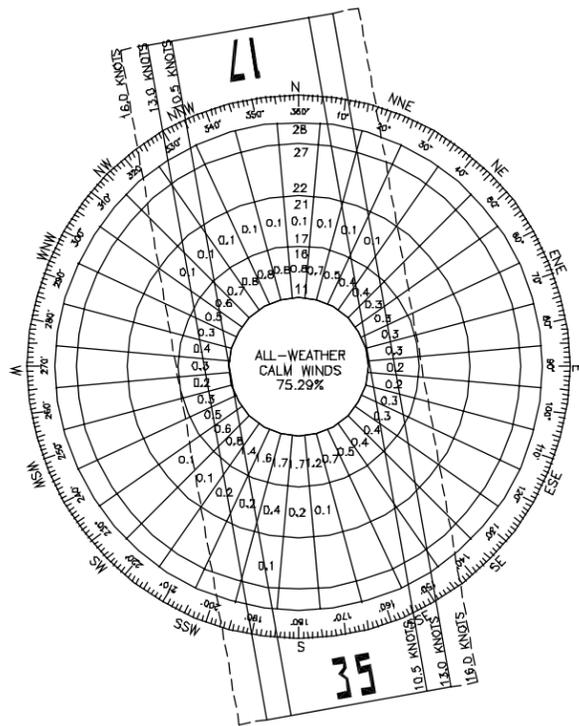
Airport Property Map – This is a single-page drawing that shows all relevant tracts of existing and ultimate airport property, including easement interests. This drawing also includes the size (acres), date (grant agreement), and existing ownership status of existing easement owners and proposed airport property (fee simple) acquisition.

AIRPORT LAYOUT PLAN FOR THE LAWRENCE SMITH MEMORIAL AIRPORT

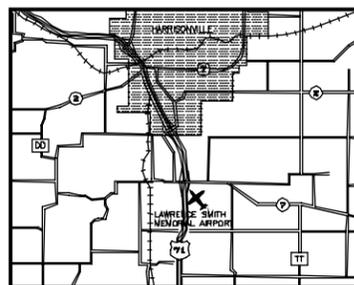
HARRISONVILLE, MISSOURI

INDEX OF DRAWINGS

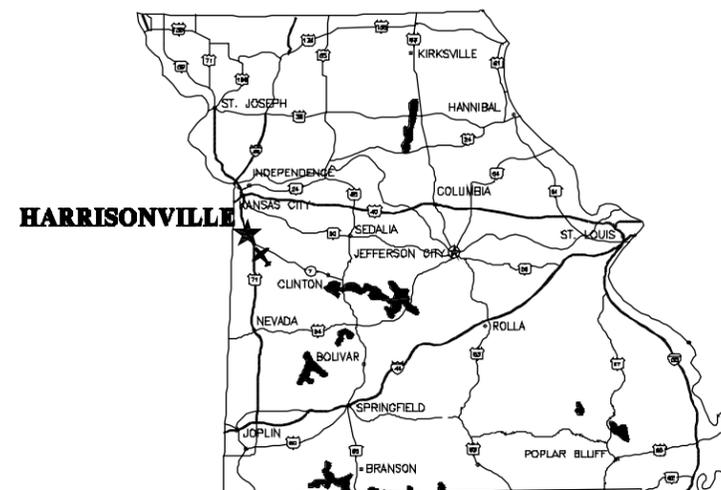
1. TITLE SHEET
2. AIRPORT LAYOUT DRAWING
3. AIRPORT AIRSPACE DRAWING
4. RUNWAY 17 INNER PORTION OF THE APPROACH SURFACE DRAWING - EXISTING/ULTIMATE
5. RUNWAY 35 INNER PORTION OF THE APPROACH SURFACE DRAWING - EXISTING/ULTIMATE
6. RUNWAY CENTERLINE PROFILE DRAWING
7. TERMINAL AREA DRAWING - EXISTING
8. TERMINAL AREA DRAWING - ULTIMATE
9. AIRPORT LAND USE DRAWING
10. AIRPORT PROPERTY MAP



WIND ROSE ANALYSIS		
RUNWAY	WIND VELOCITY	WIND COVERAGE
17-35	10.5 KNOTS (ARC A-I & B-I)	94.06%
17-35	13.0 KNOTS (ARC A-II & B-II)	97.34%
17-35	15.0 KNOTS (ARC A-III TO D-II)	99.53%
SOURCE: RICHARDS-GEBAUR, GRANDVIEW, MO 80,446 OBSERVATIONS (1984-1993)		
CALM WINDS: 0-3 KNOTS = 17.85%		
4-10.5 KNOTS = 57.44%		
0-10.5 KNOTS = 75.29%		



VICINITY MAP



LOCATION MAP

NOT TO SCALE

APPROVAL
This approval does not imply any commitment for Federal or State funding or any approval of future structures requiring notice under FAR Part 77.
This approval is subject to the conditions set forth in our letter of 4/14/05
[Signature] 4/14/05
Administrator of Aviation Date
Missouri Department of Transportation

**HARRISONVILLE, MISSOURI
LAWRENCE SMITH MEMORIAL AIRPORT
TITLE SHEET**

JOB NO. 2003-191	DESIGNED BY: RWC	DATE: 12/10/03	REVISIONS
	DRAWN BY: MFL	DATE: 01/14/04	
SCALE AS SHOWN	CHECKED BY: BCW	DATE: 06/14/05	
SHEET: 1	BUR BUCHER, WILLIS & RATLIFF CORPORATION		
OF 10			

AIRPORT LAYOUT DRAWING

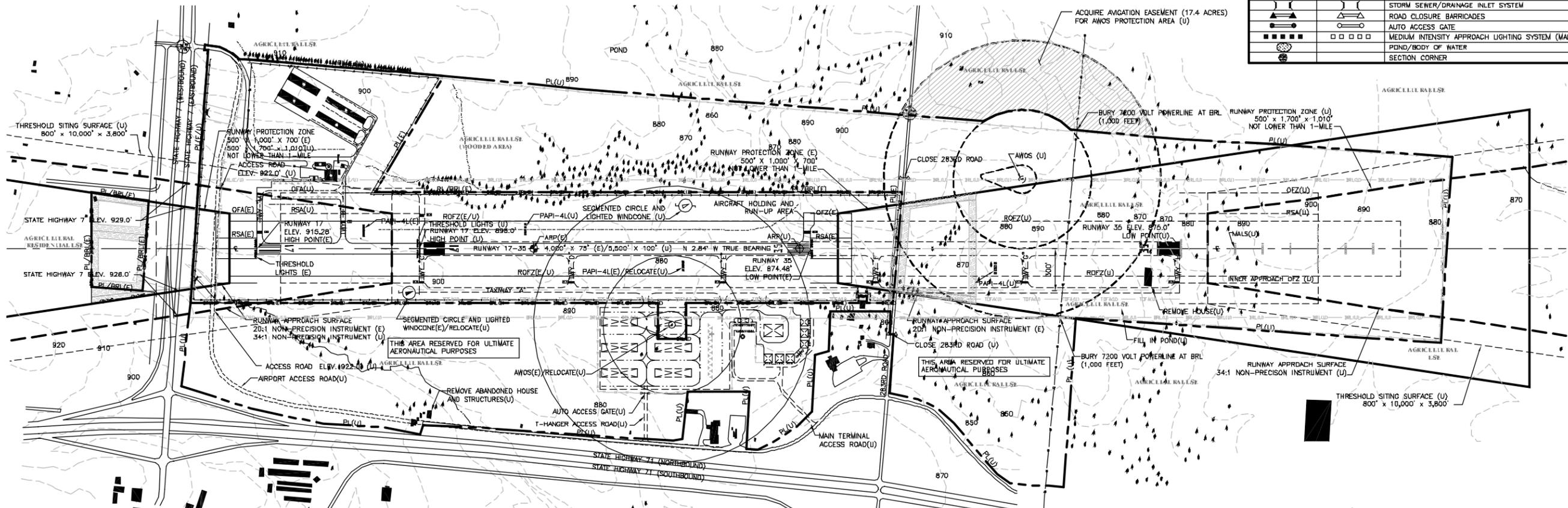
AIRPORT DATA TABLE			
		EXISTING	ULTIMATE
AIRPORT REFERENCE POINT	NORTH LATITUDE	38° 36' 36.7"	38° 36' 17.8"
COORDINATES	WEST LONGITUDE	94° 20' 36.7"	94° 20' 35.5"
MEAN MAXIMUM TEMPERATURE OF HOTTEST MONTH		90.1° F (JULY)	90.1° F (JULY)
AIRPORT ELEVATION - MEAN SEA LEVEL (MSL)		915.3'	898.0' (EST.)
AIRPORT ELECTRONIC NAVIGATIONAL AIDS		VOR/GPS	VOR/GPS
AIRPORT REFERENCE CODE (ARC)/NPIAS ROLE		B-II	C-II

EXISTING AIRPORT REFERENCE POINT (ARP) COORDINATES REFLECT FAA DATA SHEET (11/05/89) IN NORTH AMERICAN DATUM (NAD83). ULTIMATE ARP COORDINATES REFLECT GEO 83A GEODETIC CALCULATION (12/10/03) ON NAD83.

DECLARED DISTANCE TABLE										
	EXISTING					ULTIMATE				
RUNWAY	TORA	TODA	ASDA	LDA		TORA	TODA	ASDA	LDA	
17	4,000'	4,000'	4,000'	4,000'	17	5,500'	5,500'	5,500'	5,500'	
35	4,000'	4,000'	4,000'	4,000'	35	5,500'	5,500'	5,500'	5,500'	

DECLARED DISTANCES DETERMINED IN ACCORDANCE WITH AC 150/5300-13, CHANGE #7. PHYSICAL RUNWAY LENGTH INFORMATION OBTAINED FROM FAA DATA SHEET INFORMATION (11/05/89).

EXISTING	ULTIMATE	LEGEND
		FACILITIES
		BUILDINGS/STRUCTURES
		AIRPORT PROPERTY LINE
		AVIGATION/FPZ EASEMENTS
		BUILDING RESTRICTION LINE (BRL)
		RUNWAY SAFETY AREA (RSA)/OBJECT FREE AREA (OFA)
		RUNWAY PROTECTION ZONE (RPZ)
		RUNWAY OBSTACLE FREE ZONE (ROFZ)
		AIRPORT REFERENCE POINT (ARP)
		ROTATING BEACON
		PRECISION APPROACH PATH INDICATORS (PAPI)
		GUIDANCE/DIRECTIONAL/HOLD POSITION SIGN
		HOLD POSITION MARKING
		WIND CONE & SEGMENTED CIRCLE
		RUNWAY THRESHOLD LIGHTS
		RUNWAY END IDENTIFIER LIGHTS (REIL)
		GROUND CONTOUR (USGS MAP)
		FENCING
		ROAD/HIGHWAY
		CREEK/INTERMITTENT DRAINAGE
		POWERLINES/POLES
		TREES/WOODED AREA
		AUTOMATED WEATHER OBSERVING SYSTEM (AWOS)
		ABOVE GROUND OIL/GAS WELL/PUMP STATION
		STORM SEWER/DRAINAGE INLET SYSTEM
		ROAD CLOSURE BARRICADES
		AUTO ACCESS GATE
		MEDIUM INTENSITY APPROACH LIGHTING SYSTEM (MALS)
		POND/BODY OF WATER
		SECTION CORNER



RUNWAY DATA TABLE			
	EXISTING		ULTIMATE
APPROACH CATEGORY/DESIGN GROUP	B-II		C-II
RUNWAY LENGTH/WIDTH	4,000' X 75'		5,500' X 100'
RUNWAY LIGHTING	MIRL		MIRL
RUNWAY TYPE/MARKINGS	NPI		NPI
EFFECTIVE RUNWAY GRADIENT (%)	1.02%		0.42%
PAVEMENT MATERIAL	ASPHALT		CONCRETE
PAVEMENT STRENGTH (,000 LBS)	12.5 (S)/15.0 (D)		30.0 (S)/60.0 (D)
RUNWAY SAFETY AREA (RSA) LENGTH	4,600'		7,500'
RUNWAY SAFETY AREA (RSA) WIDTH	150'		500'
OBJECT FREE AREA (OFA) LENGTH	4,600'		7,500'
OBJECT FREE AREA (OFA) WIDTH	500'		800'
OBSTACLE FREE ZONE (OFZ) LENGTH	4,400'		5,900'
OBSTACLE FREE ZONE (OFZ) WIDTH	250'		400'
HOLDING POSITION	125'/200'		250'
TAXIWAY WIDTH	35'/20'		35'
TAXIWAY LIGHTING	MARKERS/WITL(RADIUS)		WITL
	17	35	17 35
INSTRUMENT APPROACH AIDS	NONE	VOR/GPS	GPS VOR/GPS
VISUAL APPROACH AIDS	PAPI-4L	PAPI-4L	PAPI-4L MALS
RUNWAY VISIBILITY MINIMUMS	VISUAL	1-MILE	1-MILE
FAR PART-77 APPROACH SLOPE	20:1	20:1	34:1
TOUCHDOWN ZONE ELEVATION (TDZE)	915.3'	899.9'	898.0'

(S)=SINGLE WHEEL GEAR (D)=DUAL WHEEL GEAR
EXISTING RUNWAY END AND TOUCHDOWN ZONE ELEVATIONS (TDZE) REFLECT FAA DATA SHEET INFORMATION (11/05/89). ULTIMATE RUNWAY END AND (TDZE) REFLECT MOST RECENT USGS TOPOGRAPHICAL INFORMATION AND PROPOSED RUNWAY PROFILE.
* FAA/STATE ELIGIBLE RUNWAY

GENERAL NOTES
FAR PART 77 REQUIRES MITIGATION TO OBJECTS (MANMADE OR NATURAL) THAT PENETRATE THE PRIMARY, TRANSITIONAL OR APPROACH SURFACES. PRIOR TO CONSTRUCTION OF RUNWAY 17-35, IT IS RECOMMENDED THAT ALL VIOLATIONS TO THE FAR PART 77 SURFACES AS WELL AS VIOLATIONS TO THE RUNWAY SAFETY AREAS BE REMOVED / RELOCATED / BURIED.

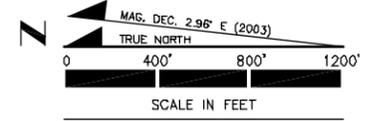
THRESHOLD SITING SURFACE
THERE ARE NO FUTURE THRESHOLD SITING SURFACE (TSS) OBJECTS PENETRATIONS. ALL IDENTIFIED ULTIMATE TSS OBSTRUCTIONS WILL BE REMOVED DURING CONSTRUCTION OF THE ULTIMATE RUNWAY 17-35.

OBSTACLE FREE ZONE (OFZ) OBJECT PENETRATION TABLE
NONE

RUNWAY END COORDINATES			
RUNWAY END	LAT/LONG	EXISTING	ULTIMATE
RUNWAY 17	NORTH LATITUDE	38° 36' 56.47"	38° 36' 44.91"
	WEST LONGITUDE	94° 20' 37.95"	94° 20' 37.22"
RUNWAY 35	NORTH LATITUDE	38° 36' 16.98"	38° 35' 50.61"
	WEST LONGITUDE	94° 20' 35.45"	94° 20' 33.78"

EXISTING RUNWAY END COORDINATES REFLECT FAA DATA SHEET (11/05/89) IN NORTH AMERICAN DATUM (NAD83). ULTIMATE RUNWAY END COORDINATES REFLECT GEO83A GEODETIC CALCULATOR (12/10/03) IN NAD83.

MODIFICATION TO STANDARDS
NONE REQUIRED



HARRISONVILLE, MISSOURI
APPROVAL BLOCK

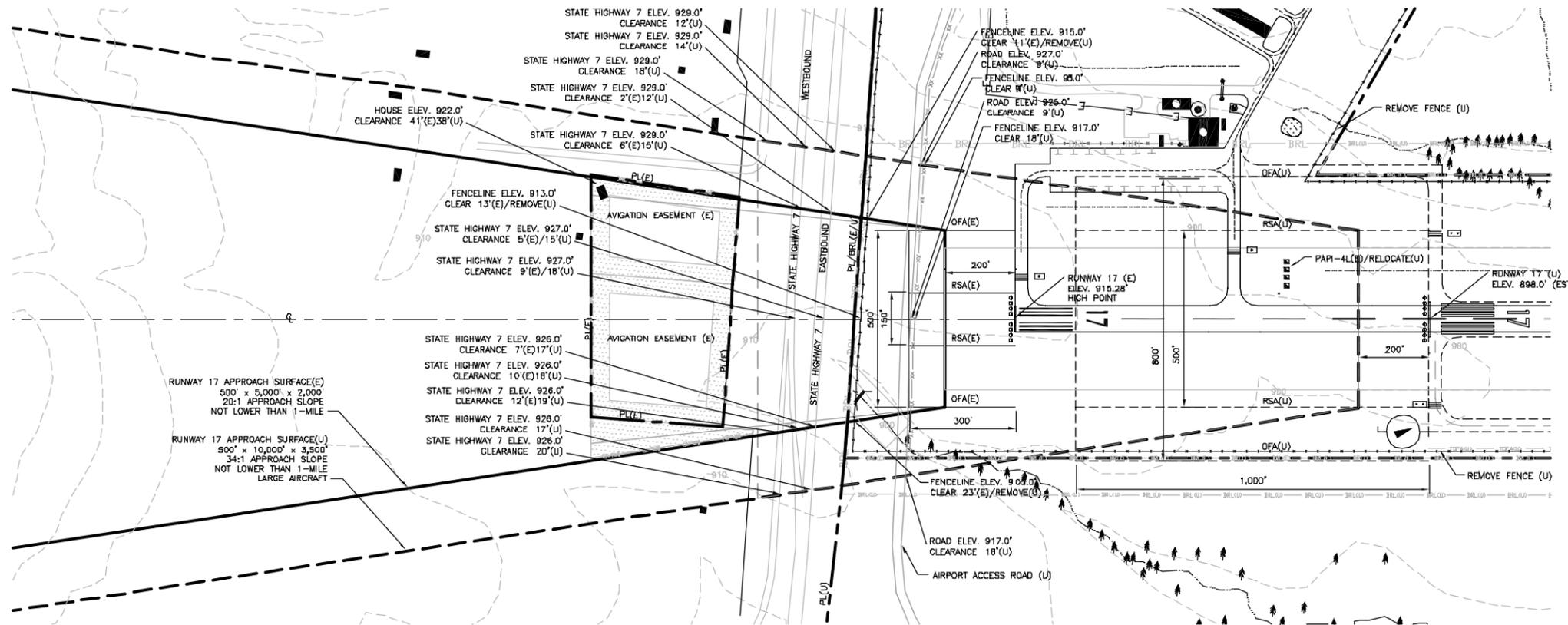
CITY OFFICIAL: *[Signature]*
OFFICIAL TITLE: *Mayor* DATE: 07/9/2005

