FLOYD W. JONES – LEBANON AIRPORT MASTER PLAN UPDATE

PREPARED FOR THE CITY OF LEBANON, MISSOURI

FINAL DRAFT

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CHAPTER ONE - INTRODUCTION

1 INTRODUCTION

AIRPORT PLANNING STUDY PROGRAM

AIRPORT STUDY PURPOSE

The Floyd W. Jones Lebanon Airport Master Plan Update has been initiated by the City of Lebanon (Airport Sponsor) to assess the future role of the 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 importance of aviation in the overall concept of community and transportation planning.

STUDY GOALS

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

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 answers several basic questions about the role and function of the Lebanon Airport, including:

- *What is the Airport's existing and future service role?*
- *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 strategies?*
- *What are the preferred airfield and terminal area development options?*
- *Estimated project costs associated with the development program?*
- *How will continued airport development affect the surrounding environment?*

Answers to these items provide the City of Lebanon with information and a schedule of needs to make an informed decision about the future of the Lebanon Airport.

Above all, 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 GOALS

Through a review of background information and from discussions with City officials and the MoDOT, Aviation Section, the major planning issues to be addressed as part of the Lebanon Master Plan Study are:

- *Identify future airport role and function at the existing airport site.*
- *Determine future runway expansion needs. Quantify existing and expected airport activity in terms of current MoDOT / FAA airport design standards and airspace criteria. As part of this, identify the performance capabilities of the most demanding aircraft (critical aircraft) in order to relate physical design needs into recommended airport facility improvements. Identify and depict airfield alternatives, which provides realistic options to expand the airport – as demand warrants.*
- *Examine airport design and airspace architecture issues for establishing improved and new instrument approach procedures.*
- *Identify future taxiway system needs based on appropriate design standards.*
- *Assess the future function and needs of the crosswind runway system.*
- *Determine favorable terminal area alternatives that provide a financially functional and realistic option to meet pilot demand levels, and other franchise airport activities.*
- *Determine future airport land requirements for general aviation expansion, on-airport commercial expansion, and land use compatibility.*

PLANNING STUDY AGREEMENT

In July 2001, the City of Lebanon, Missouri entered into an agreement with Scott Consulting Engineers and Bucher, Willis & Ratliff Corporation (BWR) for the preparation of the Airport Master Plan Update to the Floyd W. Jones – Lebanon Airport. The plan is funded 90 percent by the MoDOT - Aviation Section, and 10 percent by the City of Lebanon.

STUDY COORDINATION

Overall, the Airport Master Plan 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 Plan represents the long-term intentions regarding the location and extent of airport facility improvements at Lebanon.

The study 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.

AIRPORT ADVISORY COMMITTEE

An Airport Advisory Committee has been established to facilitate coordination of this Master Plan at the local level. The Committee is comprised of local officials, aviation users, local businesses and community residents. Meaningful input received from the Committee during project 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 Committee 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 (6) 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
Floyd W. Jones – Lebanon Airport

ELEMENT 1 – INVENTORY
- Airport "Kick-off" Meeting #1
- Airport Inventory and Condition Assessment
- Interview Business Firms/Major Users/Pilots
- Review Existing Airport Data/ Plans/Documentation
- Determine Existing Airport Activity Levels
- Determine Airport Service Area
- Identify Existing Critical Aircraft
- Complete Wind/Meteorological Analysis
- Socio-Economic Analysis

ELEMENT 2 – AIRPORT DEMAND FORECASTS
- Based Aircraft/Operational Forecast
- Instrument Operation Forecast
- Identify Activity by FAA Airport Design Categories
- Fleet Mix Forecast/Critical Aircraft
- **City/MoDOT Working Paper #1 (60 Days)**
- Technical Airport Meeting #2

ELEMENT 3 – FACILITY REQUIREMENTS /DESIGN OPTIONS
- 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)**
- Technical Airport Meeting #3

ELEMENT 4 – ENVIRONMENTAL ANALYSIS
- Environmental Coordination
- Affected Environmental Analysis
- Summary of Permits/Certifications
- **City/MoDOT Working Paper #3 (60 Days)**

ELEMENT 5 – AIRPORT PLANS
- Airport Layout Drawing (Change #6)
- 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)**

ELEMENT 6 – AIRPORT IMPROVEMENT PLAN
- Project Schedule/Phasing
- Project Cost Estimates
- Financial Plan
- **City/MoDOT Working Paper #4 (60 Days)**
- Technical Airport Meeting #4

ELEMENT 7 – FINAL DELIVERABLES
- Final Draft Report/Drawings
- City and MoDOT Final Review
- Deliver Final Report Copies and Drawing Documents
- **Transmit Final Draft Report/Plans (30 Days)**
- Transmit Final Report/Plans to State and Sponsor

- Study Task (Note: total planning project time frame is exclusive of Sponsor / State / FAA review).
- Deliver Working Paper to City and State for review and coordination (completion days).
- Public meeting with Airport Sponsor.

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

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CHAPTER TWO - AIRPORT INVENTORY

2 AIRPORT INVENTORY

FACILITY INVENTORY

The inventory, as the initial step in the airport planning program, is a systematic data collection that provides an understanding of past and present aviation factors at Lebanon. A comprehensive inventory, including the following major inventory tasks, is used to form the basis for airport recommendations throughout the Master Plan study.

- An on-site inspection (conducted by the consultant in October 2001) and 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;

- Discussions with City officials, the local Economic Development members, Airport Manager/Fixed Base Operator (FBO), and airport tenants regarding recent airport trends, operations, and services;

- The collection of airport activity data, project records, and aeronautical background information; a review of historical airport information, previous airport layout plans, maps, charts, and photographs of airport facilities including a record search and review of local airport-related ordinances, policies, operating standards and lease agreements;

- The collection of regional, county, city and airport development information to understand regional economic conditions, and to determine the surrounding airport service area characteristics;

- Obtain current and planned on- and off-airport land use development and property information, including surrounding land use patterns, existing and proposed transportation developments, infrastructure and utilities.

- The collection of regional climatic information, including predominate winds, cloud and visibility conditions and precipitation levels;

- The distribution of an Airport 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 Lebanon, which serves as the county seat and main economic center for Laclede County, is located in southwest Missouri. The Floyd W. Jones - Lebanon Airport (LBO) is located three miles south of the Lebanon central business district. From the City, airport access is gained along State Highway 5, a primary north-south route through the City, which intersects U.S. Highway 44, a mile and a half north of the Airport.

CURRENT AIRPORT ACTIVITY

Based on information gathered in June 2001, there are 46 based aircraft (35 single-engine, 7 multi-engine, and 4 jet) and 20,600 annual operations conducted at the Lebanon Airport.