HARRISONVILLE, MISSOURI
LAWRENCE SMITH MEMORIAL AIRPORT
AIRPORT LAYOUT DRAWING

JOB NO. 2003-191	DESIGNED BY: RWC	DATE: 12/10/03	REVISIONS
DRAWING NO. TWO	DRAWN BY: MFL	DATE: 01/14/04	
SCALE AS SHOWN	CHECKED BY: BCW	DATE: 06/14/05	
SHEET: 2	BUCHER, WILLIS & RATUFF CORPORATION		
OF: 10			

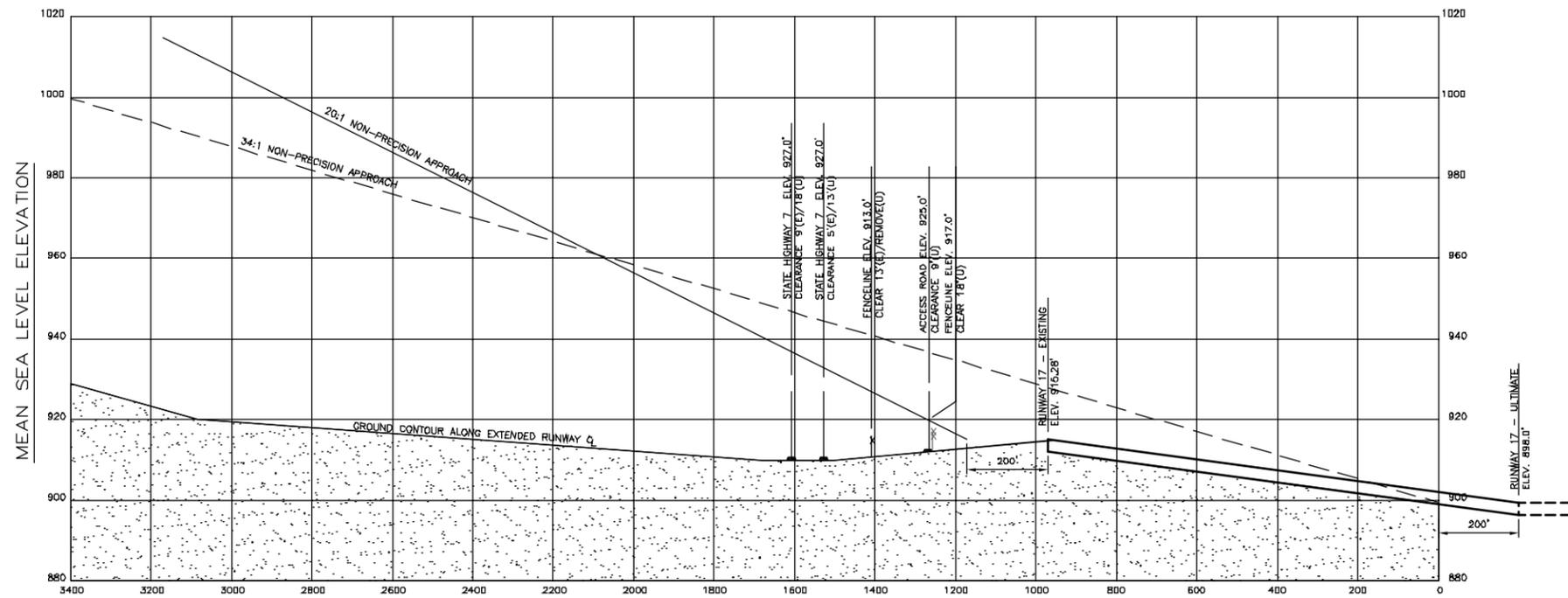
RUNWAY 17 INNER PORTION OF THE APPROACH SURFACE DRAWING - EXISTING/ULTIMATE

RUNWAY 17 - PLAN VIEW



EXISTING	ULTIMATE	LEGEND
[Symbol]	[Symbol]	FACILITIES
[Symbol]	[Symbol]	BUILDINGS/STRUCTURES
[Symbol]	[Symbol]	AIRPORT PROPERTY LINE
[Symbol]	[Symbol]	AVIATION EASEMENTS
[Symbol]	[Symbol]	BUILDING RESTRICTION LINE (BRL)
[Symbol]	[Symbol]	RUNWAY SAFETY AREA (RSA)/OBJECT FREE AREA (OFA)
[Symbol]	[Symbol]	RUNWAY PROTECTION ZONE (RPZ)
[Symbol]	[Symbol]	OBSTACLE FREE ZONE (OFZ)
[Symbol]	[Symbol]	PRECISION APPROACH PATH INDICATORS (PAPI)
[Symbol]	[Symbol]	GUIDANCE/DIRECTIONAL/HOLD POSITION SKIN
[Symbol]	[Symbol]	HOLD POSITION MARKING
[Symbol]	[Symbol]	RUNWAY THRESHOLD LIGHTS
[Symbol]	[Symbol]	RUNWAY END IDENTIFIER LIGHTS (REL)
[Symbol]	[Symbol]	GROUND CONTOUR (USGS MAP)
[Symbol]	[Symbol]	FENCING
[Symbol]	[Symbol]	PAVED/DIRT ROAD
[Symbol]	[Symbol]	CREEK/INTERMITTENT DRAINAGE
[Symbol]	[Symbol]	POWERLINES/POLES
[Symbol]	[Symbol]	STORM SEWER/DRAINAGE INLET SYSTEM
[Symbol]	[Symbol]	AUTO ACCESS GATE
[Symbol]	[Symbol]	MEDIUM INTENSITY APPROACH LIGHTING SYSTEM (MALS)
[Symbol]	[Symbol]	POND/BODY OF WATER

RUNWAY 17 - PROFILE VIEW

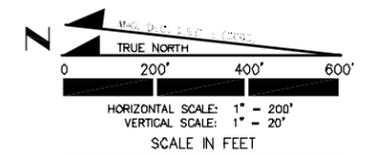


FAR PART 77 OBSTRUCTION TABLE

NO FUTURE OBSTRUCTIONS;
 NO FUTURE OBSTACLE FREE ZONE (OFZ) OBJECT PENETRATIONS;
 NO FUTURE THRESHOLD SITING SURFACE (TSS) OBJECT PENETRATIONS

INNER APPROACH DRAWING NOTES

FAR PART 77 REQUIRES MITIGATION TO OBJECTS (MANMADE OR NATURAL) THAT PENETRATE THE PRIMARY, TRANSITIONAL OR APPROACH SURFACES. PRIOR TO THE EXTENSION OF RUNWAY 17-35, ALL EARTHWORK, CLEARING, AND GRUBBING TO INCLUDE THE REMOVAL/RELOCATION/BURIAL OF ALL OBJECTS THAT PENETRATE THE FAR PART 77 SURFACES AND RUNWAY SAFETY AREAS WILL BE ACCOMPLISHED.

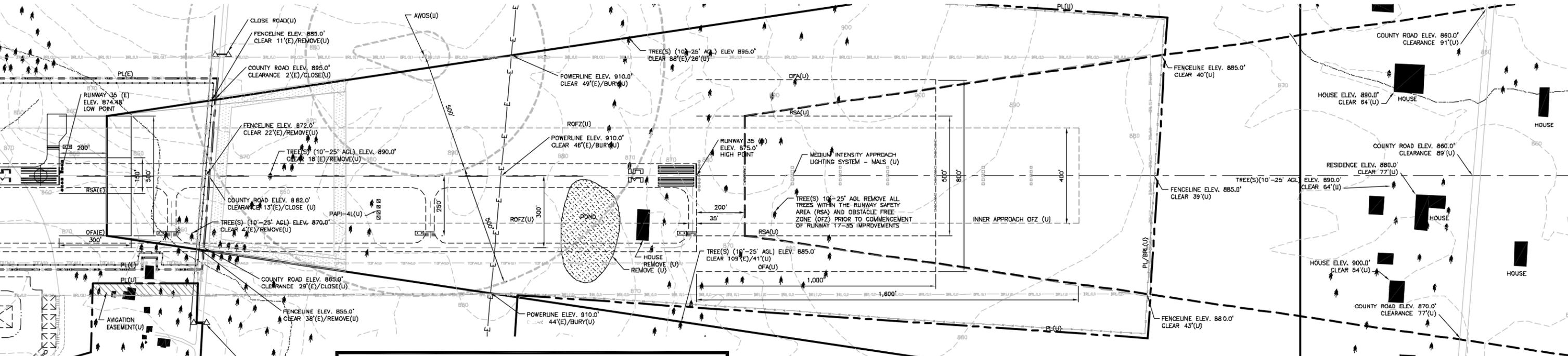


HARRISONVILLE, MISSOURI LAWRENCE SMITH MEMORIAL AIRPORT RUNWAY 17 INNER PORTION OF THE APPROACH SURFACE DRAWING - E/U

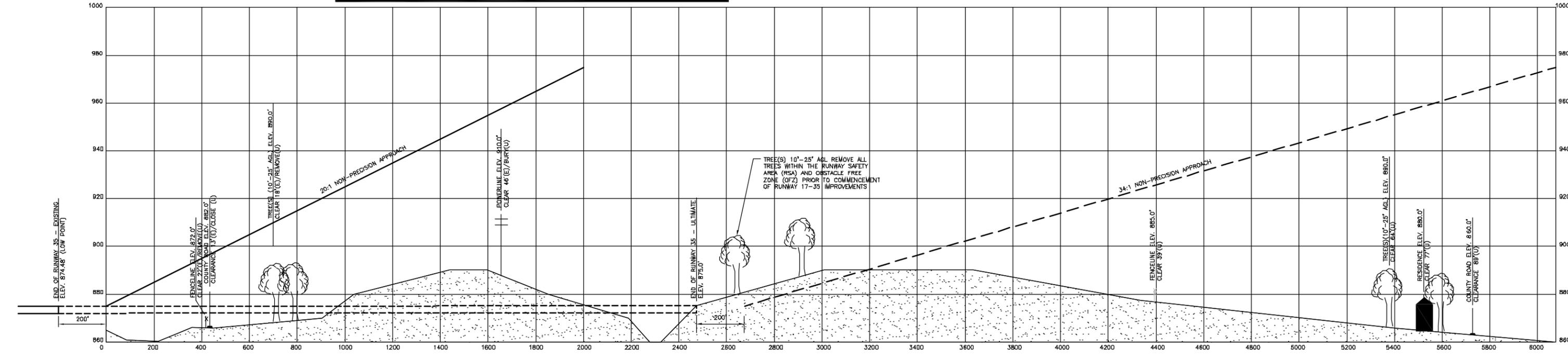
JOB NO. 2003-191	DESIGNED BY: RWC	DATE: 12/10/03	REVISIONS
DRAWING NO. FOUR	DRAWN BY: MFL	DATE: 01/14/04	
SCALE AS SHOWN	CHECKED BY: BCW	DATE: 06/14/05	
SHEET: 4	BUCHER, WILLIS & RATLIFF CORPORATION		
OF 10			

RUNWAY 35 INNER PORTION OF THE APPROACH SURFACE DRAWING - EXISTING/ULTIMATE

RUNWAY 35 - PLAN VIEW



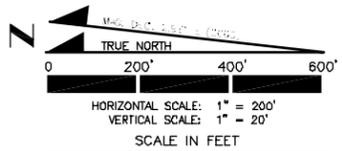
RUNWAY 35 - PROFILE VIEW



EXISTING		ULTIMATE		LEGEND	
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	FACILITIES
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	BUILDINGS/STRUCTURES
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	AIRPORT PROPERTY LINE
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	AVIATION EASEMENTS
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	BUILDING RESTRICTION LINE (BRL)
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	RUNWAY SAFETY AREA (RSA)/OBJECT FREE AREA (OFA)
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	RUNWAY PROTECTION ZONE (RPZ)
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	OBSTACLE FREE ZONE (OFZ)
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	PRECISION APPROACH PATH INDICATORS (PAPI)
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	RUNWAY THRESHOLD LIGHTS
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	RUNWAY END IDENTIFIER LIGHTS (REIL)
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	GROUND CONTOUR (USCS MAP)
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	FENCING
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	PAVED/DIRT ROAD
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	CREEK/INTERMITTENT DRAINAGE
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	POWERLINES/POLES
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	ROAD CLOSURE BARRICADES
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	AUTO ACCESS GATE
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	MEDIUM INTENSITY APPROACH LIGHTING SYSTEM (MALS)
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	POND/BODY OF WATER
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	SECTION CORNER
[Symbol]	[Symbol]	[Symbol]	[Symbol]	[Symbol]	TREE(S)/BRUSH

INNER APPROACH DRAWING NOTES

FAR PART 77 REQUIRES MITIGATION TO OBJECTS (MANMADE OR NATURAL) THAT PENETRATE THE PRIMARY, TRANSITIONAL OR APPROACH SURFACES, PRIOR TO THE EXTENSION OF RUNWAY 17-35. ALL EARTHWORK, CLEARING, AND GRUBBING TO INCLUDE THE REMOVAL/RELOCATION/BURIAL OF ALL OBJECTS THAT PENETRATE THE FAR PART 77 SURFACES AND RUNWAY SAFETY AREAS WILL BE ACCOMPLISHED.

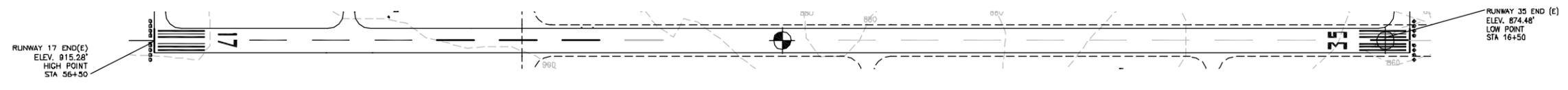


HARRISONVILLE, MISSOURI
 LAWRENCE SMITH MEMORIAL AIRPORT
RUNWAY 35 INNER PORTION
OF THE APPROACH SURFACE
DRAWING - E/U

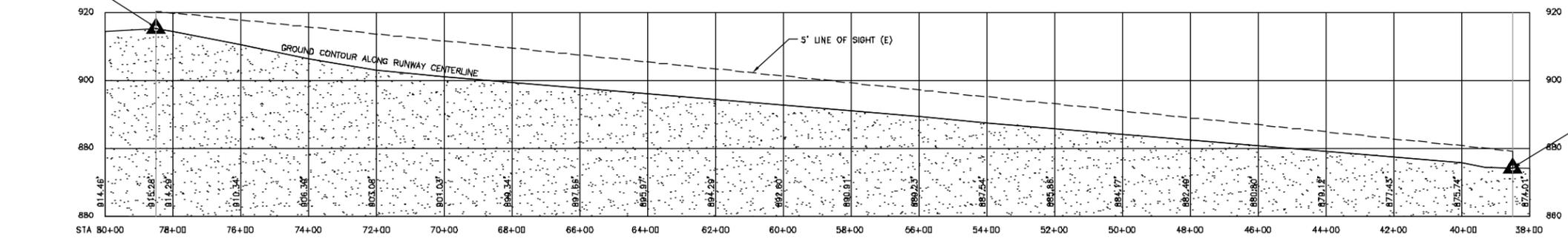
JOB NO. 2003-191	DESIGNED BY: RWC	DATE: 12/10/03	REVISIONS
DRAWING NO. FIVE	DRAWN BY: MFL	DATE: 01/14/04	
SCALE AS SHOWN	CHECKED BY: BCW	DATE: 06/14/05	
SHEET: 5	BUCHER, WILLIS & RATLIFF CORPORATION		
OF 10			