CURRENT AIRPORT ROLE

The FAA *National Plan of Integrated Airport Systems 1998-2002* (NPIAS) identifies Lebanon Airport as a general aviation airport facility. Based on the application of airport design criteria from FAA *Advisory Circular 150/5300-13, Change #6, Airport Design*, the Airport has an Airport Reference Code (ARC) of B-II.

AIRPORT OWNERSHIP AND MANAGEMENT

The Lebanon Airport is a publicly operated facility, in which the City of Lebanon is responsible for maintaining and operating in accordance with MoDOT, Aviation Section and Federal Aviation Administration (FAA) grant assurance agreements.

AIRPORT SERVICES

Airport and aircraft provisions at Lebanon include public-use services for a variety of general aviation aircraft, including the accommodation of pilot, passenger and patron activities. The Airport is attended during daylight and early-evening hours, and on demand as requested. Under the current arrangement the City, in cooperation with the Fixed Base Operator (Lebanon Aviation Services), provides the following aeronautical services:

- Aviation fuel and oil sales
- Aircraft storage and tie-downs
- Other ancillary support services
- Pilot supplies/materials/equipment
- Pilot/passenger lounge-flight planning

AIRPORT DEVELOPMENT HISTORY

Table 2.1 provides an overview of the Lebanon Airport project development history, as accomplished through federal and state grant assistance. Throughout the Airport's history, a total of $2.4 million in federal and state funding has been expended on airport development projects.

Table 2.1
Grant-Assisted Airport Development Project History
Floyd W. Jones – Lebanon Airport

Year	Airfield Project Description	Total Cost
2001	Airport Master Plan Update.	$65,914
1987	Construct, mark, and drain partial (N/S) parallel taxiway (approx. 750' x 40'); reconstruct, mark and drain connecting taxiway (approx. 450' x 35') and apron (approx. 700' x 200'); install tiedowns.	$912,452
1986	Runway Edge Drains, Airport Layout Plan Update (ALP).	$169,466
1984	Reconstruct a portion (north 4,000' x 75'), overlay, and mark existing Runway 18-36 (5,000' x 75'), install visual approach slope indicator system, Runway 18 and 36; install runway under drains (approximately 2,400 l.f.).	$471,071
1980	Land reimbursement Tracts 2, 3 and 4 (fee simple). Extend Runway 18-36 from 4,000' x 75' to 5,000' x 75' and light (MI) 5,000,' installation of visual approach slope indicators (VASI-4L) Runway 18 and 36; construct and light partial parallel and connecting taxiway (approx. 1,200' x 40'); fencing (approx. 22,000 l.f.), marking, drainage, seeding.	$660,000
1971	Construct aircraft parking apron (129' x 610').	$32,341
1965	Land acquisition (fee simple title – Tracts 1, 5 and 8; avigation easement – Tract 6); construct bituminous N/S runway (3,500' x 60') and E/W runway (approx. 2,300' x 50'); construct bituminous taxiways (approx. 1,490' x 30'); install low intensity lighting system (LIRL) on N/S and E/W runways; runway and taxiway marking; obstruction removal.	$120,868
	Total	**$2,432,112**

Airport Capital Improvement Projects:
FY2004: Extend and widen Runway 18-36.
FY2005: Extend parallel taxiway.

State Block Grant – Standby Projects:
Construct parallel taxiway extension and connecting taxiways to Runway 18-36; construct turnaround pad for Runway 9; improve safety area; install perimeter fence.

Note: Federal project costs reflect only eligible projects under the federal airport aid program(s), and do not include routine operational and maintenance costs assumed by the city or individuals.

Source: Project History (Recorded FAA Grant Agreements) FAA File Search – May 2001.

AIRFIELD CONFIGURATION AND FACILITIES

Exhibit 2.1 depicts the existing airport facilities at Lebanon Airport. **Table 2.2** describes the major airfield facilities and equipment along with a corresponding assessment of physical condition based on a July, 2001 site investigation by the consultant.

GENERAL AIRFIELD INFORMATION

The published airport elevation is 1,320.5' mean sea level (surveyed) with an airport reference point of N37°38'49.83" latitude and W092°39'13.51" longitude. The current magnetic declination for Lebanon Airport is 2°9' E (National Geophysical Data Center, 2001 - magnetic variation is approximately minus 7 minutes east per year). The airport property totals approximately 269 acres.