RUNWAY CENTERLINE PROFILE DRAWING- EXISTING/ULTIMATE

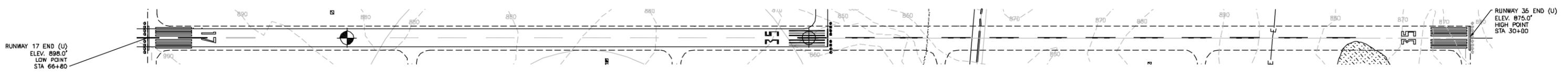
RUNWAY 17-35 PLAN VIEW - EXISTING



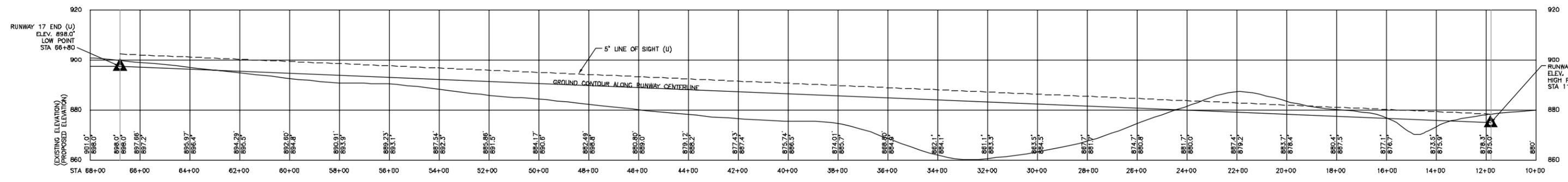
RUNWAY 17-35 PROFILE VIEW - EXISTING



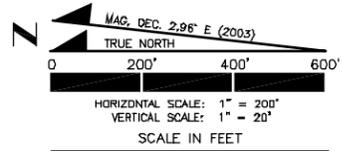
RUNWAY 17-35 PLAN VIEW - ULTIMATE



RUNWAY 17-35 PROFILE VIEW - ULTIMATE



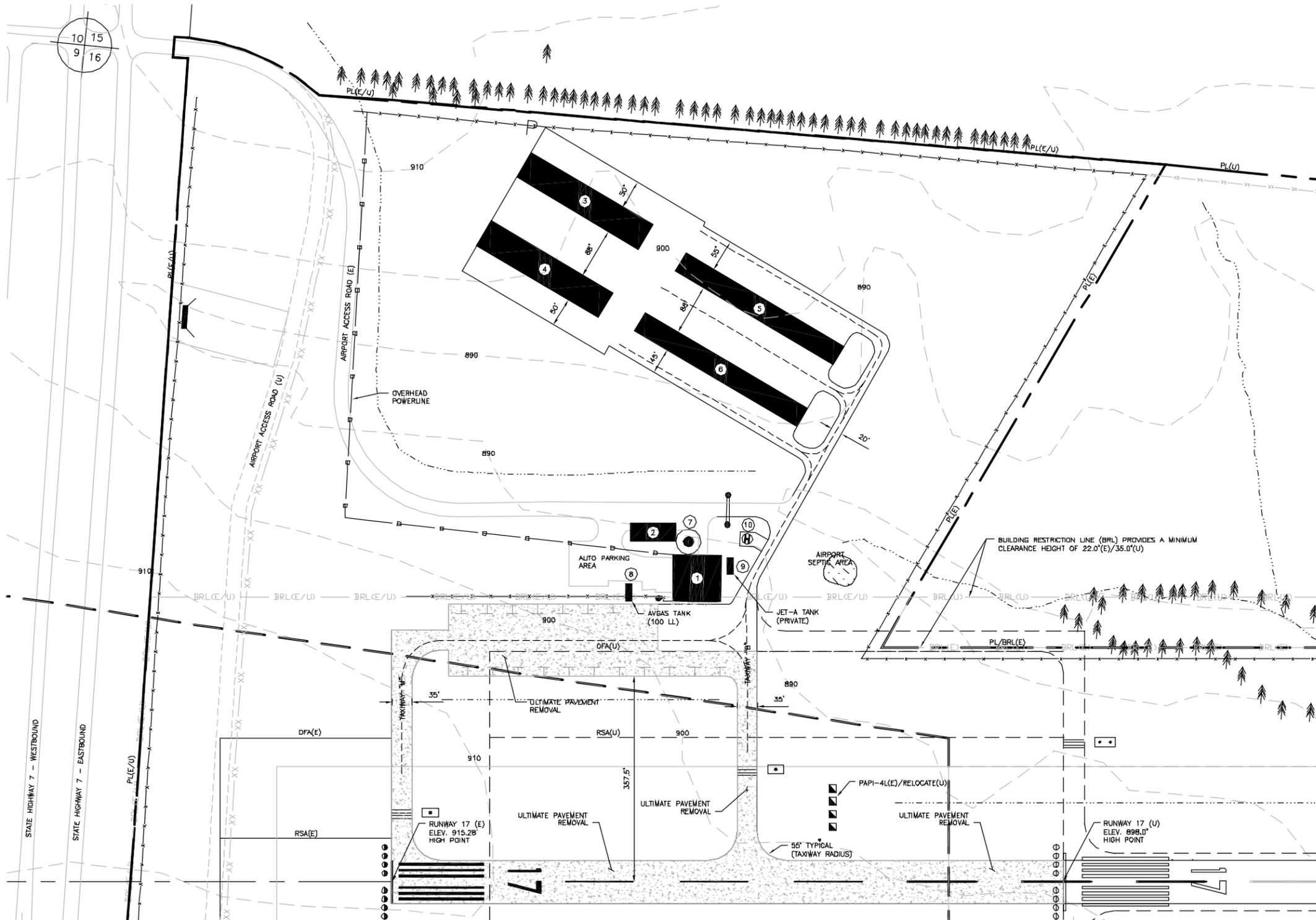
EXISTING		ULTIMATE		LEGEND	
	FACILITIES		GROUND CONTOUR (USGS MAP)		BUILDINGS/STRUCTURES
	AIRPORT PROPERTY LINE		FENCING		PAVED/DIRT ROAD
	AVIATION EASEMENTS		PAVED/DIRT ROAD		CREEK/INTERMITTENT DRAINAGE
	BUILDING RESTRICTION LINE (BRL)		POWERLINES/POLES		ROAD CLOSURE BARRICADES
	RUNWAY SAFETY AREA (RSA)/OBJECT FREE AREA (OFA)		AUTO ACCESS GATE		MEDIUM INTENSITY APPROACH LIGHTING SYSTEM (MALS)
	RUNWAY PROTECTION ZONE (RPZ)		POND/BODY OF WATER		SECTION CORNER
	OBSTACLE FREE ZONE (OFZ)		TREE(S)/BRUSH		
	PRECISION APPROACH PATH INDICATORS (PAPI)				
	RUNWAY THRESHOLD LIGHTS				
	RUNWAY END IDENTIFIER LIGHTS (REIL)				



HARRISONVILLE, MISSOURI
LAWRENCE SMITH MEMORIAL AIRPORT
RUNWAY CENTERLINE
PROFILE DRAWING-E/U

JOB NO. 2003191.06	DESIGNED BY: RWC	DATE: 12/10/03	REVISIONS
DRAWING NO. SIX	DRAWN BY: MFL	DATE: 01/14/04	
SCALE AS SHOWN	CHECKED BY: BCW	DATE: 06/14/05	
SHEET: 6	BUCHER, WILLIS & RATLIFF CORPORATION		
OF 10			

AIRPORT TERMINAL AREA DRAWING - EXISTING

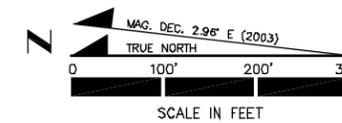


BUILDINGS AND FACILITIES			
EXISTING			
NO.	DESCRIPTION	TOP ELEVATION	DIMENSION
1	AIRPORT OFFICE/HANGAR	920'	80' x 85'
2	LIFEFLIGHT EAGLE OFFICE	902'	80' x 32'
3	T-HANGAR (A)	918'	232' x 50'
4	T-HANGAR (B)	918'	121' x 50'
5	T-HANGAR (C)	921'	327' x 35'
6	T-HANGAR (D)	921'	111' x 35'
7	AIRPORT BEACON	925'	N/A
8	FUEL STORAGE (100LL TANK & PUMP)	900'	6' x 10'
9	FUEL STORAGE (JET A TANK & PUMP)	898'	8' x 10'
11	LIFEFLIGHT EAGLE HELIPAD	N/A	25' x 25'

TERMINAL AREA DESIGN/ SEPARATION CRITERIA		
ITEM	AIRPLANE DESIGN GROUP	
	I	II
TAXIWAY WIDTH	25'	35'
TAXIWAY CENTERLINE TO: PARALLEL TAXIWAY/TAXILANE CENTERLINE	69'	105'
FIXED OR MOVABLE OBJECT	44.5'	65.5'
TAXILANE CENTERLINE TO: PARALLEL TAXILANE CENTERLINE	64'	97'
FIXED OR MOVABLE OBJECT	39.5'	57.5'
TAXIWAY SAFETY AREA WIDTH	49'	79'
TAXIWAY OBJECT FREE AREA WIDTH	89'	131'
TAXILANE OBJECT FREE AREA WIDTH	79'	115'

BASED ON FAA ADVISORY CIRCULAR 150/5300-13, CHANGE #7

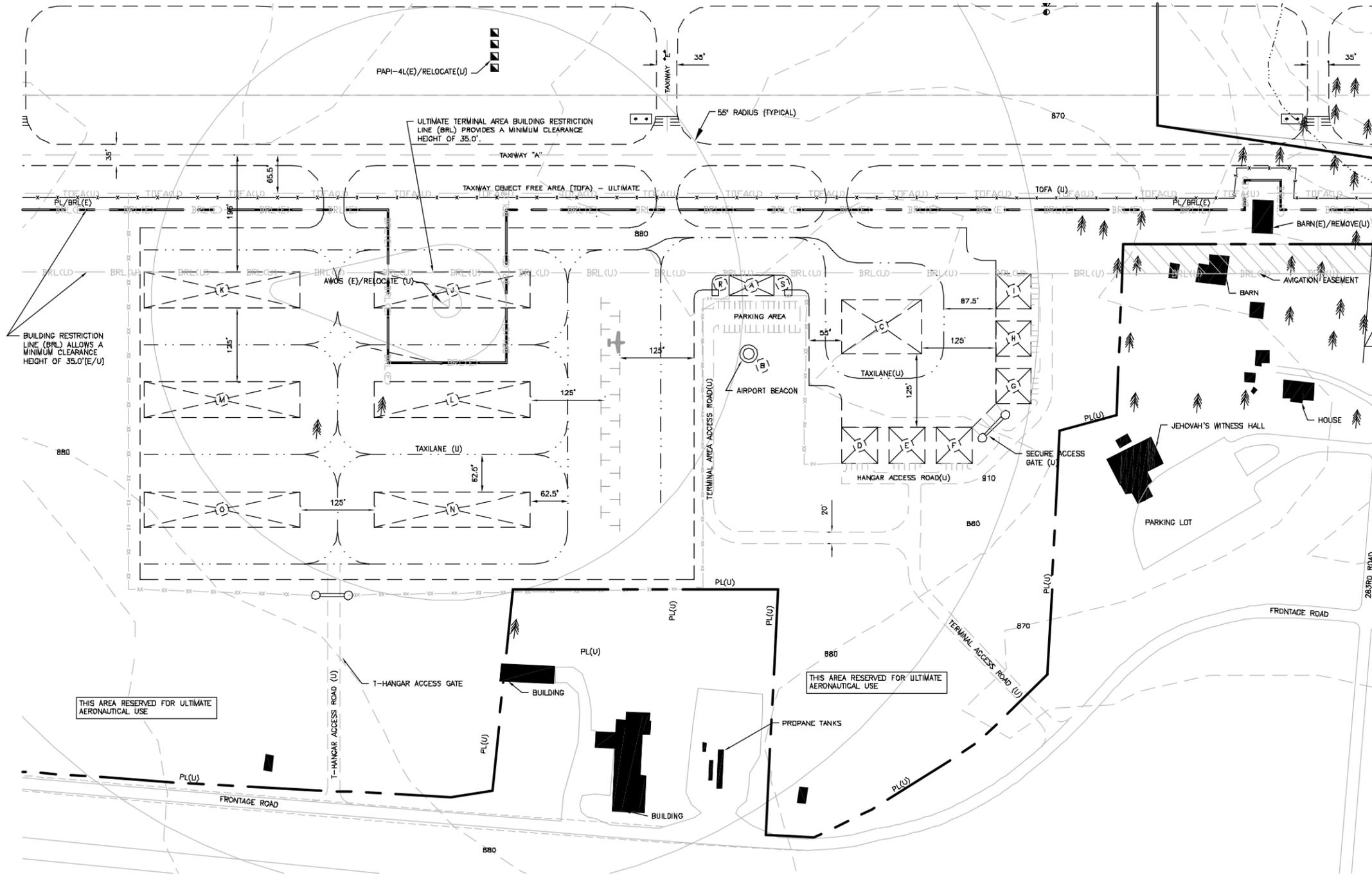
LEGEND		
EXISTING	ULTIMATE	FACILITIES
[Symbol]	[Symbol]	BUILDINGS/STRUCTURES
[Symbol]	[Symbol]	AVIATION EASEMENTS
[Symbol]	[Symbol]	AIRPORT PROPERTY LINE
[Symbol]	[Symbol]	BUILDING RESTRICTION LINE (BRL)
[Symbol]	[Symbol]	FENCING
[Symbol]	[Symbol]	TAXIWAY OBJECT FREE AREA (TOFA)
[Symbol]	[Symbol]	GROUND CONTOUR (USGS MAP)
[Symbol]	[Symbol]	CREEK/INTERMITTENT DRAINAGE
[Symbol]	[Symbol]	PAVED/DIRT ROAD
[Symbol]	[Symbol]	POWERLINES/POLES
[Symbol]	[Symbol]	GUIDANCE/DIRECTIONAL/HOLD POSITION SIGN
[Symbol]	[Symbol]	HOLD POSITION MARKING
[Symbol]	[Symbol]	AUTO ACCESS GATE
[Symbol]	[Symbol]	ABOVE GROUND OIL/GAS WELL/PUMP STATION
[Symbol]	[Symbol]	STORM SEWER/DRAINAGE INLET SYSTEM
[Symbol]	[Symbol]	AIRCRAFT TIE-DOWN
[Symbol]	[Symbol]	TREES/WOODED AREA
[Symbol]	[Symbol]	ROTATING BEACON
[Symbol]	[Symbol]	WIND CONE & SEGMENTED CIRCLE
[Symbol]	[Symbol]	AUTOMATED WEATHER OBSERVATION SYSTEM (AWOS)
[Symbol]	[Symbol]	POND/BODY OF WATER



HARRISONVILLE, MISSOURI LAWRENCE SMITH MEMORIAL AIRPORT AIRPORT TERMINAL AREA DRAWING-EXISTING

JOB NO. 2003-191	DESIGNED BY: RWC	DATE: 12/10/03	REVISIONS
DRAWING NO. SEVEN	DRAWN BY: MFL	DATE: 01/14/04	
SCALE AS SHOWN	CHECKED BY: BCW	DATE: 06/14/05	
SHEET: 7	BUCHER, WILLIS & RATLIFF CORPORATION		
OF 10			

AIRPORT TERMINAL AREA DRAWING - ULTIMATE

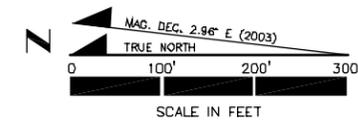


BUILDINGS AND FACILITIES			
ULTIMATE			
NO.	DESCRIPTION	TOP ELEVATION	DIMENSION
1A	TERMINAL BUILDING	896'	75' x 35'
1B	AIRPORT BEACON	915'	
1C	MAINTENANCE HANGAR	910'	135' x 90'
1D	COMMON HANGAR	898'	60' x 60'
1E	COMMON HANGAR	898'	60' x 60'
1F	COMMON HANGAR	898'	60' x 60'
1G	COMMON HANGAR	898'	60' x 60'
1H	COMMON HANGAR	898'	60' x 60'
1I	COMMON HANGAR	898'	60' x 60'
1J	10 UNIT T-HANGAR	896'	264' x 60'
1K	10 UNIT T-HANGAR	896'	264' x 60'
1L	10 UNIT T-HANGAR	896'	264' x 60'
1M	10 UNIT T-HANGAR	896'	264' x 60'
1N	10 UNIT T-HANGAR	896'	264' x 60'
1O	10 UNIT T-HANGAR	896'	264' x 60'
1P	FUEL PUMP (100LL)	885'	N/A
1Q	FUEL PUMP (JET-A)	885'	N/A

TERMINAL AREA DESIGN/ SEPARATION CRITERIA		
ITEM	AIRPLANE DESIGN GROUP	
	I	II
TAXIWAY WIDTH	25'	35'
TAXIWAY CENTERLINE TO: PARALLEL TAXIWAY/TAXILANE CENTERLINE	69'	105'
FIXED OR MOVABLE OBJECT	44.5'	65.5'
TAXILANE CENTERLINE TO: PARALLEL TAXILANE CENTERLINE	64'	97'
FIXED OR MOVABLE OBJECT	39.5'	57.5'
TAXIWAY SAFETY AREA WIDTH	49'	79'
TAXIWAY OBJECT FREE AREA WIDTH	89'	131'
TAXILANE OBJECT FREE AREA WIDTH	79'	115'

BASED ON FAA ADVISORY CIRCULAR 150/5300-13, CHANGE #7

LEGEND		
EXISTING	ULTIMATE	FACILITIES
[Symbol]	[Symbol]	BUILDINGS/STRUCTURES
[Symbol]	[Symbol]	AVIATION EASEMENTS
[Symbol]	[Symbol]	AIRPORT PROPERTY LINE
[Symbol]	[Symbol]	BUILDING RESTRICTION LINE (BRL)
[Symbol]	[Symbol]	FENCING
[Symbol]	[Symbol]	TAXIWAY OBJECT FREE AREA (TOFA)
[Symbol]	[Symbol]	GROUND CONTOUR (USGS MAP)
[Symbol]	[Symbol]	CREEK/INTERMITTENT DRAINAGE
[Symbol]	[Symbol]	PAVED/DIRT ROAD
[Symbol]	[Symbol]	POWERLINES/POLES
[Symbol]	[Symbol]	GUIDANCE/DIRECTIONAL/HOLD POSITION SIGN
[Symbol]	[Symbol]	HOLD POSITION MARKING
[Symbol]	[Symbol]	AUTO ACCESS GATE
[Symbol]	[Symbol]	ABOVE GROUND OIL/GAS WELL/PUMP STATION
[Symbol]	[Symbol]	STORM SEWER/DRAINAGE INLET SYSTEM
[Symbol]	[Symbol]	AIRCRAFT TIE-DOWN
[Symbol]	[Symbol]	TREES/WOODDED AREA
[Symbol]	[Symbol]	ROTATING BEACON
[Symbol]	[Symbol]	WIND CONE & SEGMENTED CIRCLE
[Symbol]	[Symbol]	AUTOMATED WEATHER OBSERVATION SYSTEM (AWOS)
[Symbol]	[Symbol]	POND/BODY OF WATER

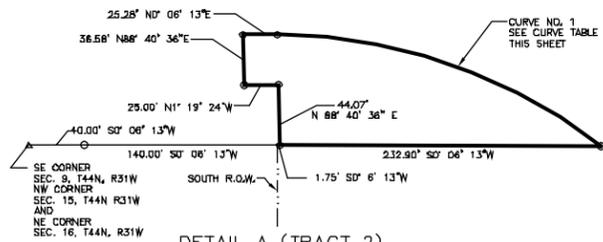


HARRISONVILLE, MISSOURI LAWRENCE SMITH MEMORIAL AIRPORT AIRPORT TERMINAL AREA DRAWING-ULTIMATE

JOB NO. 2003-191	DESIGNED BY: RWC	DATE: 12/10/03	REVISIONS
DRAWING NO. EIGHT	DRAWN BY: MFL	DATE: 01/14/04	
SCALE AS SHOWN	CHECKED BY: BCW	DATE: 06/14/05	
SHEET: 8	BUH BUCHER, WILLIS & RATLUFF CORPORATION		
OF 10			

M:\2003-191\CD\Change 7\JLT 10.dwg Apr 17, 2005 - 3:09pm

AIRPORT PROPERTY MAP



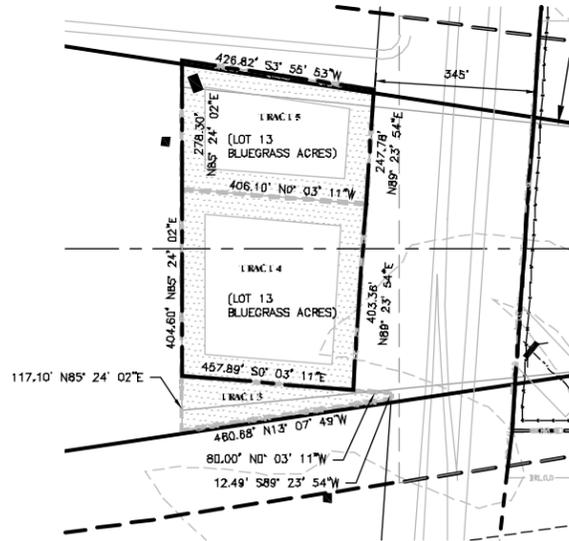
DETAIL A (TRACT 2)
Not to Scale

CURVE TABLE			
NO.	RADIUS	DELTA	ARC
1	384.13'	37° 39' 06"	252.43'

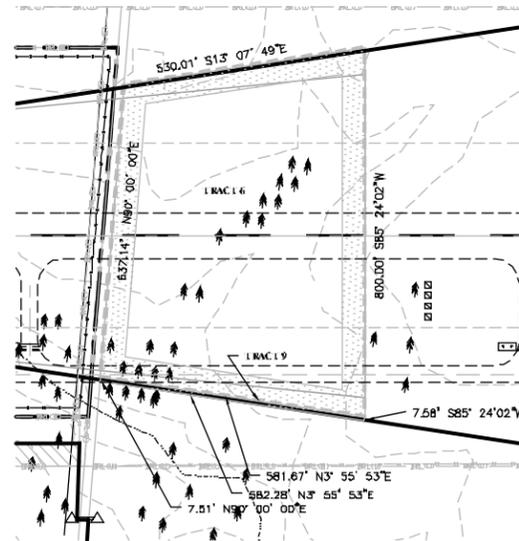
TRACT INFORMATION

TRACT NO. 1
BLANKET EASEMENTS - N 1/2, NE 1/4, SEC. 16
1. ASSOCIATED NATURAL GAS COMPANY
2. OSAGE VALLEY ELECTRIC COOPERATIVE ASSOCIATION
3. UNITED TELEPHONE COMPANY

TRACT NO. 2
BLANKET EASEMENTS - N 1/2, NE 1/4, SEC. 15
1. ASSOCIATED NATURAL GAS COMPANY
2. OSAGE VALLEY ELECTRIC COOPERATIVE ASSOCIATION



DETAIL B (TRACT 3, 4 AND 5)
Scale 1=200'



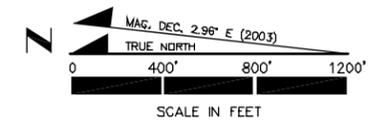
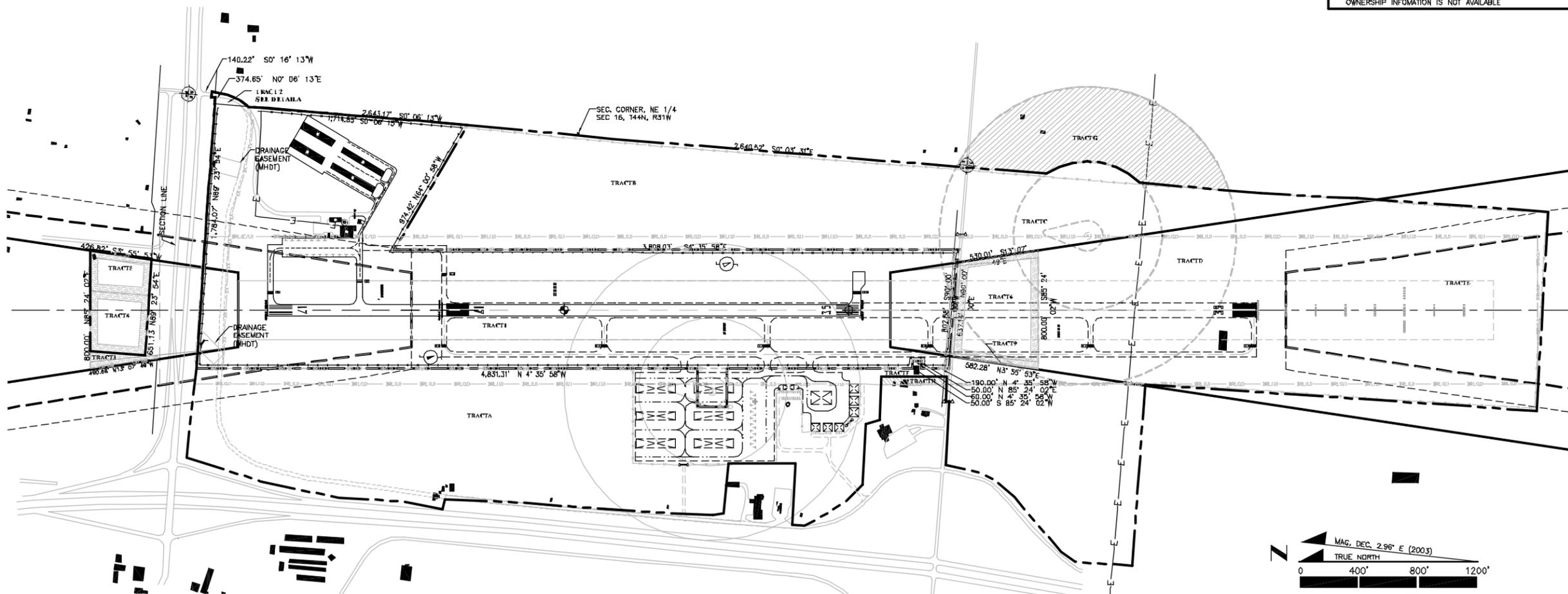
DETAIL C (TRACT 6, 8 AND 9)
Scale 1=200'

DATE TABLE							
EXISTING PROPERTY/EASEMENTS							
TRACT	ACRES	TITLE	PURPOSE	OWNER/GRANTOR/REMARKS	COUNTY RECORD VOL./PAGE	DATE	FUNDING
(1)	125.001	FEE SIMPLE	DONATION	CITY OF HARRISONVILLE	V774, P59	OCT 7, 1982	DONATION
(2)	0.313	FEE SIMPLE	ENTRANCE ROAD	CITY OF HARRISONVILLE	N/A	N/A	3-29-0032-01
(3)	0.678	EASEMENT	RPZ	EVERETT A & LEONA MILBERGER	N/A	1985	N/A
(4)	3.630	FEE SIMPLE	RPZ	CITY OF HARRISONVILLE	V896, P38	APR 17, 1985	N/A
(5)	2.503	FEE SIMPLE	RPZ	CITY OF HARRISONVILLE	V896, P37	APR 29, 1985	N/A
(6)	9.057	EASEMENT	RPZ	J. HAROLD & MILDRED M. SMITH	V896, P37	JAN 18, 1985	N/A
(7)	N/A	N/A	N/A	REMOVED TRACT NO. 7	N/A	JAN 30, 1997	N/A
(8)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
(9)	0.100	EASEMENT	RPZ	J. HAROLD & MILDRED M. SMITH	N/A	1985	N/A
(10)	1.182	FEE SIMPLE	AWOS	CITY OF HARRISONVILLE	N/A	N/A	3-29-2900-02

*91.8 ACRES LAND MATCH CREDIT AS THE PARTIAL LOCAL SHARE FOR BLOCK GRANT IMPROVEMENTS NO AIR 925-1100.
METES AND BOUNDS AND PROPERTY DESCRIPTION INFORMATION OBTAINED FROM "EXHIBIT A" PROPERTY MAP (BWR, 1996).

ULTIMATE PROPERTY/EASEMENTS				
TRACT	ACRES	TITLE	PURPOSE	OWNER(S)
(A)	63.0	FEE SIMPLE	AIRPORT/BRL	N/A
(B)	57.0	FEE SIMPLE	AIRPORT/AWOS	N/A
(C)	58.0	FEE SIMPLE	AIRPORT/BRL	N/A
(D)	48.0	FEE SIMPLE	AIRPORT/BRL	N/A
(E)	40.0	FEE SIMPLE	AIRPORT/BRL	N/A
(F)	1.0	FEE SIMPLE	AIRPORT/BRL	N/A
(G)	17.8	FEE SIMPLE	AIRPORT/BRL	N/A
(H)	0.5	FEE SIMPLE	AIRPORT/BRL	N/A

OWNERSHIP INFORMATION IS NOT AVAILABLE



LEGEND	
	AIRPORT PROPERTY LINE - EXISTING (E)
	AIRPORT PROPERTY TRACT - ULTIMATE (U)
	AIRPORT PROPERTY TRACT - EXISTING (E)
	AVIGATION EASEMENT - EXISTING (E)
	AVIGATION EASEMENT - ULTIMATE (U)

HARRISONVILLE, MISSOURI
LAWRENCE SMITH MEMORIAL AIRPORT
AIRPORT PROPERTY MAP

JOB NO. 2003-191	DESIGNED BY: RWC	DATE: 12/10/03	REVISIONS REMOVE TRACT 7, 1/30/97
DRAWING NO. TEN	DRAWN BY: MFL	DATE: 01/14/04	AIR 925-1100, 8/7/98
SCALE AS SHOWN	CHECKED BY: BCW	DATE: 06/14/05	
SHEET: 10	BUCHER, WILLIS & RATLIFF CORPORATION		
OF 10			

Appendices



Lawrence Smith
Memorial Airport

Harrisonville, Missouri



APPENDICES

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LAWRENCE SMITH MEMORIAL AIRPORT

AIRPORT MASTER PLAN UPDATE

Appendix A

AIRPORT SURVEY QUESTIONNAIRE



LAWRENCE SMITH MEMORIAL AIRPORT

AIRPORT USER/PILOT SURVEY

Dear Airport User / Aircraft Owner:

The City of Harrisonville is preparing an Airport Study to identify improvements to the Lawrence Smith Memorial Airport (LRY). As a based aircraft owner, operator, or business user, you can provide helpful information concerning airport usage, current needs, and long-range improvement priorities. Your comments are appreciated, and can be returned in the enclosed postage-paid, self-addressed envelope. We assure strict confidence in your response!

Thank You,

BUCHER, WILLIS & RATLIFF CORPORATION

Phone: (800) 748-8276: Robert Crain, Airport Planner

Name: _____ Business Name: _____
 Address: _____
 _____ Aircraft Type: _____
 _____ Aircraft Type: _____
 Zip Code: _____ Phone: _____

PILOT & AIRCRAFT ACTIVITY

1. Years you, or your business, have used, or based a plane at the [Lawrence Smith Memorial Airport \(LRY\)](#)?

Used: _____ Based: _____

- If currently based elsewhere, and with the availability of hangars, would you base your plane at LRY? [] Yes [] No

2. Indicate the type *and* percent of your aircraft activity at LRY?

<input type="checkbox"/> Pleasure / Recreational	_____ %	<input type="checkbox"/> Agricultural	_____ %
<input type="checkbox"/> Personal Business	_____ %	<input type="checkbox"/> Flight Training	_____ %
<input type="checkbox"/> Corporate (Part 135)	_____ %	<input type="checkbox"/> Military	_____ %
<input type="checkbox"/> Cargo	_____ %	<input type="checkbox"/> Other: _____	_____ %

3. • Average number of flights conducted at [LRY](#) per month? _____
 • Percent Runway 17 usage? _____ % / Percent Runway 35 usage? _____ %
 • Average number of flight hours per month? _____
 • Average touch & gos at LRY per month? _____
 • Average instrument approaches conducted at LRY per month? _____
 • Average flight distance from [LRY](#)? _____
 • Average number of passengers per flight? _____

4. Projected aircraft use? Rent Keep Aircraft Purchase Larger Aircraft Sell
If "purchase larger aircraft", what type(s)? _____, _____

5. Projected airport activity at ([LRY](#))? Increase Same Decline



AIRPORT PILOT/PASSENGER SERVICES

- 6. Are existing pilot services at LRY adequate [explain below]? [] Yes [] No
7. Are the existing passenger services/accommodations adequate [explain below]? [] Yes [] No

BUSINESS / CORPORATE AIRPORT USE

- 8. Does your company, parent, or affiliated clientele use LRY? [] Yes [] No
Is the size and location of LRY adequate for your business? [] Yes [] No

Projected business-related use of LRY? [] Increase [] Same [] Decline

Business-related destinations _____, _____, _____

AIRPORT FACILITIES

- 9. Rate each facility & equipment in terms of condition, if applicable (5=adequate; 1= inadequate)

Airfield Conditions and Factors

Table with 2 columns of facility names and 2 columns of rating lines. Includes Runway Length, Width, Markings, Taxiway System, Lighting, Airport Traffic Patterns, Airspace, Weather Reporting, Airfield Pavement Strength, Fencing, Edge Lighting, Visual Aids, Visibility, Instrument Procedures, NAVAIDS, and Communications Systems.

Terminal Area Conditions and Factors

Table with 2 columns of facility names and 2 columns of rating lines. Includes Terminal Building Accommodations, Fuel Dispensing, Aircraft Maintenance, Terminal Security, Water Drainage, Apron Tie-Down, Hangar Space, Courtesy/Rental Car, Regulations/Contracts, and Auto Access/Parking.

GENERAL COMMENTS

- 10. Please offer any comments important to you, but not previously addressed:

Thank you for your time!



LAWRENCE SMITH MEMORIAL AIRPORT

Airport User/pilot survey

Dear Business Owner / Airport User:

The City of Harrisonville, Missouri is preparing an Airport Study to identify improvements for the Lawrence Smith Memorial Airport. As a key business, you can provide valuable information on airport usage, needs and improvements as a "direct" or "indirect" user of the airport. Completion of this questionnaire is often by a **business manager** or **corporate flight department**. Please contact John Evans at the Airport or our consultants, Brad Weisenburger / Robert Crain with **Bucher, Willis & Ratliff Corporation**, at (816) 363-2696 if you have any questions regarding the survey. They will be happy to re-direct any survey request and welcome your call if there are any questions. Your response is greatly appreciated. Surveys can be returned in the enclosed postage-paid, self-addressed envelope. This is an opinion survey and only reflects the views of the respondents. **Information received from your business is held in strict confidence!**

Thank You,
The City of Harrisonville

Business Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Telephone: _____ E-Mail: _____

Respondent's Name/Title: _____ / _____

COMMERCIAL PASSENGER USE and ACTIVITY

1. Do you or your company use commercial passenger service from the [Lawrence Smith Memorial Airport](#)? Yes _____ No _____
If "Yes", indicate the number of passengers/tickets you purchase annually and to what destinations?

2. Do you or your company fly from another airport? Yes _____ No _____
If "Yes", specify which airport(s) how often? _____

AIRPORT USE and ACTIVITY

3. Does your company use, operate, or base an aircraft at [Lawrence Smith Memorial](#)? Yes _____ No _____
Does your parent company, or equivalent, use [Lawrence Smith Memorial](#)? Yes _____ No _____
If "Yes", indicate your Company's type of activity at the [Lawrence Smith Memorial Airport](#)?

<input type="checkbox"/> Personal / Executive Business _____%	<input type="checkbox"/> Flight Training / Instruction _____%
<input type="checkbox"/> Aircraft (Passenger) Charter _____%	<input type="checkbox"/> Cargo / Shipping / Parts _____%
<input type="checkbox"/> Aircraft Repair / Service _____%	<input type="checkbox"/> Aerial Surveillance _____%
<input type="checkbox"/> Agricultural / Natural Resources _____%	<input type="checkbox"/> Other: _____%



LAWRENCE SMITH MEMORIAL AIRPORT

Airport User/pilot survey

4. What is your total business aircraft use at the [Lawrence Smith Memorial Airport](#)?
- Total average business related flights at [Lawrence Smith Memorial](#) per month? _____
 - Average number of passengers per flight? _____
 - Average flight distance? _____ miles
 - Frequent destinations:
_____, _____, _____

VISITING INFORMATION

5. Type of business / work:
- | | |
|------------------------------------------------|---------------------------------------------|
| <input type="checkbox"/> Manufacturing | <input type="checkbox"/> Wholesale / Retail |
| <input type="checkbox"/> Services / Consulting | <input type="checkbox"/> Construction |
| <input type="checkbox"/> Real Estate | <input type="checkbox"/> Government |
| <input type="checkbox"/> Energy / Utilities | <input type="checkbox"/> Other: _____ |
- Purpose of visit:
- | | |
|------------------------------------------------------|-------------------------------------------------------|
| <input type="checkbox"/> Executive Visits / Meeting | <input type="checkbox"/> Technical / Inventory Visits |
| <input type="checkbox"/> Business Start-Up | <input type="checkbox"/> Conferences / Seminars |
| <input type="checkbox"/> Customer Contact | <input type="checkbox"/> Client / Marketing |
| <input type="checkbox"/> Part / Supplies / Shipments | <input type="checkbox"/> Other: _____ |
6. Final destination once arriving at [Lawrence Smith Memorial Airport](#):
- [Harrisonville, Missouri](#)
 - [Cass County, KC Metro](#)
 - Other: _____

7. Parent or affiliated company headquarters location(s):
- City: _____, State _____
- City: _____, State _____

8. Projected business-related use of [Lawrence Smith Memorial](#)? Increase Same Decrease

AIRPORT ACCOMMODATIONS

9. Is the location of [Lawrence Smith Memorial](#) adequate for your business? Yes No
10. Are the services at the [Lawrence Smith Memorial Airport](#) adequate for your business? Yes No
11. Would locating / expanding your business at [Lawrence Smith Memorial](#) be an option? Yes No
12. If hangars/facilities were available, would you base an aircraft at [Lawrence Smith Memorial](#)? Yes No
13. Has your business expressed a need for airport improvements? Yes No
- If yes, please specify: _____
- _____
- _____

GENERAL COMMENTS

14. Please offer *any* comments important to you, but not previously addressed:
- _____
- _____
- _____

Thank you for your time!