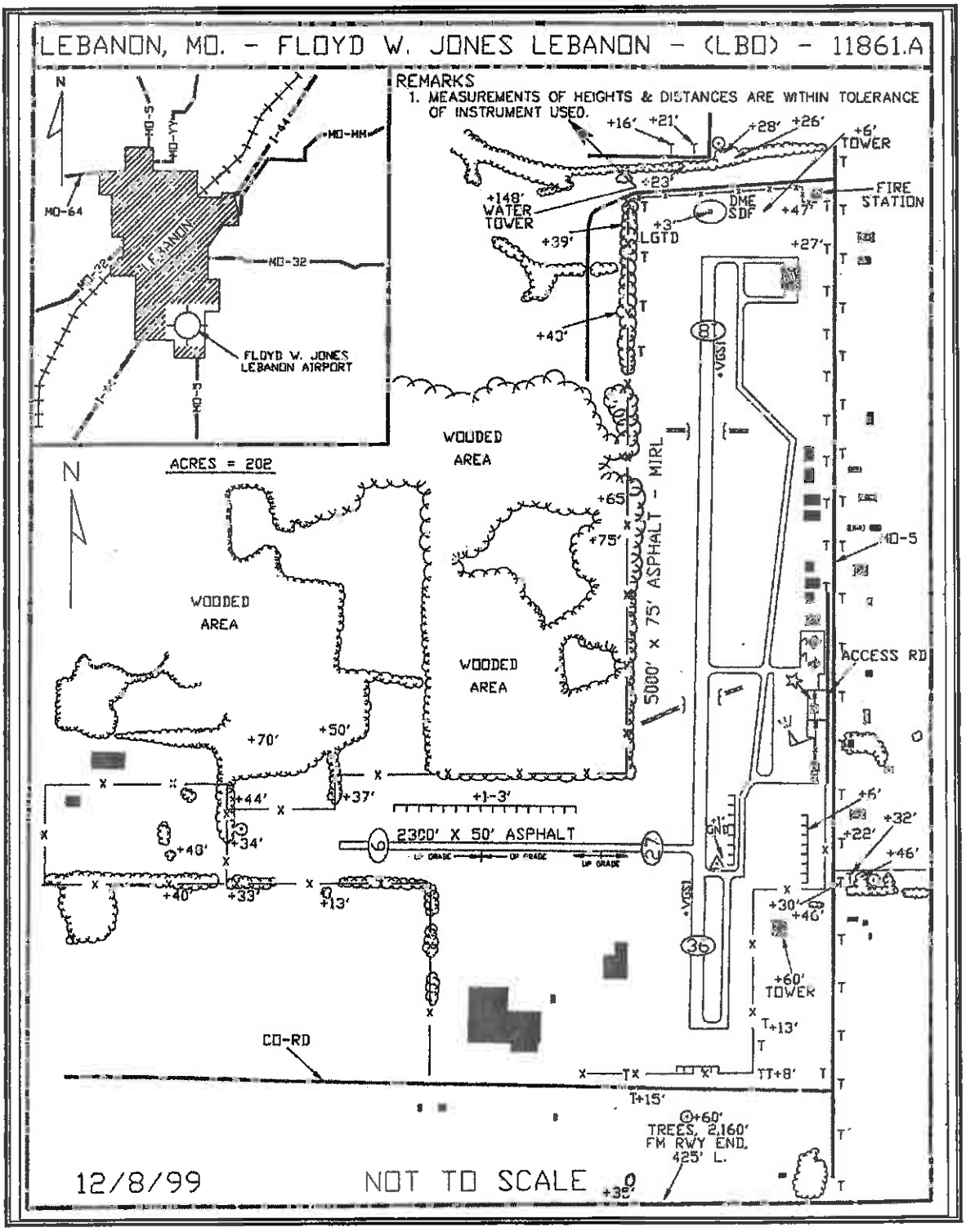
Runway System

The airfield configuration consists of two intersecting paved runways, including the primary Runway 18-36 (5,000' x 75') and a crosswind Runway 9-27 (2,374' x 50'). Both runways provide unrestricted takeoff and landing distances based on published information, with Runway 18-36 served by a full-parallel taxiway system. Runway 9-27 is accessed by crossing Runway 18-36. Runway 18-36 is a non-precision instrument runway with an estimated pavement strength of 54,000 pounds (dual wheel gear). Runway 9-27 is a visual runway with an estimated pavement strength of 12,500 pounds (single wheel gear). The Runway 18-36 pavement is in fair to good condition, with minor edge cracking (base material reported in poor condition). The Runway 9-27 pavement condition is in good condition.

Taxiway System

The taxiway system entails a full-length parallel to Runway 18-36, including entrance taxiways to the north and south threshold and two exit taxiways providing access to the main terminal and hangar areas. The taxiway width is 30 feet wide, with a runway centerline offset separation of 200 to 540 feet. The parallel taxiway configuration, as constructed along the original stabilized turf runway, contains excessive centerline curves that make it difficult for larger aircraft to navigate, especially at night (jet aircraft often "back-taxi" down the runway to avoid using the taxiway due to the pavement condition and alignment). Overall, the "asphalt" taxiway sections are in very poor condition, with extensive areas of cracking, patching and surface deterioration. The "concrete" taxiway and taxilane pavement areas are in fair condition, needing crack sealing.

EXHIBIT 2.1: AIRPORT LOCATION / FACILITY MAP



Source: MODOT 5010 *Airfield Inspection* Form – Lebanon Airport - 1999.

Table 2.2
Existing Airfield Facilities and Condition
Floyd W. Jones – Lebanon Airport

Airfield Item	Description and Size	Condition
	Runway Facilities & Equipment	
RUNWAY 18-36		
Runway Surface	5,000' x 75' (Asphalt); 54,000 pounds (dual wheel gear) – est.	Fair-Good
True Runway Bearing	1.70° (ADAM Survey, 1990)	--
Pavement Markings	Non-Precision Instrument	Fair-Poor
Runway Lighting	Medium Intensity Runway Lighting (MIRL), Pilot Control*	Fair
	REIL – Rwy 36 (nonstandard location)	Fair-Good
Visual Approach Aids	Pulsating Approach Slope Indicator (PLASI) – Rwy 18 & 36**	Poor
	*Runway lighting low intensity until pilot activated.	
	**PLASI light slope out of compliance	
RUNWAY 9-27		
Runway Surface	2,374' x 50' (Asphalt); 12,500 pounds (single wheel gear) – est.	Good
True Runway Bearing	271.01° (ADAM Survey, 1990)	--
Edge Lighting	None	--
Pavement Markings	Basic (Centerline striping)	Good
Visual Approach Aids	None	--
	Taxiway Facilities & Equipment	
Parallel Taxiway System	Full –parallel system to Runway 18-36 (30') 200' to 540' offset	Fair-Poor
Exit Taxiways	Taxiways serving Runway 18-36 ends (40')	Fair-Poor
Mid-field Taxiways	Mid-field taxiways (concrete)	Good
Pavement Strength	Unknown – pavement analysis needed	--
Taxiway Lighting	Radius – (two on each side of taxiway entrance)	Fair/Poor
Taxiway Marking	Non-standard marking	Poor
	Note: Non-standard taxiway separation for north and south taxiway segments.	
	Additional Airfield Items	
Airport Rotating Beacon	Tower construction, adjacent to east side of apron	Fair
Wind Indicator	Located on light pole behind fuel storage tanks	Fair
Airfield Signs	Located on runways and taxiways	Poor
Non-Directional Beacon	Located 4.2 NM south of Runway 36 end	Good
Airport Electrical Vault	Located in building south of terminal building	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

Note: Pavement strength is estimated since recent overlay projects. A new pavement analysis will be required to determine "existing" pavement strength.

Source: BWR Inventory Airfield Inspection – October 2001.

AIRPORT COMPLIANCE ISSUES

As obtained through prior airfield inspection from MoDOT – Aviation Section, and per an airport site investigation conducted by the consultant, several airport compliance issues have been identified, as per previous notification.

Runway/Airfield

The runway visibility zone (RVZ) for Runway 9 and 18 contain multiple trees, which are violations to FAR Part 77. The RPZ should be controlled by the Airport to mitigate obstructions. Runway 27 contains non-compatible land uses (church). The RPZ should be under control of the Airport and remain free of any place of public assembly, residence, and fuel storage. The Runway 9-27 line-of-sight standards are violated by longitudinal/centerline grade changes. Based on airport design standards, Runway 9-27 does not meet the minimum design standards for a crosswind runway serving ARC A-I, utility aircraft (3,000' x 60'). Further pavement strength analysis should be conducted. The pulsating approach slope indicator (PLASI) lights at Lebanon have non-standard glide paths. The PLASI for Runway 18 was measured at 37 feet for the threshold crossing height and 27 feet on Runway 36. The latest FAA recommended threshold crossing height is approximately 40 feet. Some of the runway edge lights are lower than 14 inches above the finished grade of the safety area.