LAWRENCE SMITH MEMORIAL AIRPORT

AIRPORT MASTER PLAN UPDATE

Appendix B

WIND STATION DATA

WINDROSE

ALL-WEATHER WINDS (OBSERVATIONS)										
Type of Wind Data:	All-Weather			Revision Date:			08/17/05			
Wind Station:	Richards-Gebaur			Period of Record:			1984-1993			
Number of Observations:	56,669			Airport:			Lawrence Smith Memorial Airport			
WindRose	Wind Speed Observations per Wind Speed Category (Knots)									
Direction	0-3	4-6	7-10	11-16	17-21	22-27	28-33	34-40	41+	Total
10	188	361	539	372	49	11	0	0	0	1,520
20	122	249	409	258	53	5	0	0	0	1,096
30	142	312	400	215	38	6	0	0	0	1,113
40	162	373	386	203	21	1	0	0	0	1,146
50	160	338	321	190	16	3	0	0	0	1,028
60	196	390	360	171	8	2	0	0	0	1,127
70	215	384	361	174	6	0	0	0	0	1,140
80	167	333	310	145	11	2	0	0	0	968
90	198	357	343	102	7	1	1	0	0	1,009
100	188	369	374	136	7	1	0	0	0	1,075
110	169	344	361	143	5	1	0	0	0	1,023
120	160	403	454	151	4	0	0	0	0	1,172
130	188	440	485	201	4	0	0	0	0	1,318
140	157	416	501	249	9	0	0	0	0	1,332
150	191	510	574	282	17	1	0	0	0	1,575
160	222	606	766	425	22	2	0	0	0	2,043
170	194	619	941	678	80	8	0	0	0	2,520
180	269	712	1098	944	108	23	1	0	0	3,155
190	264	733	1068	965	217	32	1	0	0	3,280
200	186	556	961	910	126	18	1	0	0	2,758
210	257	472	872	781	113	18	1	0	0	2,514
220	230	426	603	452	69	9	2	0	0	1,791
230	152	329	466	319	33	2	1	1	0	1,303
240	190	379	399	261	19	2	0	0	0	1,250
250	236	349	331	172	12	1	0	0	0	1,101
260	181	270	302	136	12	1	0	0	0	902
270	196	275	273	142	25	5	1	0	0	917
280	199	248	241	201	22	1	0	0	0	912
290	125	252	279	171	17	1	2	0	0	847
300	186	285	348	294	24	2	0	0	0	1,139
310	178	273	471	367	48	3	0	0	0	1,340
320	128	276	405	416	54	1	0	0	0	1,280
330	201	316	540	456	51	1	0	0	0	1,565
340	206	416	545	452	31	0	0	0	0	1,650
350	168	412	586	428	30	1	0	0	0	1,625
360	191	466	629	443	49	3	0	0	0	1,781
Calm	3354	0	0	0	0	0	0	0	0	3,354
Total	10,116	14,249	18,302	12,405	1,417	168	11	1	0	56,669

Calm Wind Observations (0 - 3 knots): 10,116 17.85%
 Light Wind Observations (3 - 10.5 knots): 32,551 57.44%
 Calm and Light Winds (0 - 10.5-knots) 42,667 **75.29%**
 Strong Winds 24.71%

WINDROSE

ALL-WEATHER WINDS (PERCENT OF OBSERVATIONS)										
Type of Wind Data:	All-Weather		Revision Date:		08/17/05					
Wind Station:	Richards-Gebaur		Period of Record:		1984-1993					
Number of Observations:	56,669		Airport:		Lawrence Smith Memorial Airport					
WindRose	Wind Speed Observations per Wind Speed Category (Knots)									
Direction	0-3	4-6	7-10	11-16	17-21	22-27	28-33	34-40	41+	Total
10	0.3	0.6	1.0	0.7	0.1	0.0	0.0	0.0	0.0	2.68%
20	0.2	0.4	0.7	0.5	0.1	0.0	0.0	0.0	0.0	1.93%
30	0.3	0.6	0.7	0.4	0.1	0.0	0.0	0.0	0.0	1.96%
40	0.3	0.7	0.7	0.4	0.0	0.0	0.0	0.0	0.0	2.02%
50	0.3	0.6	0.6	0.3	0.0	0.0	0.0	0.0	0.0	1.81%
60	0.3	0.7	0.6	0.3	0.0	0.0	0.0	0.0	0.0	1.99%
70	0.4	0.7	0.6	0.3	0.0	0.0	0.0	0.0	0.0	2.01%
80	0.3	0.6	0.5	0.3	0.0	0.0	0.0	0.0	0.0	1.71%
90	0.3	0.6	0.6	0.2	0.0	0.0	0.0	0.0	0.0	1.78%
100	0.3	0.7	0.7	0.2	0.0	0.0	0.0	0.0	0.0	1.90%
110	0.3	0.6	0.6	0.3	0.0	0.0	0.0	0.0	0.0	1.81%
120	0.3	0.7	0.8	0.3	0.0	0.0	0.0	0.0	0.0	2.07%
130	0.3	0.8	0.9	0.4	0.0	0.0	0.0	0.0	0.0	2.33%
140	0.3	0.7	0.9	0.4	0.0	0.0	0.0	0.0	0.0	2.35%
150	0.3	0.9	1.0	0.5	0.0	0.0	0.0	0.0	0.0	2.78%
160	0.4	1.1	1.4	0.7	0.0	0.0	0.0	0.0	0.0	3.61%
170	0.3	1.1	1.7	1.2	0.1	0.0	0.0	0.0	0.0	4.45%
180	0.5	1.3	1.9	1.7	0.2	0.0	0.0	0.0	0.0	5.57%
190	0.5	1.3	1.9	1.7	0.4	0.1	0.0	0.0	0.0	5.79%
200	0.3	1.0	1.7	1.6	0.2	0.0	0.0	0.0	0.0	4.87%
210	0.5	0.8	1.5	1.4	0.2	0.0	0.0	0.0	0.0	4.44%
220	0.4	0.8	1.1	0.8	0.1	0.0	0.0	0.0	0.0	3.16%
230	0.3	0.6	0.8	0.6	0.1	0.0	0.0	0.0	0.0	2.30%
240	0.3	0.7	0.7	0.5	0.0	0.0	0.0	0.0	0.0	2.21%
250	0.4	0.6	0.6	0.3	0.0	0.0	0.0	0.0	0.0	1.94%
260	0.3	0.5	0.5	0.2	0.0	0.0	0.0	0.0	0.0	1.59%
270	0.3	0.5	0.5	0.3	0.0	0.0	0.0	0.0	0.0	1.62%
280	0.4	0.4	0.4	0.4	0.0	0.0	0.0	0.0	0.0	1.61%
290	0.2	0.4	0.5	0.3	0.0	0.0	0.0	0.0	0.0	1.49%
300	0.3	0.5	0.6	0.5	0.0	0.0	0.0	0.0	0.0	2.01%
310	0.3	0.5	0.8	0.6	0.1	0.0	0.0	0.0	0.0	2.36%
320	0.2	0.5	0.7	0.7	0.1	0.0	0.0	0.0	0.0	2.26%
330	0.4	0.6	1.0	0.8	0.1	0.0	0.0	0.0	0.0	2.76%
340	0.4	0.7	1.0	0.8	0.1	0.0	0.0	0.0	0.0	2.91%
350	0.3	0.7	1.0	0.8	0.1	0.0	0.0	0.0	0.0	2.87%
360	0.3	0.8	1.1	0.8	0.1	0.0	0.0	0.0	0.0	3.14%
Calm	5.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.92%
Total	17.85%	25.14%	32.30%	21.89%	2.50%	0.30%	0.02%	0.00%	0.00%	100.00%

Percent Calm Winds (winds less than 11 knots): 75.29%

Runway use: Runway 17: 45.1%
Runway 35: 54.9%

Prevailing Winds

North	13.54%	South	24.27%	North	39.0%
Northeast	7.79%	Southwest	12.10%	South	61.0%
East	9.20%	West	8.26%		
Southeast	6.74%	Northwest	9.39%		

30 Degrees of alignment 47.4%



LAWRENCE SMITH MEMORIAL AIRPORT

AIRPORT MASTER PLAN UPDATE

Appendix C

AVIATION FORECAST WORKSHEETS

Historic	LRY Based Aircraft	Cass County Pop.	Cass County PCI	Missouri Pop.	Missouri PCI	U.S. PCI
1980	5	51,290	\$ 9,373	4,921,966	\$ 9,390	\$ 10,183
1981	3	52,225	\$ 10,497	4,932,069	\$ 10,457	\$ 11,280
1982	3	52,704	\$ 10,613	4,929,456	\$ 11,035	\$ 11,901
1983	3	53,290	\$ 11,087	4,943,735	\$ 11,716	\$ 12,554
1984	6	54,880	\$ 12,379	4,975,276	\$ 12,960	\$ 13,824
1985	10	55,934	\$ 13,346	5,000,260	\$ 13,868	\$ 14,705
1986	19	57,409	\$ 14,056	5,023,055	\$ 14,505	\$ 15,397
1987	19	59,322	\$ 14,587	5,056,702	\$ 15,250	\$ 16,284
1988	19	60,966	\$ 15,035	5,081,737	\$ 16,086	\$ 17,403
1989	19	62,509	\$ 15,910	5,095,844	\$ 17,083	\$ 18,566
1990	24	64,155	\$ 16,264	5,128,880	\$ 17,743	\$ 19,572
1991	24	65,698	\$ 16,759	5,170,800	\$ 18,514	\$ 20,023
1992	29	66,960	\$ 18,086	5,217,101	\$ 19,454	\$ 20,960
1993	31	68,649	\$ 18,737	5,271,175	\$ 20,166	\$ 21,539
1994	31	70,822	\$ 19,676	5,324,497	\$ 21,094	\$ 22,340
1995	30	72,731	\$ 20,235	5,378,247	\$ 21,873	\$ 23,255
1996	33	74,256	\$ 21,316	5,431,553	\$ 22,828	\$ 24,270
1997	36	76,290	\$ 22,169	5,481,193	\$ 23,926	\$ 25,412
1998	38	78,534	\$ 23,163	5,521,765	\$ 25,171	\$ 26,893
1999	41	80,750	\$ 24,253	5,561,948	\$ 25,857	\$ 27,880
2000	44	82,636	\$ 25,516	5,605,067	\$ 27,493	\$ 29,760
2001	44	84,897	\$ 26,493	5,637,309	\$ 28,221	\$ 30,413
2002	53	84,538	\$ 26,276	5,674,055	\$ 28,457	\$ 30,941
2008	61	96,608	\$ 30,984	5,750,099	\$ 33,707	\$ 36,244
2013	72	104,677	\$ 34,907	5,892,243	\$ 38,082	\$ 40,953
2018	82	112,085	\$ 38,830	6,025,412	\$ 42,456	\$ 45,662
2023	93	118,547	\$ 42,753	6,140,293	\$ 46,831	\$ 50,371

**Based Aircraft-
Time Series**

2008	61
2013	72
2018	82
2023	93

R 0.984 R(Square) 0.968

**Based Aircraft-
County Population** x= County Population (Independent Variable)
y= Based Aircraft (Dependent Variable)

2008	64
2013	74
2018	84
2023	92

R 0.978 R(Square) 0.956

Based Aircraft- County PCI x= County PCI (Independent Variable)
y= Based Aircraft (Dependent Variable)

2008 61
2013 71
2018 82
2023 93

R 0.980627626 R(Square) 0.962

Based Aircraft- Multiple Variables x= County Population & County PCI (Independent Variables)
y= Based Aircraft (Dependent Variable)

2008 61
2013 71
2018 82
2023 93

Based Aircraft- Analyses Average

2008 62
2013 72
2018 83
2023 93

Based Aircraft- State Population x= State Population (Independent Variable)
y= Based Aircraft (Dependent Variable)

2008 53
2013 61
2018 69
2023 75

R 0.967 R(Square) 0.936

Based Aircraft- State PCI x= State PCI (Independent Variable)
y= Based Aircraft (Dependent Variable)

2008 61
2013 72
2018 82
2023 93

R 0.989 R(Square) 0.978

Based Aircraft- Multiple Variables x= State Population & State PCI (Independent Variables)
y= Based Aircraft (Dependent Variable)

2008 62
2013 73
2018 84
2023 96

Based Aircraft- Analyses Average

2008 59
2013 69
2018 79
2023 89



LAWRENCE SMITH MEMORIAL AIRPORT

AIRPORT MASTER PLAN UPDATE

Appendix D

AIA OPERATIONS CALCULATION SHEET

Preferred IFR Operations

Year	Local Operations	% IFR G.A. Fleet	% IFR Pilots	% Marginal VFR	IMC Operations	Forecast AIA's
2003	3,710	56.0%	48.9%	9.4%	95	48
2008	8,231	56.0%	49.1%	9.4%	213	106
2013	13,632	57.0%	49.6%	9.4%	362	181
2018	19,295	57.0%	50.4%	9.4%	521	261
2023	26,691	58.0%	50.4%	9.4%	733	367

Note: Itinerant Operations does not include military operations

Source: Percent of IFR pilots from FAA Forecast of Civil Aviation (2003-2014).

Source: Estimated statistical linear trend line (2015-2023).

*The increase in the percent of IFR-rated pilots is extrapolated from FAA forecasts growth indicating 0.6 percent in IFR training during the next 12 years. The percent of IFR Rated Pilots is based on FAA. Forecasts (2001-2012), and linear trend line (2013-2022).

Year	Business Operations	% IFR G.A. Fleet	% IFR Pilots	% Marginal VFR	IMC Operations	Forecast AIA's
2003	130	100.0%	100.0%	9.4%	12	6
2008	1,700	100.0%	100.0%	9.4%	160	80
2013	4,500	100.0%	100.0%	9.4%	423	212
2018	6,425	100.0%	100.0%	9.4%	604	302
2023	8,350	100.0%	100.0%	9.4%	785	392

Note: Itinerant Operations does not include military operations

Source: Percent of IFR pilots from FAA Forecast of Civil Aviation (2003-2014).

Source: Estimated statistical linear trend line (2015-2023).

Year	Air Taxi Operations	% IFR G.A. Fleet	% IFR Pilots	% Marginal VFR	IMC Operations	Forecast AIA's
2003	400	100.0%	48.9%	9.4%	18	9
2008	400	100.0%	49.1%	9.4%	18	9
2013	450	100.0%	49.6%	9.4%	21	10
2018	550	100.0%	50.4%	9.4%	26	13
2023	700	100.0%	50.5%	9.4%	33	17

Note: Itinerant Operations does not include military operations

Source: Percent of IFR pilots from FAA Forecast of Civil Aviation (2003-2014).

Source: Estimated statistical linear trend line (2015-2023).

Year	Practice	% IFR G.A. Fleet	% IFR Pilots	% Marginal VFR	IMC Operations	Forecast AIA's
2003	300	56.0%	100.0%	9.4%	16	8
2008	325	56.0%	100.0%	9.4%	17	9
2013	351	57.0%	100.0%	9.4%	19	9
2018	380	57.0%	100.0%	9.4%	20	10
2023	412	58.0%	100.0%	9.4%	22	11

Note: Itinerant Operations does not include military operations

Source: Percent of IFR pilots from FAA Forecast of Civil Aviation (2003-2014).

Source: Estimated statistical linear trend line (2015-2023).

Year	General Aviation Operations	Business Operations	Air Taxi Operations	Practice	Total	Percent of Total Ops
2003	48	6	9	8	71	0.53%
2008	106	80	9	9	204	1.51%
2013	181	212	10	9	412	3.05%
2018	261	302	13	10	586	4.34%
2023	367	392	17	11	787	5.83%

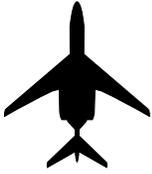
Note: Itinerant Operations does not include military operations

Source: Percent of IFR pilots from FAA Forecast of Civil Aviation (2003-2014).

Source: Estimated statistical linear trend line (2015-2023).