Taxiway System

The full-length parallel taxiway system serving Runway 18-36 has a runway-to-taxiway centerline separation varying between 200 to 540 feet. Based on the current airport role, the standard runway-to-taxiway centerline separation for an ARC B-II runway is 240 feet.

Airport Safety Areas

Runway and taxiway safety areas (OFA/RSA/TOFA) should be cleared and graded to prevent potentially hazardous ruts, humps, depressions, or other surface variations. Non-standard "Hold Short" signs are located in the taxiway safety area. All signs should be mounted on low impact resistant supports of the lowest practical height with the frangible point no higher than 3" above grade.

FAR Part 77 Surfaces

Runway 18-36 and Runway 9-27 have multiple obstructions to the FAR Part 77 surfaces. The approach surface on Runway 18 contains trees 23 feet to 28 feet higher than the runway threshold elevation, 600 feet to 675 feet north of the runway end and east and west of the extended runway centerline. Runway 36 contains trees 60 feet higher than the runway threshold elevation, 2,160 feet south of the runway end and 425 feet west of the extended runway centerline. The approach surface on Runway 9

contains trees 28 feet to 34 feet higher than the runway threshold elevation, 750 feet to 775 feet west of the runway end, and 50 feet to 150 feet north of the extended runway centerline. The Runway 27 approach surface contains trees 46 feet higher than the runway threshold elevation, located 1,010 feet east of the runway end, and 175 feet south of the extended runway centerline. In addition, tall trees and high ground violate the transitional and primary surfaces of both runways. High ground violates the primary surface north of Runway 9-27 and east of Runway 27 threshold. Tall trees violate the 7 to 1 transitional surface along the north side of Runway 9-27. Tall trees violate the 7 to 1 transitional surface along the west side of Runway 18-36 and high ground violates the transitional surface on the east side.

Airport Marking and Signage

Non-standard runway holding position markings and signs (140 feet) at several taxiway locations. Taxiways do not have the recommended markings, markings are in poor condition, and centerline markings do not extend onto the runway. Several hangar taxiways do not have the recommended safety areas or object free areas. "Distance Remaining" signs on the primary runway need repainted and mounted on frangible mounts. Additional directional signage is needed for the terminal area to prevent unwanted vehicular traffic from entering the runways, taxiways, aircraft aprons, and hangar areas.

Airport Fencing and Security

Airport fencing is inadequate to preclude wildlife (i.e. deer) from entering the airport environment. Wildlife can, and have, imposed serious danger to landing and departing aircraft. More substantial fencing is needed to adequately to protect aircraft and wildlife. In addition, security fencing and access gates in the terminal area should be installed to deter unauthorized people and vehicles from the Airport where public access is not permitted.

TERMINAL AREA FACILITIES

The terminal area, located on the east side of the airfield, consists of buildings and structures central to the operation, function and promotion of the Airport, including public-use airport facilities and buildings occupied by private and commercial enterprises. The following are major terminal area/landside facilities:

- Terminal building / offices / lounge
- General aircraft storage / tie-down areas
- Public automobile parking lot
- Airport utilities (power, water and sewer)
- Aircraft maintenance hangar
- Aircraft fuel facility / storage
- Service equipment

The core terminal area, including the terminal building, main apron, and fueling facilities, is physically constrained due to the proximity of Highway 5 on the east and the parallel taxiway system serving Runway 18-36. In addition, the landside development area is limited due to the required separation from the Runway 18-36 centerline for airspace clearance and the Runway 27 protection zone area. The hangar development area is similarly constrained, with drainage and grade factors a limitation to future expansion capabilities.

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

Airport Terminal Office

As identified in **Table 2.3** the terminal building contains a foyer area, service/sales counter area, office area, kitchen, dining area, weather briefing room, and restroom facilities. The FBO (Airport Manager) operates from the terminal building in providing administrative duties and operational coordination, including the daily preparation of food for transient pilots and passengers.

Aircraft Hangars

Lebanon currently has eleven common hangars and three T-hangars located along the east-side terminal area complex. One of the common hangars is located within City property not designated as airport property, with access provided along two connecting taxiways. As indicated in **Table 2.3**, most of the common hangars are in good to fair condition, with two hangars in poor condition. Electrical hookup, water and sewage are provided to each hangar. Most of the hangar access taxiways are in fair condition with several areas in poor condition exhibited by cracking asphalt or broken concrete. Two T-hangars have gravel access taxiways. There are currently three T-hangars filled to capacity with no available space for additional aircraft and approximately 10 aircraft owners on the "hangar waiting list."

Aircraft Apron

The main aircraft apron (181,440 S.F.) is located directly west of the terminal building. The proximity of the apron provides immediate access to the terminal building and fuel services for based and transient pilots, containing 34 tie-down spaces (painted and roped) available for on-demand use. Currently, there are 12 based aircraft using tie-downs at Lebanon. The concrete apron is in good to fair condition with minor cracks and grass growing through the seams of the concrete panels.

Aviation Fuel Storage

The FBO provides aircraft fueling services with two dedicated aviation fuel trucks – Jet A (1,200 gallons) and 100LL (2,200 gallons). Two underground storage tanks (12,000 gallons per tank) are located on the east side of the aircraft apron, south of the terminal building. Interest has been expressed in providing additional Jet-A storage capacity. The fuel trucks and tanks are owned by the City.

Ground Access and Parking

The main airport entrance from State Highway 5, with no dedicated turn lane, is located directly east of the airport terminal building and uncontrolled by traffic lights or signs. The main terminal building parking area contains approximately 15 parking spaces. A paved, unsecured hangar access road runs east of the terminal area with parking situated directly behind each of the airport hangars on paved/gravel surfaces. An additional hangar entrance road is located at the north end of the hangar access road. Airport utility equipment (tractors, trucks, etc.) is stored behind the old terminal building.

Terminal Area Lighting

Lighting for the terminal area is provided by pole mounted lights on the east side of the parking apron. Individual hangar lighting is provided through structure mounted or pole mounted lighting.

Table 2.3 lists the existing terminal area (landside) facilities at the Lebanon Airport.