Actual Itinerant AIA Operations = Total "other" itinerant operations x percent IFR rated pilots x percent IMC

Source: International Station Meteorological Climate Summary; Richards-Gebaur Airport (1984-1993)



LAWRENCE SMITH MEMORIAL AIRPORT

AIRPORT MASTER PLAN UPDATE

Appendix E

AIRPORT PEAKING / CAPACITY CHARACTERISTICS

AIRPORT PEAKING/CAPACITY CHARACTERISTICS						
Operations	Existing	2008	2013	2018	2023	
Total Annual "Civilian" Aircraft Operations	13,250	17,263	22,720	29,684	38,130	
Peak Month Operations	1,458	1,899	2,499	3,265	4,194	
Peak Average Day Operations	47	62	82	107	137	
Peak Hour Operations	7.1	9.3	12.3	16.1	20.6	
Passengers Per Aircraft Operation	1.25	1.30	1.50	1.60	1.75	
Design Hour Passengers	8.8	12.1	18.5	25.7	36.0	

TERMINAL BUILDING REQUIREMENTS						
Item	S.F.	Existing	2008	2013	2018	2023
Design Hour Passenger		8.8	12.1	18.5	25.7	36.0
Public-Use Terminal Building Area(s)						
Pilot Lounge/Flight Planning Area	24.0	800	900	1,000	1,200	1,200
Administrative/Management Office Area	10.5	92	127	194	270	378
Restrooms	2.0	18	24	37	51	72
Restrooms	2.0	18	24	37	51	72
Dining/Kitchen/Meeting Area	16.0	141	210	295	411	575
Utility Room	2.0	18	24	37	51	72
Equipment/Storage/Mechanical/Circulation	6.0	53	73	111	154	216
Leased Terminal Building Area(s)						
Fixed Based Operator (FBO) Area	0.0	0	0	0	0	0
Restroom	0.0	0	0	0	0	0
General Meeting Room Area (Optional)	0.0	0	0	0	0	0
Restaurant/Kitchen (Optional)	0.0	0	0	0	0	0
Classroom Area (Optional)	0.0	0	0	0	0	0
Total Terminal Building Area (S.F.)		1,139	1,382	1,710	2,189	2,585

PUBLIC AUTOMOBILE PARKING REQUIREMENTS						
Item	Existing	2008	2013	2018	2023	
Design Hour Passengers	8.8	12.1	18.5	25.7	36.0	
Parking Space Factor (Cars Per Passenger)	0.55	0.55	0.55	0.55	0.55	
Public Automobile Parking Spaces	6	7	10	14	20	
Size of Parking Area Per Space (S.F.)	174	175	175	175	175	
Parking Area (S.F.)	1,044	1,164	1,776	2,472	3,461	
Maneuvering and Access Area @ 25%	261	291	444	618	865	
Total Automobile Parking Area (S.F.)	1,305	1,455	2,220	3,090	4,327	

AIRCRAFT APRON REQUIREMENTS						
Item	Existing	2008	2013	2018	2023	
Total Based Aircraft	39	45	48	54	60	
Based Demand for Apron Tie-Down (%)	25%	25%	25%	25%	25%	
Apron Area - Based (2,700 S.F./Aircraft)	26,325	30,375	32,400	36,450	40,500	
Apron Maneuvering/Taxiing Area @ 50% (S.F.)	13,163	15,188	16,200	18,225	20,250	
Total - Based Aircraft Apron Area (S.F.)	39,488	45,563	48,600	54,675	60,750	
Annual Itinerant Operations	4,110	8,631	13,632	19,295	26,691	
Peak Month - Itinerant Operations	247	518	818	1,158	1,601	
Peak Day - Itinerant Operations	8.2	17.3	27.3	38.6	53.4	
40% of Peak Day - Itinerant Facility Demand	3.29	6.90	10.91	15.44	21.35	
Itinerant Apron Demand (3,240 S.F./Small)	5,327	11,186	17,667	25,006	34,592	
Itinerant Apron Demand (6,400 S.F./Large)	10,522	22,095	34,898	49,395	68,329	
Apron Maneuvering/Taxiing Area @ 50% to 75% (S.F.)	9,256	19,437	30,699	43,452	60,108	
Total - Itinerant Apron Area (S.F.)	25,104	52,718	83,264	117,854	163,029	
Total Apron Area (S.F.)	64,591	98,281	131,864	172,529	223,779	
Total Apron Area (S.Y.)	7,177	10,920	14,652	19,170	24,864	
Total Tie-Downs	17	28	38	50	65	

AIRPORT HANGAR REQUIREMENTS					
Item	Existing	2008	2013	2018	2023
(A) Single-engine	48	51	61	69	78
(A) Twin-engine (piston)	5	6	6	7	7
(A) Twin-engine (turbine)	0	1	1	2	3
(A) Jet	0	1	1	2	3
(A) Helicopter	1	2	2	2	2
Other	0	0	0	0	0
Total Based Aircraft --->	54	61	71	82	93
Conventional Hangar Aircraft Demand :	1	5	5	8	10
Single-engine aircraft (1,200 S.F.)	0	0	0	0	0
Twin-engine aircraft (1,400 S.F.)	0	1	1	2	2
Twin turbo-prop (3,000 S.F.)	0	1	1	2	3
Jet (6,400 S.F.)	0	1	1	2	3
Helicopter (2,000 S.F.)	1	2	2	2	2
Standard Aircraft Conventional Hangar Area (S.F.)	4,200	14,800	14,800	25,600	35,000
Office/Storage/Utility Hangar Space (20%)	840	2,960	2,960	5,120	7,000
Total Conventional Hangar Area (S.F.)	5,040	17,760	17,760	30,720	42,000
T-Hangar Aircraft Demand:	53	54	64	72	82
Single-engine aircraft (1,200 S.F.)	48	49	59	67	77
Twin-engine aircraft (1,400 S.F.)	5	5	5	5	5
Total T-Hangar Area (S.F.)	41,970	65,800	77,800	87,400	99,400
Common Hangar - Transients/Maintenance:	0	4	4	6	8
Single-engine aircraft (1,200 S.F.)	0	2	2	2	2
Twin-engine aircraft (1,400 S.F.)	0	2	2	4	6
Total Common Hangar Area (S.F.)	3,600	5,200	5,200	8,000	10,800
Total Usable Hangar Area	49,770	85,800	97,800	121,000	145,200
Total Hangar Area	50,610	88,760	100,760	126,120	152,200
Total T-Hangar Area (S.F.)	41,970	65,800	77,800	87,400	99,400
Total Common/Corporate Area (S.F.)	7,800	22,960	22,960	38,720	52,800

AIRCRAFT FUEL REQUIREMENTS					
Item	Existing	2008	2013	2018	2023
Jet Aircraft (Turbine) Fuel Requirements					
Annual Aircraft Operations	13,250	17,263	22,720	29,684	38,130
Average Monthly Operations	1,104	1,439	1,893	2,474	3,178
Percent Annual Jet/Turbine Operations	1.0%	10.0%	20.0%	21.5%	23.0%
Annual Jet/Turbine Operations	133	1,726	4,544	6,382	8,770
Average Flight Hour Per Operation	1.8	1.8	2.0	2.1	2.2
Average Gallons/Operation - JET A	140.0	150.0	150.0	150.0	150.0
Percent Jet A "Itinerant" Fueling	100.0%	94.0%	92.0%	87.0%	85.0%
Percent Jet A "Domicile" Fueling	0.0%	6.0%	8.0%	13.0%	15.0%
Yearly JET A Demand (gallons)	0	26,288	100,332	227,370	368,994
Monthly JET A Demand (gallons)	0	2,191	8,361	18,948	30,749
Piston Aircraft (AVGAS) Fuel Requirements					
Percent Piston Operations	99.0%	90.0%	80.0%	78.5%	77.0%
Annual Piston Operations	13,118	15,537	18,176	23,302	29,360
Average Flight Distance (NM)	190	190	190	190	190
Average Flight Hour Per Operation	1.6	1.6	1.7	1.8	2.0
Average Gallons/Operation - AVGAS	12.0	12.0	12.0	12.0	12.0
Percent "Itinerant" Fueling	64.0%	62.0%	60.0%	59.0%	58.0%
Percent "Domicile Airport" Fueling	36.0%	38.0%	40.0%	41.0%	42.0%
Yearly AVGAS Demand	36,267	43,925	52,347	67,641	85,825
Monthly AVGAS Demand	3,022	3,660	4,362	5,637	7,152
Total Monthly Fuel Storage (gallons)	3,022	5,851	12,723	24,584	37,902
Total Yearly Fuel (gallons)	36,267	70,213	152,678	295,011	454,819

Calculation Notes:

Average parking space factor for general aviation airports is between 0.9 and 1.2.



LAWRENCE SMITH MEMORIAL AIRPORT

AIRPORT MASTER PLAN UPDATE

Appendix F

AIRPORT DEVELOPMENT COSTS

**LAWRENCE SMITH MEMORIAL AIRPORT
0-5 YEAR DEVELOPMENT (PHASE I)
ESTIMATED PROJECT COSTS AND FUNDING SOURCES**

Project Description	Unit	Quantity	Unit Cost	Local Cost (5%)	MoDOT/FAA Cost (95%)	Total Cost (100%)
PHASE I - LAND ACQUISITION						
Tract A (fee simple)	Acre	63.0	\$16,000	\$50,400	\$957,600	\$1,008,000
Tract B (fee simple)	Acre	57.0	\$16,000	\$45,600	\$866,400	\$912,000
Tract C (fee simple)	Acre	58.0	\$16,000	\$46,400	\$881,600	\$928,000
Tract D (fee simple)	Acre	46.0	\$16,000	\$36,800	\$699,200	\$736,000
Tract E (fee simple)	Acre	40.0	\$16,000	\$32,000	\$608,000	\$640,000
Tract F (fee simple)	Acre	1.0	\$16,000	\$800	\$15,200	\$16,000
		265.0				
Subtotal Project Cost				\$212,000	\$4,028,000	\$4,240,000
Engineering, Administrative & Legal Costs (10%)				\$21,200	\$402,800	\$424,000
TOTAL PHASE I - LAND ACQUISITION				\$233,200	\$4,430,800	\$4,664,000

PHASE I - RUNWAY AND TAXIWAY

Construct New Runway 17-35 and Connector Taxiway

Construct Runway 17-35 (4,400' x 100'; 30,000 lbs SWG)

Mobilization	L.S.	1.0	\$400,000	\$20,000	\$380,000	\$400,000
Clearing & Grubbing	Acres	40	\$1,300.00	\$2,600	\$49,400	\$52,000
Class A Excavation	C.Y.	750,000	\$2.50	\$93,750	\$1,781,250	\$1,875,000
Pavement Removal	S.Y.	17,500	\$2.50	\$2,188	\$41,563	\$43,750
Erosion Control Barrier	L.F.	4,000	\$4.00	\$800	\$15,200	\$16,000
Fly Ash	Tons	1,901	\$18.00	\$1,711	\$32,507	\$34,218
4" Crushed Aggregate Base Course	S.Y.	49,885	\$3.50	\$8,730	\$165,868	\$174,598
6" P.C.C. Pavement	S.Y.	48,889	\$23.00	\$56,222	\$1,068,225	\$1,124,447
Reflectorized Pavement Marking	S.F.	32,178	\$0.75	\$1,207	\$22,927	\$24,134
24" RCP	L.F.	416	\$35.00	\$728	\$13,832	\$14,560
24" RCP End Section	Each	4.0	\$400	\$80	\$1,520	\$1,600
Prefabricated Underdrain	L.F.	8,800	\$7.00	\$3,080	\$58,520	\$61,600
Non-Perforated 4" PE Outlet Pipe	L.F.	1,760	\$8.00	\$704	\$13,376	\$14,080
Splash Pad	Each	20	\$500	\$500	\$9,500	\$10,000
Wind Cone (Style 1, Size 2)	Each	1.0	\$8,500	\$425	\$8,075	\$8,500
Underground Cable	L.F.	23,298	\$1.00	\$1,165	\$22,133	\$23,298
Cable Trench	L.F.	16,311	\$1.50	\$1,223	\$23,243	\$24,467
Bare Counterpoise & Trench	L.F.	18,074	\$0.85	\$768	\$14,595	\$15,363
Premanufactured Vault Building	Each	1.0	\$20,000	\$1,000	\$19,000	\$20,000
15 kW Constant Current Regulator, 3-step	Each	1.0	\$13,000	\$650	\$12,350	\$13,000
7.5 kW Constant Current Regulator, 5-step	Each	1.0	\$7,000	\$350	\$6,650	\$7,000
Vault Controls and Connections	L.S.	1.0	\$5,000	\$250	\$4,750	\$5,000
2-4" PVC Concrete Encased Electrical Duct	L.F.	220	\$20.00	\$220	\$4,180	\$4,400
Base Mounted M.I.R.L.	Each	10	\$500	\$250	\$4,750	\$5,000
Stake Mounted M.I.R.L.	Each	50	\$400	\$1,000	\$19,000	\$20,000
L-867 Junction Box	Each	2.0	\$500	\$50	\$950	\$1,000
Guidance Sign, One Module (Size 1, Style 4)	Each	2.0	\$2,000	\$200	\$3,800	\$4,000
Guidance Sign, Two Module (Size 1, Style 4)	Each	1.0	\$2,250	\$113	\$2,138	\$2,250
Runway End Identifier Light (REIL) System	Each	2.0	\$15,000	\$1,500	\$28,500	\$30,000
Relocate PAPI-4L	Each	2.0	\$2,000	\$200	\$3,800	\$4,000
Fence, Class C (woven wire)	L.F.	9,350	\$4.00	\$1,870	\$35,530	\$37,400
Swinging Access Gate (16')	Each	1.0	\$500	\$25	\$475	\$500
Sliding Access Gate (26')	Each	2.0	\$2,000	\$200	\$3,800	\$4,000
Seeding and Miscellaneous	Acres	78	\$1,000	\$3,900	\$74,100	\$78,000
						\$4,153,163

Construct Connector Taxiway

Class A Excavation	C.Y.	1,658	\$2.50	\$207	\$3,938	\$4,145
Erosion Control Barrier	L.F.	500	\$4.00	\$100	\$1,900	\$2,000
Fly Ash	Tons	732	\$18.00	\$659	\$12,517	\$13,176
4" Crushed Aggregate Base Course	S.Y.	28,862	\$3.50	\$5,051	\$95,966	\$101,017
6" P.C.C. Pavement	S.Y.	28,862	\$23.00	\$33,191	\$630,635	\$663,826
Reflectorized Pavement Marking	S.F.	2,600	\$0.75	\$98	\$1,853	\$1,950
24" RCP	L.F.	400	\$35	\$700	\$13,300	\$14,000
24" RCP End Section	Each	4	\$400	\$80	\$1,520	\$1,600
Prefabricated Underdrain	L.F.	8,800	\$7.00	\$3,080	\$58,520	\$61,600
Non-Perforated 4" PE Outlet Pipe	L.F.	1,760	\$8.00	\$704	\$13,376	\$14,080
Splash Pad	Each	2	\$500	\$50	\$950	\$1,000
2-4" PVC Concrete Encased Electrical Duct	L.F.	220	\$20.00	\$220	\$4,180	\$4,400
Guidance Sign, Two Module (Size 1, Style 4)	Each	2	\$2,000	\$200	\$3,800	\$4,000
Guidance Sign, Three Module (Size 1, Style 4)	Each	1	\$2,500	\$125	\$2,375	\$2,500
Stake Mounted M.I.T.L.	Each	4	\$500	\$100	\$1,900	\$2,000
Retro Reflectors	Each	16	\$50.00	\$40	\$760	\$800
Seeding and Miscellaneous	Acres	5	\$1,000	\$250	\$4,750	\$5,000
						\$897,094

Close 283RD Road						
Close / Barrier / Sign 283RD Road	L.S.	1	\$3,500	\$175	\$3,325	\$3,500
						\$3,500
Remove Bridge/Install Box Culvert						
Remove Existing Automobile Bridge	L.S.	1	\$5,000	\$250	\$4,750	\$5,000
Pre-Cast 6'x6' Reinforced Concrete Box	L.F.	800	\$325	\$13,000	\$247,000	\$260,000
						\$265,000
Bury 7200 Volt Powerline						
Bury Powerline	L.F.	1,200	\$20	\$1,200	\$22,800	\$24,000
						\$24,000
Remove Abandoned Farm House & Structures						
Remove House	Each	1	\$3,000	\$150	\$2,850	\$3,000
Remove Barns	Each	4	\$1,000	\$200	\$3,800	\$4,000
						\$7,000
Relocate/Remove Residence						
Remove Existing Residence	Each	1	\$250,000	\$15,250	\$289,750	\$305,000
Fill-in Pond	L.S.	1	\$5,000	\$250	\$4,750	\$5,000
						\$310,000
Subtotal Project Cost				\$282,988	\$5,376,770	\$5,659,757
Contingency Engineering, Legal, & Administrative Costs (25%)				\$70,747	\$1,344,192	\$1,414,939
TOTAL PHASE I - RUNWAY AND TAXIWAY				\$353,735	\$6,720,962	\$7,074,697

PHASE I - TERMINAL AREA

Crack Seal Main Aircraft Parking Apron						
Mobilization	L.S.	1	\$2,000	\$100	\$1,900	\$2,000
Minor Crack / Joint Repair	S.Y.	7,472	\$1.25	\$467	\$8,873	\$9,340
Pavement Marking	L.F.	600	\$1.25	\$38	\$713	\$750
Seeding and Miscellaneous	L.S.	1	\$1,000	\$50	\$950	\$1,000
						\$13,090
Install Jet-A Fuel Tank & Pump*						
Install Jet-A Fuel Tank & Pump	L.S.	1.0	\$50,000	\$50,000	\$0	\$50,000
						\$50,000
Subtotal Project Cost				\$50,655	\$12,436	\$63,090
Engineering, Administrative & Legal Costs (25%)				\$12,664	\$3,109	\$15,773
TOTAL PHASE I - TERMINAL AREA				\$63,318	\$15,544	\$78,863

PHASE I - OTHER PROJECTS (CAPITAL)

Conduct Environmental Assessment for Ultimate Airport Improvements						
Study	L.S.	1	\$40,000	\$2,000	\$38,000	\$40,000
						\$40,000
Install 24-Hour Access Restroom*						
Install 24-Hour Access Restroom	L.S.	1	\$3,000	\$3,000	\$0	\$3,000
						\$3,000
Purchase Airport Courtesy Car*						
Purchase Airport Courtesy Car	L.S.	1	\$2,000	\$2,000	\$0	\$2,000
						\$2,000
Conduct Airport Commercial/Industrial Development Plan						
Conduct Airport Commercial/Industrial Development Plan	L.S.	1	\$25,000	\$1,250	\$23,750	\$25,000
						\$25,000
Subtotal Project Cost				\$8,250	\$61,750	\$70,000
Engineering, Administrative & Legal Costs (25%)				\$2,063	\$15,438	\$17,500
TOTAL PHASE I - OTHER				\$10,313	\$77,188	\$87,500

Subtotal Project Cost				\$553,892	\$9,478,955	\$10,032,847
Engineering, Administrative & Legal Costs				\$106,673	\$1,765,539	\$1,872,212
TOTAL PHASE I DEVELOPMENT				\$660,565	\$11,244,494	\$11,905,059

PHASE I - OTHER PROJECTS (NON-CAPITAL)

Implement Fuel Spill Prevention Program
 Adopt "Airport Height and Hazard Zoning"
 Develop Airport Website
 Adopt Standard Airport Operating and Hangar Lease Agreement

**LAWRENCE SMITH MEMORIAL AIRPORT
6-10 YEAR DEVELOPMENT (PHASE II)
ESTIMATED PROJECT COSTS AND FUNDING SOURCES**

Project Description	Unit	Quantity	Unit Cost	Local Cost	MoDOT/FAA Cost	Total Cost (100%)
PHASE II - LAND ACQUISITION						
Tract G - (AWOS easement)	Acres	17.8	\$2,000	\$1,780	\$33,820	\$35,600
Subtotal Project Cost				\$1,780	\$33,820	\$35,600
Engineering, Administrative & Legal Costs (10%)				\$178	\$3,382	\$3,560
TOTAL PHASE II - LAND ACQUISITION				\$1,958	\$37,202	\$39,160