Table 2.3
Airport Terminal Area Facilities
Floyd W. Jones – Lebanon Airport

Item	Physical Characteristics			Dimension/Size
Apron	Concrete Parking Apron – 34 tie down spaces			240' x 756'(20,160 S.Y.)
Aviation Fuel	100LL – Storage Tank & Service Truck Jet-A – Storage Tank & Service Truck			12,000 / 1,200 Gal. 12,000 / 2,200 Gal. 24,000 / 3,400 Gal.
Auto Parking	15 paved parking spaces at airport terminal building			N/A
Ref #	**Airport Buildings**	**Tenant(s)**	**Building Facilities**	**Dimension/Size (S.F.)**
A1	Terminal Building	Lebanon Aviation	Airport offices/FBO	1,800 S.F.
	Hangar Style	**Structure Condition**	**Stored Aircraft**	**Total Hangar Dimension/Area (S.F.)**
1	T-Hangar	Poor	4 Aircraft (A-I)	58' x 58' / 3,364 S.F.
2	T-Hangar	Poor	4 Aircraft (A-I)	58' x 58' / 3,364 S.F.
3	Common	Fair	2 Aircraft (A-I)	85' x 62' / 5,270 S.F.
4	Common	Fair	2 Aircraft (A-I & B-I)	60' x 40' / 2,400 S.F.
5	Common	Fair	3 Aircraft (A-I – B-I)	70' x 90' / 6,300 S.F.
6	T-Hangar	Good	5 Aircraft (A-I – B-I)	170' x 35' / 5,950 S.F.
7	Common	Good	1 Aircraft (B-II)	70' x 90' / 6,300 S.F.
8	Common	Fair	Bonanza (A-I)	80' x 100' / 8,000 S.F.
9	Common	Good	3 Aircraft (A-I – B-II)	85' x 50' / 4,250 S.F.
10	Common	Good	1 Aircraft (B-I)	50' x 75' / 3,750 S.F.
11	Common	Fair	2 Aircraft (B-II & A-I)	50' x 75' / 3,750 S.F.
12	Corporate	Fair	4 Aircraft (A-I – B-II)	118' x 130' / 15,340 S.F.
13	Corporate	Fair	1 Aircraft (A-I)	50' x 50' / 2,500 S.F.
14	Corporate	Fair	1 Aircraft (C-I)	60' x 60' / 3,600 S.F.
Parking Apron	**Tie-Down**	Fair-Good	12 Aircraft (A-I)	
Total			46 Aircraft	74,138 S.F.

Note: Hangar #12 is located on City property.

Source: BWR Airport Site Inspection – October 2001.

AIRSPACE SYSTEM & NAVIGATIONAL AIDS

NAVAID facilities are located at or near an airport, providing point-to-point reference throughout the national airspace system by means of airborne, ground-based and satellite instrumentation. **Exhibit 2.2**, in combination with the airport service area, depicts the aeronautical navigation system including electronic navigational aids (NAVAIDS) within the surrounding Lebanon area.

NAVIGATIONAL AIDS / AIRPORT INSTRUMENT APPROACHES

Table 2.4 provides the most recently published instrument approach information at Lebanon. Instrument approaches allow arrivals during inclement meteorological conditions, and increases airport reliability and safety.

Table 2.4
Airport Instrument Approaches
Floyd W. Jones – Lebanon Airport

Runway/Airport Approach	Approach Type	Runway Visibility Minimums (Aircraft Category)	Lowest Minimum Descent Altitude (MDA)
Runway 18	RNAV(GPS)	1½-Mile (All Categories) ❷ 1-Mile (Category A & B) ❸ 1¼-Mile (Category C & D) ❸	1,760' MSL/444' AGL
Runway 36	NDB	1-Mile (Category A & B) 1¼-Mile (Category C & D)	1,740' MSL/419' AGL
Runway 36	SDF ❶	1-Mile (Category A, B & C) 1¼-Mile (Category D)	1,700' MSL/379' AGL
Runway 36	RNAV(GPS)	1¼-Mile (All Categories) ❷ 1-Mile (Category A, B & C) ❸ 1¼-Mile (Category D) ❸	1,680' MSL/359' AGL 1,700' MSL/379' AGL 1,700' MSL/379' AGL

Note: Use local altimeter setting – otherwise, use Springfield-Branson Regional Airport.
Note: Alternate minimums not authorized due to unmonitored facility or absence of on-airport weather reporting.
Note: No standard instrument departure (SID) or arrival procedures published for the airport.

Visual Approach – a runway without a straight-in instrument approach.
Non-Precision Approach – a runway that provides lateral instrument guidance to a runway end, or airport.

❶ ADF required.
❷ LNAV/VNAV DA (Lateral and vertical navigation based on GPS capabilities).
❸ LNAV/MDA (Lateral navigation based on GPS capabilities).

(ADF) – Automatic Direction Finder; (MSL) – Mean Sea Level; (AGL) – Above Ground Level; (NDB) – Nondirectional Beacon; (GPS) – Global Positioning System; (RNAV) – Area Navigation; (LNAV) – Lateral Navigation; (SDF) – Simplified Directional Facility; (MDA) – Minimum Descent Altitude; (VNAV) – Vertical Navigation; (DA) – Decision Altitude.

Source: U.S. Terminal Procedures – Iowa/Missouri (NC-3) – November 2001.

AIRPORT SERVICE AREA / SURROUNDING AIRPORTS

The airport service area is a geographical region served by a select airport. A determination can be made regarding the area of service offered from the Lebanon Airport by locating competing airports and their relative distance to population centers, assessing the role of surrounding airports, and evaluating their facilities, equipment and services as well as programmed expansion projects.