PHASE II - RUNWAY AND TAXIWAY

Construct Parallel Taxiway (4,400' x 35'; 30,000 lbs SWG)						
Mobilization	L.S.	1	\$80,000	\$4,000	\$76,000	\$80,000
Class A Excavation	C.Y.	4,760	\$2.50	\$595	\$11,305	\$11,900
Erosion Control Barrier	L.F.	3,200	\$4.00	\$640	\$12,160	\$12,800
Fly Ash	Tons	735	\$18.00	\$662	\$12,569	\$13,230
4" Crushed Aggregate Base Course	S.Y.	26,884	\$3.50	\$4,705	\$89,389	\$94,094
6" P.C.C. Pavement	S.Y.	24,472	\$23.00	\$28,143	\$534,713	\$562,856
Reflectorized Pavement Marking	S.F.	11,355	\$0.75	\$426	\$8,090	\$8,516
24" RCP	L.F.	128	\$35	\$224	\$4,256	\$4,480
24" RCP End Section	Each	2	\$400	\$40	\$760	\$800
Prefabricated Underdrain	L.F.	4,400	\$7.00	\$1,540	\$29,260	\$30,800
Non-Perforated 4" PE Outlet Pipe	L.F.	880	\$8.00	\$352	\$6,688	\$7,040
Splash Pad	Each	10	\$500	\$250	\$4,750	\$5,000
2-4" PVC Concrete Encased Electrical Duct	L.F.	256	\$20.00	\$256	\$4,864	\$5,120
Guidance Sign, Two Module (Size 1, Style 4)	Each	6	\$2,000	\$600	\$11,400	\$12,000
Guidance Sign, Three Module (Size 1, Style 4)	Each	2	\$2,500	\$250	\$4,750	\$5,000
Stake Mounted M.I.T.L	Each	16	\$500	\$400	\$7,600	\$8,000
L-867 Junction Box	Each	2	\$500	\$50	\$950	\$1,000
Retro Reflectors	Each	50	\$50.00	\$125	\$2,375	\$2,500
Seeding and Miscellaneous	Acres	8	\$1,000	\$400	\$7,600	\$8,000
						\$873,136
Subtotal Project Cost				\$43,657	\$829,479	\$873,136
Engineering, Administrative & Legal Costs (25%)				\$10,914	\$207,370	\$218,284
TOTAL PHASE II - RUNWAY AND TAXIWAY				\$54,571	\$1,036,849	\$1,091,420

PHASE II - TERMINAL AREA

Construct New Terminal Building (2,625 S.F.)*						
Mobilization	L.S.	1.0	\$5,000	\$5,000	\$0	\$5,000
Excavation and Embankment	C.Y.	500	\$5.00	\$2,500	\$0	\$2,500
P.C.C. (4")	S.Y.	270	\$35.00	\$9,450	\$0	\$9,450
Construct Terminal Building	S.F.	2,625	\$60.00	\$157,500	\$0	\$157,500
Utility Hookup	L.S.	1.0	\$2,000	\$2,000	\$0	\$2,000
Building Mounted Apron Security Lighting	Each	2.0	\$2,000	\$4,000	\$0	\$4,000
						\$180,450

Note: Financing for terminal building assumed through conventional methods using local (airport) funds.

Construct Aircraft Parking Apron (47,084 S.Y.)						
Mobilization	L.S.	1.0	\$90,000	\$4,500	\$85,500	\$90,000
Class A Excavation	C.Y.	16,144	\$2.50	\$2,018	\$38,342	\$40,360
Erosion Control Barrier	L.F.	1,000	\$4.00	\$200	\$3,800	\$4,000
Fly Ash	Tons	2,015	\$18.00	\$1,814	\$34,457	\$36,270
4" Crushed Aggregate Base Course	S.Y.	47,084	\$3.50	\$8,240	\$156,554	\$164,794
6" P.C.C. Pavement	S.Y.	47,084	\$23.00	\$54,147	\$1,028,785	\$1,082,932
Reflectorized Pavement Marking	S.F.	1,735	\$0.75	\$65	\$1,236	\$1,301
Tie Downs	Each	54.0	\$125	\$338	\$6,413	\$6,750
Conventional Underdrains	L.F.	1,100	\$12.00	\$660	\$12,540	\$13,200
Non-Perforated 4" PE Outlet Pipe	L.F.	900	\$8.00	\$360	\$6,840	\$7,200
Underdrains Clean Out Risers	Each	3.0	\$180	\$27	\$513	\$540
Apron Lights	Each	4.0	\$15,000	\$3,000	\$57,000	\$60,000
Seeding and Miscellaneous	Acres	2.0	\$1,000	\$100	\$1,900	\$2,000
						\$1,509,347

Construct Maintenance Hangar (12,150 S.F.)*

Mobilization	L.S.	1.0	\$5,000	\$5,000	\$0	\$5,000
Excavation and Embankment	C.Y.	500	\$5.00	\$2,500	\$0	\$2,500
P.C.C. (5")	S.Y.	1,350	\$23.00	\$31,050	\$0	\$31,050
Common Hangar	S.F.	12,150	\$27.00	\$328,050	\$0	\$328,050
Utility Hookup	L.S.	1.0	\$5,000	\$5,000	\$0	\$5,000
Seeding and Miscellaneous	L.S.	1.0	\$1,000	\$1,000	\$0	\$1,000
						\$372,600

Note: Financing for maintenance hangar assumed through conventional methods using local (airport) funds.

Relocate 100LL (AVGAS) Fuel Tank & Pump*

Relocate 100LL (AVGAS) Fuel Pump	L.S.	1.0	\$5,000	\$5,000	\$0	\$5,000
						\$5,000

Relocate Jet-A Fuel Tank & Pump*

Relocate 100LL (AVGAS) Fuel Pump	L.S.	1.0	\$5,000	\$5,000	\$0	\$5,000
						\$5,000

Relocate AWOS

Relocate AWOS	L.S.	1.0	\$20,000	\$1,000	\$19,000	\$20,000
						\$20,000

Construct Terminal Access Road and Parking Area (4,900 S.Y.)*

Mobilization	L.S.	1	\$5,000	\$5,000	\$0	\$5,000
Class A Excavation	C.Y.	5,000	\$4.50	\$22,500	\$0	\$22,500
Erosion Control Barrier	L.F.	2,000	\$4.00	\$8,000	\$0	\$8,000
7" Crushed Aggregate Base Course	S.Y.	4,900	\$7.00	\$34,300	\$0	\$34,300
3" Bituminous Surface Course	Tons	854	\$40.00	\$34,160	\$0	\$34,160
Asphalt Cement	Tons	52	\$125	\$6,500	\$0	\$6,500
Bituminous Prime Coat	Gal	2,330	\$1.50	\$3,495	\$0	\$3,495
Bituminous Tack Coat	Gal	700	\$1.50	\$1,050	\$0	\$1,050
24" CMP		88	\$35.00	\$3,080	\$0	\$3,080
24" CMP End Section	Each	2	\$400	\$800	\$0	\$800
Seeding and Miscellaneous	Acres	2	\$1,000	\$2,000	\$0	\$2,000
						\$120,885

Construct 10-Unit T-Hangar (15,840 S.F.)*

Class A Excavation	C.Y.	500	\$5.00	\$2,500	\$0	\$2,500
Lime Treated Subgrade (9")	S.Y.	1,760	\$2.25	\$3,960	\$0	\$3,960
Crushed Aggregate Base Course (5")	S.Y.	1,760	\$5.50	\$9,680	\$0	\$9,680
Construct Concrete Hangar Pad (4")	S.Y.	1,760	\$42.00	\$73,920	\$0	\$73,920
Construct 8-Unit T-Hangar	S.F.	15,840	\$18.00	\$285,120	\$0	\$285,120
Seeding and Miscellaneous	Acres	1	\$1,000	\$1,000	\$0	\$1,000
Utility Hookup / Activation	L.S.	1	\$1,200	\$1,200	\$0	\$1,200
						\$377,380

Note: Hangar financing assumed through conventional methods using local (airport) funds or private investment options.

Construct 10-Unit T-Hangar (15,840 S.F.)*

Class A Excavation	C.Y.	500	\$5.00	\$2,500	\$0	\$2,500
Lime Treated Subgrade (9")	S.Y.	1,760	\$2.25	\$3,960	\$0	\$3,960
Crushed Aggregate Base Course (5")	S.Y.	1,760	\$5.50	\$9,680	\$0	\$9,680
Construct Concrete Hangar Pad (4")	S.Y.	1,760	\$42.00	\$73,920	\$0	\$73,920
Construct 10-Unit T-Hangar	S.F.	15,840	\$18.00	\$285,120	\$0	\$285,120
Seeding and Miscellaneous	Acres	1	\$1,000	\$1,000	\$0	\$1,000
Utility Hookup / Activation	L.S.	1	\$1,200	\$1,200	\$0	\$1,200
						\$377,380

Note: Hangar financing assumed through conventional methods using local (airport) funds or private investment options.

Install Airport Rotating Beacon

Airport Rotating Beacon	L.S.	1	\$20,000	\$1,000	\$19,000	\$20,000
Cable & Trench	L.F.	400	\$4.50	\$90	\$1,710	\$1,800
Seeding and Miscellaneous	L.S.	1.0	\$1,000	\$50	\$950	\$1,000
						\$22,800

Construct Common Hangar (3,600 S.F.)*

Class A Excavation	C.Y.	200	\$5.00	\$1,000	\$0	\$1,000
Lime Treated Subgrade (9")	S.Y.	400	\$2.25	\$900	\$0	\$900
Crushed Aggregate Base Course (5")	S.Y.	400	\$5.50	\$2,200	\$0	\$2,200
Construct Concrete Hangar Pad (4")	S.Y.	400	\$42.00	\$16,800	\$0	\$16,800
Construct Common Hangar	S.F.	3,600	\$23.00	\$82,800	\$0	\$82,800
Seeding and Miscellaneous	Acres	1	\$1,000	\$1,000	\$0	\$1,000
Utility Hookup / Activation	L.S.	1	\$1,200	\$1,200	\$0	\$1,200
						\$105,900

Note: Hangar financing assumed through conventional methods using local (airport) funds or private investment options.

Construct Common Hangar (3,600 S.F.)*

Class A Excavation	C.Y.	200	\$5.00	\$1,000	\$0	\$1,000
Lime Treated Subgrade (9")	S.Y.	400	\$2.25	\$900	\$0	\$900
Crushed Aggregate Base Course (5")	S.Y.	400	\$5.50	\$2,200	\$0	\$2,200
Construct Concrete Hangar Pad (4")	S.Y.	400	\$42.00	\$16,800	\$0	\$16,800
Construct Common Hangar	S.F.	3,600	\$23.00	\$82,800	\$0	\$82,800
Seeding and Miscellaneous	Acres	1	\$1,000	\$1,000	\$0	\$1,000
Utility Hookup / Activation	L.S.	1	\$1,200	\$1,200	\$0	\$1,200
						\$105,900

Note: Hangar financing assumed through conventional methods using local (airport) funds or private investment options.

Install Terminal Area Fencing (3,011 L.F.)

Fencing	L.F.	3,011	\$4.00	\$602	\$11,442	\$12,044
Seeding and Miscellaneous	Acres	3	\$1,000	\$150	\$2,850	\$3,000
						\$15,044

Install Auto Access Gates (2 Each)

Access Gates	Each	2	\$1,000.00	\$100	\$1,900	\$2,000
Security System	Each			\$0	\$0	\$0
						\$2,000

Subtotal Project Cost	\$1,728,955	\$1,490,732	\$3,219,686
Engineering, Administrative & Legal Costs (25%)	\$432,239	\$372,683	\$804,922
TOTAL PHASE II - TERMINAL AREA	\$2,161,193	\$1,863,415	\$4,024,608

Construct North End Airport Access Road (6,036 L.F.)

Mobilization	L.S.	1	\$25,000	\$1,250	\$23,750	\$25,000
Class A Excavation	C.Y.	5,588	\$5.00	\$1,397	\$26,543	\$27,940
Erosion Control Barrier	L.F.	5,000	\$4.00	\$1,000	\$19,000	\$20,000
Fly Ash	Tons	516		\$0	\$0	\$0
7" Crushed Aggregate Base Course	S.Y.	12,100	\$7.00	\$4,235	\$80,465	\$84,700
3" Bituminous Surface Course	Tons	1,400	\$40.00	\$2,800	\$53,200	\$56,000
Asphalt Cement	Tons	140	\$125	\$875	\$16,625	\$17,500
Bituminous Prime Coat	Gal	6,040	\$1.50	\$453	\$8,607	\$9,060
Bituminous Tack Coat	Gal	1,810	\$1.50	\$136	\$2,579	\$2,715
24" CMP	L.F.	6	\$35.00	\$11	\$200	\$210
24" CMP End Section	Each	12	\$400	\$240	\$4,560	\$4,800
Seeding and Miscellaneous	Acres	10	\$1,000	\$500	\$9,500	\$10,000
						\$257,925

Subtotal Project Cost	\$12,896	\$245,029	\$257,925
Engineering, Administrative & Legal Costs (25%)	\$3,224	\$61,257	\$64,481
TOTAL PHASE II - OTHER	\$16,120	\$306,286	\$322,406

Subtotal Project Cost	\$1,787,288	\$2,599,060	\$4,386,348
Engineering, Administrative & Legal Costs	\$446,555	\$644,692	\$1,091,247
TOTAL PHASE II DEVELOPMENT	\$2,233,843	\$3,243,752	\$5,477,594

**LAWRENCE SMITH MEMORIAL AIRPORT
11-20 YEAR DEVELOPMENT (PHASE III)
ESTIMATED PROJECT COSTS AND FUNDING SOURCES**

Project Description	Unit	Quantity	Unit Cost	Local Cost	MoDOT/FAA Cost	Total Cost (100%)
PHASE III - LAND ACQUISITION						
None		N/A	N/A	\$0	\$0	\$0
Subtotal Project Cost				\$0	\$0	\$0
Engineering, Administrative & Legal Costs (10%)				\$0	\$0	\$0
TOTAL PHASE III - LAND ACQUISITION				\$0	\$0	\$0

PHASE III - RUNWAY AND TAXIWAY

Extend Runway 17-35 and Parallel Taxiway

Extend Runway 17-35 (1,100' x 100'; 30,000 lbs SWG)

Mobilization	L.S.	1.0	\$200,000	\$10,000	\$190,000	\$200,000
Erosion Control Barrier	L.F.	1,000	\$4.00	\$200	\$3,800	\$4,000
Class A Excavation	C.Y.	3,395	\$5.00	\$849	\$16,126	\$16,975
Fly Ash	Tons	523	\$18.00	\$471	\$8,943	\$9,414
4" Crushed Aggregate Base Course	S.Y.	12,470	\$3.50	\$2,182	\$41,463	\$43,645
6" P.C.C. Pavement	S.Y.	12,222	\$23.00	\$14,055	\$267,051	\$281,106
Reflectorized Pavement Marking	S.F.	8,044	\$0.75	\$302	\$5,731	\$6,033
24" RCP	L.F.	104	\$35.00	\$182	\$3,458	\$3,640
24" RCP End Section	Each	2.0	\$400	\$40	\$760	\$800
Prefabricated Underdrain	L.F.	2,200	\$7.00	\$770	\$14,630	\$15,400
Non-Perforated 4" PE Outlet Pipe	L.F.	440	\$8.00	\$176	\$3,344	\$3,520
Splash Pad	Each	6	\$500	\$150	\$2,850	\$3,000
Wind Cone (Style 1, Size 2)	Each	1.0	\$8,500	\$425	\$8,075	\$8,500
Underground Cable	L.F.	5,824	\$1.00	\$291	\$5,533	\$5,824
Cable Trench	L.F.	4,078	\$1.50	\$306	\$5,811	\$6,117
Bare Counterpoise & Trench	L.F.	4,518	\$0.85	\$192	\$3,648	\$3,840
Base Mounted M.I.R.L.	Each	2	\$500	\$50	\$950	\$1,000
Stake Mounted M.I.R.L.	Each	12	\$400	\$240	\$4,560	\$4,800
Guidance Sign, One Module (Size 1, Style 4)	Each	1.0	\$2,000	\$100	\$1,900	\$2,000
Relocate PAPI-4L	Each	2.0	\$2,000	\$200	\$3,800	\$4,000
Fence, Class C (woven wire)	L.F.	1,870	\$4.00	\$374	\$7,106	\$7,480
Seeding and Miscellaneous	Acres	20	\$1,000	\$1,000	\$19,000	\$20,000
						\$651,094

Construct Parallel Taxiway (1,100' x 35'; 30,000 lbs SWG)

Erosion Control Barrier	L.F.	1,100	\$4.00	\$220	\$4,180	\$4,400
Class A Excavation	C.Y.	1,188	\$5.00	\$297	\$5,643	\$5,940
Fly Ash	Tons	183	\$18.00	\$165	\$3,129	\$3,294
4" Crushed Aggregate Base Course	S.Y.	6,721	\$3.50	\$1,176	\$22,347	\$23,524
6" P.C.C. Pavement	S.Y.	6,118	\$23.00	\$7,036	\$133,678	\$140,714
Reflectorized Pavement Marking	S.F.	2,838	\$0.75	\$106	\$2,022	\$2,129
24" RCP	L.F.	32	\$35	\$56	\$1,064	\$1,120
24" RCP End Section	Each	2	\$400	\$40	\$760	\$800
Prefabricated Underdrain	L.F.	1,100	\$7.00	\$385	\$7,315	\$7,700
Non-Perforated 4" PE Outlet Pipe	L.F.	220	\$8.00	\$88	\$1,672	\$1,760
Splash Pad	Each	2	\$500	\$50	\$950	\$1,000
2-4" PVC Concrete Encased Electrical Duct	L.F.	64	\$20.00	\$64	\$1,216	\$1,280
Guidance Sign, Two Module (Size 1, Style 4)	Each	2	\$2,000	\$200	\$3,800	\$4,000
Guidance Sign, Three Module (Size 1, Style 4)	Each	2	\$2,500	\$250	\$4,750	\$5,000
Stake Mounted M.I.T.L	Each	4	\$500	\$100	\$1,900	\$2,000
Retro Reflectors	Each	12	\$50.00	\$30	\$570	\$600
Seeding and Miscellaneous	Acres	2	\$1,000	\$100	\$1,900	\$2,000
						\$207,260

Subtotal Project Cost				\$42,918	\$815,437	\$858,354
Engineering, Administrative & Legal Costs (25%)				\$10,729	\$203,859	\$214,589
TOTAL PHASE II - RUNWAY AND TAXIWAY				\$53,647	\$1,019,296	\$1,072,943

PHASE III - TERMINAL AREA

Expand Aircraft Parking Apron and Taxilane (32,275 S.Y.)

Mobilization	L.S.	1	\$90,000	\$4,500	\$85,500	\$90,000
Class A Excavation	C.Y.	8,965	\$2.00	\$897	\$17,034	\$17,930
Erosion Control Barrier	L.F.	1,000	\$5.00	\$250	\$4,750	\$5,000
Fly Ash	Tons	1,380	\$18.00	\$1,242	\$23,598	\$24,840
4" Crushed Aggregate Base Course	S.Y.	32,275	\$3.50	\$5,648	\$107,314	\$112,963
6" P.C.C. Pavement	S.Y.	32,275	\$23.00	\$37,116	\$705,209	\$742,325
Reflectorized Pavement Marking	S.F.	1,240	\$0.75	\$47	\$884	\$930
Conventional Underdrains	L.F.	1,500	\$12.00	\$900	\$17,100	\$18,000
Non-Perforated 4" PE Outlet Pipe	L.F.	1,100	\$8.00	\$440	\$8,360	\$8,800
Underdrains Clean Out Risers	Each	4	\$180	\$36	\$684	\$720
Apron Lights	Each	3	\$15,000	\$2,250	\$42,750	\$45,000
Seeding and Miscellaneous	Acres	2	\$1,000	\$100	\$1,900	\$2,000
						\$1,068,508

Construct 10-Unit T-Hangar (15,840 S.F.)

Class A Excavation	C.Y.	415	\$5.00	\$2,075	\$0	\$2,075
Lime Treated Subgrade (9")	S.Y.	1,760	\$2.25	\$3,960	\$0	\$3,960
Crushed Aggregate Base Course (5")	S.Y.	1,760	\$5.50	\$9,680	\$0	\$9,680
Construct Concrete Hangar Pad (4")	S.Y.	1,760	\$42.00	\$73,920	\$0	\$73,920
Construct 10-Unit T-Hangar	S.F.	15,840	\$18.00	\$285,120	\$0	\$285,120
Seeding and Miscellaneous	Acres	1	\$1,000	\$1,000	\$0	\$1,000
Utility Hookup / Activation	L.S.	1	\$1,200	\$1,200	\$0	\$1,200
						\$376,955

Note: Hangar financing assumed through conventional methods using local (airport) funds or private investment options.

Construct 10-Unit T-Hangar (15,840 S.F.)

Class A Excavation	C.Y.	415	\$5.00	\$2,075	\$0	\$2,075
Lime Treated Subgrade (9")	S.Y.	1,760	\$2.25	\$3,960	\$0	\$3,960
Crushed Aggregate Base Course (5")	S.Y.	1,760	\$5.50	\$9,680	\$0	\$9,680
Construct Concrete Hangar Pad (4")	S.Y.	1,760	\$42.00	\$73,920	\$0	\$73,920
Construct 10-Unit T-Hangar	S.F.	15,840	\$18.00	\$285,120	\$0	\$285,120
Seeding and Miscellaneous	Acres	1	\$1,000	\$1,000	\$0	\$1,000
Utility Hookup / Activation	L.S.	1	\$1,200	\$1,200	\$0	\$1,200
						\$376,955

Note: Hangar financing assumed through conventional methods using local (airport) funds or private investment options.

Construct Common Hangar (3,600 S.F.)

Class A Excavation	C.Y.	200	\$5.00	\$1,000	\$0	\$1,000
Lime Treated Subgrade (9")	S.Y.	400	\$2.25	\$900	\$0	\$900
Crushed Aggregate Base Course (5")	S.Y.	400	\$5.50	\$2,200	\$0	\$2,200
Construct Concrete Hangar Pad (4")	S.Y.	400	\$42.00	\$16,800	\$0	\$16,800
Construct Common Hangar	S.F.	3,600	\$18.00	\$64,800	\$0	\$64,800
Seeding and Miscellaneous	Acres	1	\$1,000	\$1,000	\$0	\$1,000
Utility Hookup / Activation	L.S.	1	\$1,200	\$1,200	\$0	\$1,200
						\$87,900

Note: Hangar financing assumed through conventional methods using local (airport) funds or private investment options.

Construct Common Hangar Auto Access (900 S.Y.)

Mobilization	L.S.	1	\$5,000	\$5,000	\$0	\$5,000
Class A Excavation	C.Y.	300	\$5.00	\$1,500	\$0	\$1,500
Erosion Control Barrier	L.F.	200	\$4.00	\$800	\$0	\$800
7" Crushed Aggregate Base Course	S.Y.	900	\$7.00	\$6,300	\$0	\$6,300
3" Bituminous Surface Course	Tons	157	\$40.00	\$6,280	\$0	\$6,280
Asphalt Cement	Tons	10	\$125	\$1,250	\$0	\$1,250
Bituminous Prime Coat	Gal	2,450	\$1.50	\$3,675	\$0	\$3,675
Bituminous Tack Coat	Gal	368	\$1.50	\$552	\$0	\$552
24" CMP	L.F.	200	\$35.00	\$7,000	\$0	\$7,000
24" CMP End Section	Each	2	\$400	\$800	\$0	\$800
Seeding and Miscellaneous	Acres	4	\$1,000	\$4,000	\$0	\$4,000
						\$37,157

Subtotal Project Cost	\$932,392	\$1,015,082	\$1,947,475
Engineering, Administrative & Legal Costs (25%)	\$233,098	\$253,771	\$486,869
TOTAL PHASE III - TERMINAL AREA	\$1,165,490	\$1,268,853	\$2,434,343

Subtotal Project Cost	\$975,310	\$1,830,519	\$2,805,829
Engineering, Administrative & Legal Costs	\$243,828	\$457,630	\$701,457
TOTAL PHASE III DEVELOPMENT	\$1,219,138	\$2,288,148	\$3,507,286

Subtotal All Projects	\$3,316,490	\$13,908,534	\$17,225,024
Engineering, Administrative & Legal Costs	\$797,056	\$2,867,860	\$3,664,916
TOTAL DEVELOPMENT COST	\$4,113,546	\$16,776,394	\$20,889,940



LAWRENCE SMITH MEMORIAL AIRPORT

AIRPORT MASTER PLAN UPDATE

Appendix G

AGENCY RESPONSE LETTERS (ENVIRONMENTAL REVIEW)

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES

Bob Holden, Governor • Stephen M. Mahfood, Director

www.dnr.state.mo.us

December 11, 2003

Robert W. Crain
Bucher, Willis & Ratliff
7920 Ward Parkway
Kansas City, Missouri 64414-2021

Re: Lawrence Smith Memorial Airport Expansion (FHWA) Harrisonville, Cass County, Missouri

Dear Mr. Crain:

Thank you for submitting information on the above referenced project for our review pursuant to Section 106 of the National Historic Preservation Act (P.L. 89-665, as amended) and the Advisory Council on Historic Preservation's regulation 36 CFR part 800, which require identification and evaluation of cultural resources.

We have reviewed the information provided concerning the above referenced project. We have determined that due to the moderate to high potential for the presence of archaeological sites near and within the area of the proposed project, as indicated by the presence of known sites on similar topographic locations in the vicinity, an archaeological survey should be conducted. This survey should be completed prior to the initiation of project-related construction activities.

A list of independent archaeological contractors who can perform such services is available through the Department of Natural Resources, Division of Administrative Support. The list can be obtained by calling (573) 751-0958 and requesting the "archaeological contractors list." Note that any 36 CFR Part 61 qualified archaeologist may perform an archaeological survey. If you choose a contractor not on the list, please be certain to include his or her curriculum vitae in the report. We would appreciate two (2) copies of the archaeological survey report when it is finished so we may complete the review and comment process.

If you have any questions, please write Judith Deel at State Historic Preservation Office, P.O. Box 176, Jefferson City, Missouri 65102 or call Ms. Deel at 573/751-7862. Please be sure to include the **SHPO Log Number (006-CS-04)** on all future correspondence or inquiries relating to this project.

Sincerely,

STATE HISTORIC PRESERVATION OFFICE



Mark A. Miles
Director and Deputy State
Historic Preservation Officer

c Peggy Casey, FHWA
Bob Reeder, MoDOT
Kathy Harvey, MoDOT
Rick DeLuca, Harrisonville



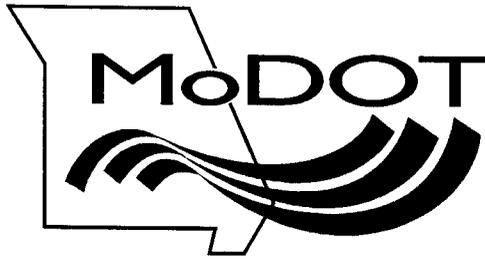
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CORPORATION
KANSAS CITY, MO

Integrity and excellence in everything we do



Missouri
Department
of Transportation



Sabin A. Yañez, District Engineer

District 4 – Kansas City Area
600 NE Colbern Road
Lee's Summit, MO 64086
(816) 622-6500
Fax (816) 622-0699
Toll free 1-888 ASK MoDOT
www.modot.state.mo.us

December 19, 2003

Mr. Robert W. Crain
Airport Planner
Bucher, Willis, & Ratliff Corporation
7920 Ward Parkway
Kansas City, MO 64114-2021

Dear Mr. Crain:

I have made a cursory review of the material you provided on the expansion on the airport in Harrisonville and do not see any conflicts with planned improvements on US71.

We do not have funding in our current five-year plan to improve this US71 and its outer roadways in this area but we hope to add a resurfacing project to the program as soon as funding becomes available. This project would start at the new concrete pavement on US71 just north of this location and extend south to the Bates/Cass County line. This work would not be part of any upgrade of US71 to interstate I-49 as discussed in our previous phone conversation.

We currently have no plan to upgrade US71 to interstate I-49 north of Joplin, Missouri. There are several groups in southwest Missouri who would like to see US71 upgraded to I-49 from Joplin north to I-435 and I-470 in Kansas City. If such a plan was ever funded, the 283rd Street crossover would most likely be replaced with a bridge overpass not a full interchange unless the crossing was moved further south to get a greater separation from the current Route 7 Interchange in Harrisonville.

Please keep in mind that any construction work on the Missouri Department of Transportation (MoDOT) right of way along US71 or its outer roads will require a permit from MoDOT. I am forwarding your letter and information packet to our permit section for further comments.

If you have any further questions or comments, please call me at (816) 622-0474.

Sincerely,

Steven D. Hamadi, P.E.
Transportation Project Manager

Copy to: Mr. Norm Beeman-4tr





DEPARTMENT OF THE ARMY
KANSAS CITY DISTRICT, CORPS OF ENGINEERS
700 FEDERAL BUILDING
KANSAS CITY, MISSOURI 64106-2896

REPLY TO
ATTENTION OF:

December 22, 2003

Regulatory Branch
(200400339)

Mr. Robert W. Crain
Bucher, Willis & Ratliff Corporation
7920 Ward Parkway
Kansas City, Missouri 64114-2021

RECEIVED
DEC 24 2003
BWR **BUCHER, WILLIS & RATLIFF**
CORPORATION
KANSAS CITY, MO

Dear Mr. Crain:

This is in reply to your December 9, 2003, letter requesting permitting requirements for proposed improvements to the Lawrence Smith Memorial Airport. The project is located in Sections 16 and 21, Township 44 north, Range 31 west, Cass County, Missouri.

The Corps of Engineers has jurisdiction over all waters of the United States. Discharges of dredged or fill material in waters of the United States, including wetlands, require prior authorization from the Corps under Section 404 of the Clean Water Act (33 USC 1344). The implementing regulation for this Act is found at 33 CFR 320-330.

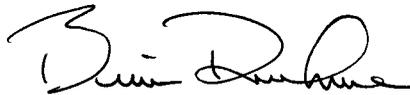
Information submitted with your letter indicates expansion of the runway across a tributary of the East Fork, South Grand River. If this is the preferred alternative chosen for the Master Plan being developed for the airport, a delineation of the affected channel impacts will be required to further evaluate permit requirements. Should the proposed improvements require the discharge of dredged or fill material in any waters of the United States, including wetlands, a Department of the Army (DA) permit may be required. However, if the proposed improvements do not require the discharge of dredged or fill material in any waters of the United States, including wetlands, a DA permit will not be required.

A pond and other facilities proposed for removal were mentioned in your letter. The location and character of this pond and possible associated wetlands were not clearly identified on the maps submitted with your letter. If there is any question regarding wetlands being involved, a preliminary jurisdictional wetland determination should be submitted to the Kansas City District Corps of Engineers for DA permit requirements.

Federal regulations require that a DA permit be issued by the Corps of Engineers prior to the initiation of any construction on the portion of a proposed activity that is within the Corps' regulatory jurisdiction.

If you have any questions concerning this matter, please feel free to contact me at 816-983-3703 (FAX 816-426-2321). Please reference Permit No. 200400339 in all comments and/or inquiries relating to this project.

Sincerely,

A handwritten signature in black ink, appearing to read "Brian Donahue". The signature is fluid and cursive, with a large initial "B" and a long, sweeping underline.

Brian T. Donahue
Regulatory Specialist
Kansas City Regulatory Branch



MISSOURI DEPARTMENT OF CONSERVATION

Headquarters

2901 West Truman Boulevard, P.O. Box 180, Jefferson City, Missouri 65102-0180

Telephone: 573/751-4115 ▲ Missouri Relay Center: 1-800-735-2966 (TDD)

JOHN D. HOSKINS, Director

January 7, 2004

Mr. Robert W. Crain
Bucher, Willis & Ratliff
7920 Ward parkway
Kansas City, Missouri 64114-2021

Dear Mr. Crain:

Re: Lawrence Smith Memorial Airport – Cass County, MO

Thank you for your letter of December 4, 2003, regarding species of conservation concern within the proposed project area.

A review of our records shows that sensitive species or communities are not known to exist on or near the above referenced site. This reflects information we currently have in our database. Please be advised this is **not a site clearance letter**. Rather, this letter provides an indication of whether or not public lands and sensitive resources are known to be (or are likely to be) located close to the proposed project.

Incorporating information from our Heritage Database into project plans is an important step that can help reduce unnecessary impacts to Missouri's sensitive natural resources. However, the Heritage Database is only one reference that should be used to evaluate potential adverse impacts. Other types of information, such as wetland and soils maps and on-site inspections or surveys, should be considered. Reviewing current landscape and habitat information and species biological characteristics would additionally ensure that species of conservation concern are appropriately identified and addressed.

The project area occurs in a region of karst geology. These areas are characterized by subterranean water movement. Features like caves, springs, and sinkholes are common. Cave fauna are influenced by water pollution and other changes to water quality. Every effort should be made to protect groundwater in the project area.

Thank you for the opportunity to review and comment.

Sincerely,

SHANNON CAVE
PUBLIC INVOLVEMENT COORDINATOR

SDC:be

COMMISSION

STEPHEN C. BRADFORD
Cape Girardeau

ANITA B. GORMAN
Kansas City

CYNTHIA METCALFE
St. Louis

LOWELL MOHLER
Jefferson City

RECEIVED
JAN 12 2004
BUCHER, WILLIS & RATLIFF
CORPORATION
KANSAS CITY, MO

FARMLAND CONVERSION IMPACT RATING

PART I (To be completed by Federal Agency)		Date Of Land Evaluation Request 12/11/03			
Name Of Project Lawrence Smith Memorial Airport		Federal Agency Involved Bucher, Willis & Ratliff Corp.			
Proposed Land Use Aeronautical Purpose		County And State Cass, Missouri			
PART II (To be completed by NRCS)		Date Request Received By NRCS			
Does the site contain prime, unique, statewide or local important farmland? (If no, the FPPA does not apply -- do not complete additional parts of this form).		Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Acres Irrigated ---	Average Farm Size 204
Major Crop(s) Corn / Soybeans	Farmable Land In Govt. Jurisdiction Acres: 395,524 % 88.00	Amount Of Farmland As Defined in FPPA Acres: 395,524 % 88.00			
Name Of Land Evaluation System Used LESA	Name Of Local Site Assessment System ---	Date Land Evaluation Returned By NRCS 12/12/03			
PART III (To be completed by Federal Agency)		Alternative Site Rating			
		Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly		134.0			
B. Total Acres To Be Converted Indirectly		132.0			
C. Total Acres In Site		266.0	0.0	0.0	0.0
PART IV (To be completed by NRCS) Land Evaluation Information					
A. Total Acres Prime And Unique Farmland		263.0			
B. Total Acres Statewide And Local Important Farmland					
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted		0.067			
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value		47.8			
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value Of Farmland To Be Converted (Scale of 0 to 100 Points)		76.0	0	0	0
PART VI (To be completed by Federal Agency) Site Assessment Criteria (These criteria are explained in 7 CFR 658.5(b))		Maximum Points			
1. Area In Nonurban Use		15	12		
2. Perimeter In Nonurban Use		10	9		
3. Percent Of Site Being Farmed		20	9		
4. Protection Provided By State And Local Government		20	0		
5. Distance From Urban Builtup Area		0	10		
6. Distance To Urban Support Services		0	7		
7. Size Of Present Farm Unit Compared To Average		10	0		
8. Creation Of Nonfarmable Farmland		25	10		
9. Availability Of Farm Support Services		5	0		
10. On-Farm Investments		20	1		
11. Effects Of Conversion On Farm Support Services		25	0		
12. Compatibility With Existing Agricultural Use		10	10		
TOTAL SITE ASSESSMENT POINTS		160	68.0	0	0
PART VII (To be completed by Federal Agency)					
Relative Value Of Farmland (From Part V)		100	76.0	0	0
Total Site Assessment (From Part VI above or a local site assessment)		160	68.0	0	0
TOTAL POINTS (Total of above 2 lines)		260	144.0	0	0
Site Selected:		Date Of Selection		Was A Local Site Assessment Used? Yes <input type="checkbox"/> No <input type="checkbox"/>	
Reason For Selection:					



BUCHER, WILLIS & RATLIFF
CORPORATION

7920 Ward Parkway
Kansas City, Missouri 64114-2021
816/363-2696
BWR 2003-191