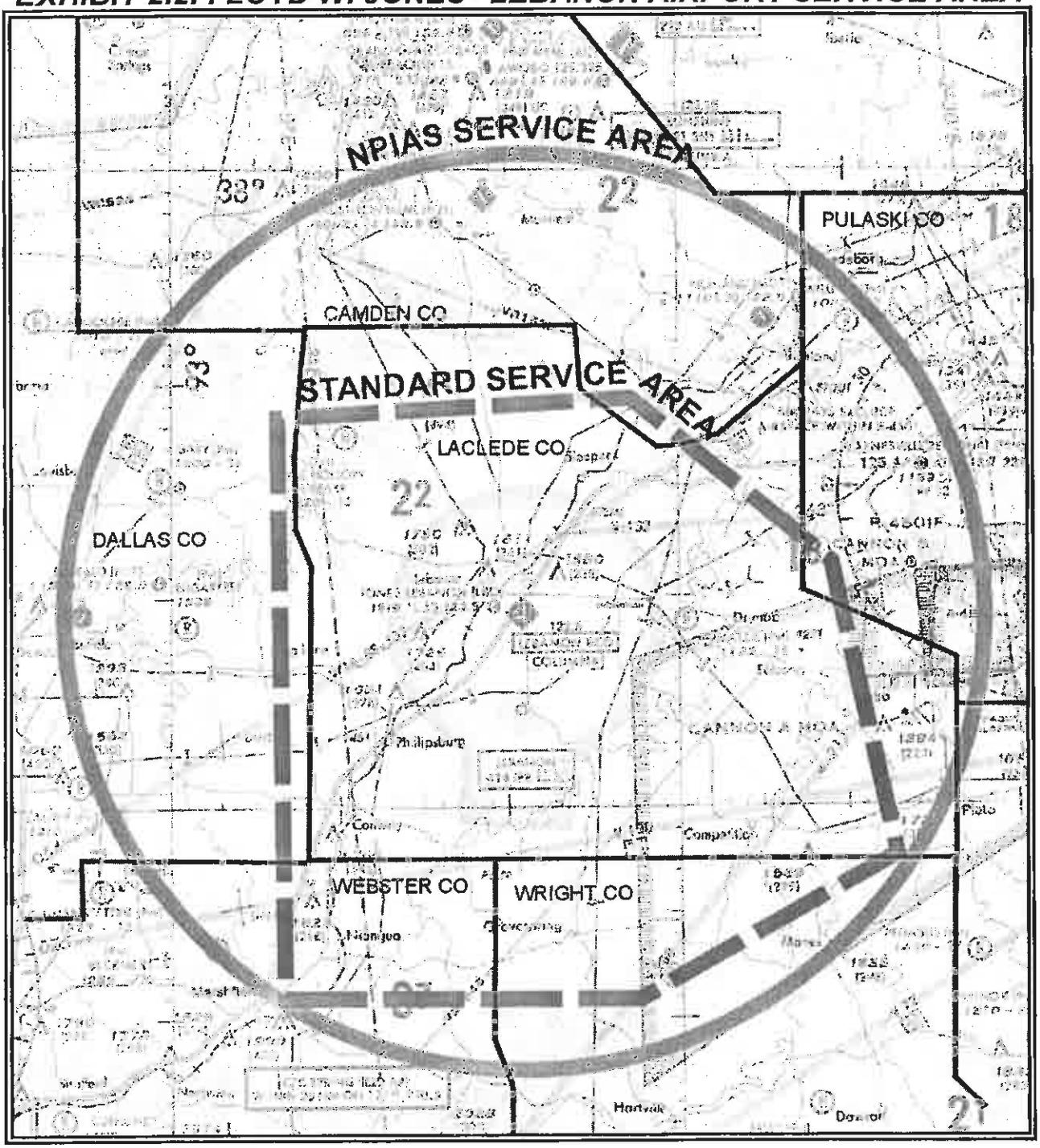
Surrounding airports have varying degrees of influence on the airport service area with respect to competing services (flight training, charters, fuel, maintenance, courtesy car, security, etc.), facilities and equipment, navigational aids and accessibility. It should be noted, however, that the demand for aviation facilities does not necessarily conform to political or geographical boundaries.

The general aviation service area for the Lebanon Airport was determined by application of the following service area models, as described below:

> ***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-mile) ground access to the originating airport. Several public-use airports and privately-owned facilities fall within this 25- mile range, which excludes the NPIAS criteria from realistically defining the entire service area boundary.
>
> ***Standard Service Area:*** This service area takes into consideration the *role* and *service level* of each civilian public-use general aviation airport in the immediate area, other population centers, and ground access distance and travel times between surrounding public-use general aviation airports.

Exhibit 2.2 illustrates the NPIAS, Standard and Primary Service Areas. The standard service area includes the majority of Laclede County, a portion of Wright and Webster Counties to the south, and a fraction of Dallas County to the west, Camden County to the north, and Pulaski County to the east. The standard airport service area contains an estimated 33,200 residents.

EXHIBIT 2.2: FLOYD W. JONES - LEBANON AIRPORT SERVICE AREA



Source: NOAA/ FAA Kansas City Sectional Aeronautical Chart, 2001.

Table 2.5 lists information regarding the role, facilities, and services offered at the nearest public-use general aviation and commercial airports. Understanding the capabilities and influence of the surrounding airports provides insight into existing and future aviation demand and airport role for the Lebanon Airport.

Table 2.5
Area Public-Use Airport Facilities
Floyd W. Jones – Lebanon Airport

Airport Name Airport Sponsor/Distance From Airport (NM)	Airport Role	Runway Characteristics	Aircraft/ Operations	Airport Services
Floyd W. Jones – Lebanon Airport (LBO)	GA	18-36; 5,000' x 75' (P) (L) 9-27; 2,374' x 50' (P)	46 planes 20,600 ops	NPI Fuel Hangars/Tie
Richland Municipal (MO1) Richland 18 NE ♦	GA	14-32; 3,000' x 49' (P)	2 planes 500 ops	V Tie
Camdenton Memorial (H21) Camdenton 20 N ♦	GA	15-33; 3,428' x 60' (P)	19 planes 10,000 ops	NPI Fuel/Repair Hangars/Tie
Buffalo Municipal (H17) Buffalo 21 W ♦	GA	3-21; 3,215' x 50' (P) (L)	15 planes 5,000 ops	V Tie
Waynesvile Regional (TBN) Airport at Forney Field Fort Leonard Wood 25 E ♦	MIL	14-32; 6,038' x 150' (P) (L)★	1 plane 6,995 ops	P
Fine Memorial (A1Z) Kaiser Lake Ozark 27 NE	GA	3-21; 6,497' x 100' (P) (L)	4 planes 6,500 ops	NPI Fuel
Grand Glaize (K15) Osage Beach 27 N	GA	14-32; 3,205' x 60' (P) (L)	24 planes 8,000 ops	NPI Fuel/Repair Hangars Rental
Bolivar Municipal (M17) Bolivar 34 W	GA	18-36; 3,400' x 60' (P) (L)	37 planes 17,000 ops	V Fuel/Repair Hangars
Mountain Grove Mem'l (1MO) 35 SE	GA	8-26; 3,590' x 50' (P)	14 planes 8,500 ops	NPI Fuel/Repairs Hangars
Springfield Downtown (3DW) Springfield 38 SW	GA	11-29; 4,035' x 50' (P)	42 planes 5,000 ops	NPI Fuel/Repairs Hangars/Tie
Total Activity			**204 planes 88,095 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

Source: NOAA-FAA Sectional Aeronautical Chart, 2000 and most recent FAA 5010 Inspection Data Sheets.

AIRPORT VICINITY LAND USE CHARACTERISTICS

The principal land use factors for consideration of land use planning and zoning in and around an airport include the runway protection zones (RPZ), natural and man-made obstructions to flight, aircraft noise, and potential development in the vicinity of the airport.

AIRPORT PROPERTY

The Lebanon Airport occupies nearly 269 acres, as contained entirely within city annexation. The majority of the property inside the Airport is used for aeronautical purposes. A tract of city property to the northeast of the airfield contains a city fire station and a common aircraft hangar used by multiple tenants. The city also maintains ownership of a large parcel of land south of the Runway 36 end, immediately south of Fremont Road, which is dedicated to airport use. There are no known non-common utility easements for gas, oil, or water flowage traversing airport property. The ownership of airport property is provided on the Airport Property Map drawing.

SURROUNDING AIRPORT AREA / DEVELOPMENT / ZONING

The Airport perimeter is bordered by Highway 5 to the east and Fremont Road to the south, both providing interchange access to Interstate 44. Expansion of commercial franchises along Highway 5 is expected, including unimproved property immediately east of the Airport.

The Airport is zoned for Low-Density Residential Use. Most adjacent property immediately surrounding the Airport is improved, but also includes some sustained general farming and wooded areas. Property to the east is primarily commercial along the State Highway 5 corridor, with additional commercial use to the north and southwest of the airfield. A developing up-scale residential area, containing single family units, abuts the Airport along the west side. Property to the southwest of the airfield is occupied by an armory and a large manufacturing company. Property to the west of the Crosswind Runway 9-27 is unimproved but plated for subdivision development.

AIRPORT / LAND USE ORDINANCES

The City of Lebanon has adopted an Airport Zoning Ordinance known as the Floyd W. Jones Lebanon Airport Zoning Ordinance. This ordinance provides definitions of terms used regarding the airport and the surrounding region, as well as specifications for types of uses, heights of structures and non-conforming uses in association with the Airport and associated airspace specific to the Lebanon Airport and the City of Lebanon.

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).

SUMMARY OF CURRENT AIRPORT ACTIVITY

As identified by the airport survey and other airport-related interviews, the general aviation activities at the Lebanon Airport support a variety of direct and indirect aviation services, including:

- corporate / executive transport
- recreational / pleasure flying
- government / military use
- land / aerial surveying
- scheduled flying events and fly-ins
- flight instruction, training, promotion
- farming / agricultural crop spraying
- emergency medical services / transport
- utility / pipeline patrol
- surveillance

SUMMARY OF BASED AIRCRAFT AND HISTORIC ANNUAL OPERATIONS

Table 2.6 summarizes the historic number of based aircraft, registered aircraft and annual operations at the Lebanon Airport since 1991. The following observations were identified at the Lebanon Airport as part of the inventory of historical and current airport activity levels:

Aircraft Activity Summary: Since 1990, based aircraft have increased from 26 to 46, averaging two additional based aircraft per year. Nearly one-quarter of the based aircraft are turbine-powered planes, including turboprop and business jets typically configured with less than 8-10 passenger seats. The concentration of sophisticated business and corporate (FAR Part 135) aircraft based at Lebanon is unusually significant for a rural community service airport, accounting for over 3,500 operations per year (4 to 5 flights per day). Also, the growth in based aircraft is consistent with the increasing number of registered county aircraft during the same time period, as the Lebanon Airport has captured the entire share of county registered aircraft.

Operational Activity Summary: Airport activity has increased to 20,600 annual operations (takeoff and landings). Operations are comprised of local and itinerant, including recreational, business, corporate, flight training, proficiency, ag-operators, flight club, and other transient (foreign) users. Most of the local operations involve instructional flight training and pilot proficiency flights, including flight training activity from surrounding airports. Airport survey responses indicated that "touch & go" operations account for nearly 10-15 percent of all operations, while nighttime activity accounts for nearly 5-10 percent. The estimated number of instrument approaches performed annually is approximately 500. The average flight distance from the Airport is over 300 nautical miles. The primary runway is used for the majority of airport operations while the crosswind runway is primarily used for crosswind training and during strong wind conditions from the east or west. Runway use is estimated at: 53 percent for Runway 18; 37 percent for Runway 36; five percent for Runway 9 and 27.

Table 2.6
Historic Aviation Activity (Civilian Based Aircraft and Annual Operations)
Floyd W. Jones – Lebanon Airport

Year	Single-Engine Aircraft	Multi-Piston/ Turbine/ Bus. Jet	Total Based Aircraft	Registered County Aircraft	Total Local Operations	Total Itinerant Operations	Total Annual Operations
1992	18	8	**26**	32	8,850	4,150	**13,000**
1993	17	8	**25**	34	7,050	2,250	**9,300**
1995	17	12	**29**	N/A	3,200	5,800	**9,000**
1997	17	12	**29**	N/A	5,150	6,850	**12,000**
1999	27	9	**36**	N/A	1,970	12,030	**14,000**
2000	27	9	**36**	N/A	1,970	12,030	**14,000**
Existing	**35**	**11**	**46**	**46**	**6,810**	**13,790**	**20,600**

Based Aircraft – An actively registered general aviation airplane stationed at a select airport, which regularly uses the airport as the primary "home-base" for filing flight plans, frequently uses available airport amenities, and/or maintains a formal commitment for long-term parking/storage.

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.

County Registered Aircraft - Registered US general aviation fixed-wing aircraft, by County, as published in the Census of US Civil Aircraft by the USDOT, FAA (FAA APO-94-10). Most recent data from FAA Civil Aviation Inquiry – Internet lookup.

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 (1990-2001) as available.* U.S. Registered General Aviation Aircraft by Aircraft Owner - FAA Census of U.S. Civil Aircraft (1991-1993). AIRPAC Database – August 2000.

AIRPORT BUSINESS / CORPORATE ACTIVITY (Airport Interviews/Survey Responses)

The following summarizes the major business and corporate users of the Lebanon Airport as identified through survey information and follow-up interviews. This information is important for determining the airport facility needs and requirements in accommodating based and transient enterprises operating larger and more demanding general aviation turbine aircraft.

Based turbine aircraft include:

Based Turbine Business Jets

- Cessna Citation V (ARC B-II)
- Hawker 800 (ARC B-I / B-II)
- Cessna Citation 501 (ARC B-II)
- Cessna Citation II (ARC B-II)

Based Turbine Propeller Aircraft

- Beechcraft King Air E-90 (ARC B-II)
- Beechcraft King Air 100 (ARC B-II)
- Beechcraft King Air C-90 (ARC B-II)
- Beechcraft King Air B200 (ARC B-II)
- Aero Commander (ARC B-II)
- Piper Cheyenne (ARC B-I)

Copeland (Emerson Electric) – Copeland owns a Cessna Citation V that shuttles management to Lebanon every month for site visits from their home office in Dayton, Ohio. Copeland employs approximately 814 people from the Lebanon area. Although the company pilots are pleased with the level of service and amenities at Lebanon, they have concerns regarding the taxiway pavement condition and alignment, and airport security. They normally "back taxi" on the runway to the mid-field taxiway to avoid the taxiway pavement and excessive turns to reach the aircraft parking apron from the runway ends. In addition, airport security is a significant company issue due to easy access of the aircraft parking apron by the general public. If they require an overnight stay, they fly the aircraft to other nearby airports that offer a more secure environment. Furthermore, the likelihood of deer on or near the runway during hours of darkness deters the company from landing at Lebanon during this time. Other amenities they would like to see at Lebanon include an instrument approach from the north, an instrument landing system (ILS), and an automated weather reporting station (AWOS). These items would allow them more access during inclement weather conditions and strong winds from the south.

Golden Investments: Golden owns and bases a Cessna 550 Citation II, King Air and Bonanza at Lebanon Airport and accounts for 480 annual operations at Lebanon due to business purposes. Although a personal interview at the time of this printing has not yet been accomplished with the chief pilot or owner, the airport survey indicated the desire to upgrade to a larger jet in the future provided the primary Runway 18-36 is lengthened and widened to accommodate the upgrade. Furthermore, the pilot would like to see the crosswind Runway 9-27 length and width increased.

Charles E. Brown Beverage Company: Brown Beverage, who owns beverage distributorships in central Missouri, operates a Cessna Citation I SP from the Lebanon Airport as a corporate aircraft to shuttle the owner and managers to meetings and trade shows throughout the county. The company uses their aircraft approximately 16 to 17 times per month (400 annual operations) and averages 300 miles per trip. The chief pilot indicated the need for better taxiway pavement and alignment. The current condition of the parallel taxiway system is poor and breaking apart. Taxiway pavement strength is also an issue during hot weather due to aircraft sinking into asphalt.

Detroit Tool: Detroit Tool is a tool and die fabrication company employing 756 local residents. The company leases two common hangars at Lebanon to store a IAI Turbo-Commander AC-690B turboprop aircraft and flies approximately 200 times per year (400 operations) to destinations coast to coast to visit other company offices' customers. In addition to the Commander, the company owned and operated a IAI Westwind turbojet out of Lebanon before they sold the aircraft in December, 2000. When they flew the Westwind, the company was responsible for a total of 400 flights (800 operations) per year. The chief pilot indicated that a new taxiway with improved pavement strength capabilities were their most important needs as the pavement would not fully support the Westwind when they operated it from Lebanon. It was added that the company plans to purchase a Westwind, Hawker 800, or a Citation III in the future, but not before the taxiway pavement strength is able to withstand the heavier loads from these aircraft and the recent economic downturn reverses its current trend. In addition, the wildlife on the runways during nighttime hours is a concern. They have had not accidents involving deer, but would like to see "deer-proof" fencing erected to alleviate the potential conflict. Other amenities include lower approach minimums so they do not have to divert to another airport during IMC conditions.

Durham Company: The Durham Company manufactures electric meter mounting equipment and employs 237 workers from the local area. The company operates a King Air E-90 and Bonanza from Lebanon as a corporate aircraft. The pilot indicated on the airport survey the company flies to and from destinations in eastern Kansas to Massachusetts. Durham Company accounts for 360 operations annually, and indicates the possibility to increase its operations in the future.

Justice Furniture/Hastings Aviation Company: Justice Furniture Manufacturing makes upholstered furniture and has approximately 90 employees. They own a King Air C-90 that has been based at Lebanon for the past two years and accounts for 360 annual operations. The main purpose of their aircraft use is to meet with customers and clients in the Midwestern United States, and to shuttle customers to the Lebanon furniture plant for tours.

The chief pilot indicates the desire to upgrade to a larger King Air (BE-200) in the future, and indicates they will be certificated as a charter operator and flight instructor in the future upon retirement from current business. Airport issues of concern are the deteriorating conditions of the taxiway, weak runway lighting, and wildlife on the airport after dark.

Independent Stave, who produces white oak barrels for use in aging distillation products, employs 395 people from the area. The company leases a common hangar at Lebanon and flies a Cessna Citation II, Cessna 182 and a Beech 18. The company uses their aircraft to visit customers around the U.S. Major concerns for the company pilot are pavement conditions and wildlife on the airfield at night.

Additional companies who use or base aircraft at Lebanon include:

H.D. Lee Company, a subsidiary of *Vanity Fair*, makes work and casual clothing with 864 employees at their local plant in Lebanon. The company flies a Falcon 50 to Lebanon at least 5 times per year.

Marathon Electric, a subsidiary of *Regal Beloit* from Wisconsin, manufacturers electric motors and generator sets. The company employs 459 local people and lands a Hawker 800 approximately 10 times a year at Lebanon.

Table 2.7 provides a summary of operations by fleet mix, or percent of operations, conducted by aircraft types at the Lebanon Airport. This information is important for identifying the threshold of activity by aircraft category and class.

Table 2.7
Aircraft Operations by ARC (2000 Operational Levels)
Floyd W. Jones – Lebanon Airport

Aircraft Type/ Associated User Aircraft Type	Estimated Annual Operations	Percent of Total Annual Operations
Small and Large Piston and Turboprop Aircraft		
ARC A-I piston/turbo-propeller aircraft	17,620	85.53%
ARC B-I to B-II piston/turbo-propeller aircraft	1,284	6.24%
Business Jet Aircraft		
ARC B Category business jet aircraft	1,600	8.23%
ARC C Category business jet aircraft	36	
ARC D Category business jet aircraft	60	
Estimated Total Annual Operations (2001)	20,600	100%

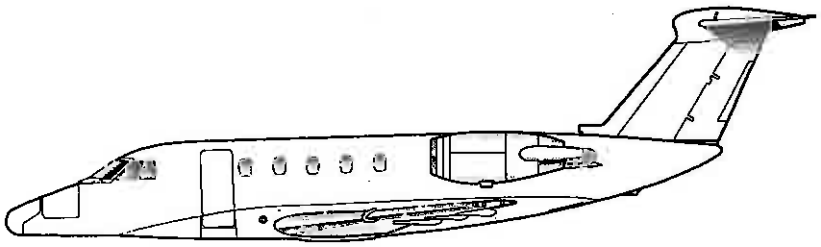
Source: Airport interviews and survey data – October 2001

CRITICAL AIRCRAFT / FAMILY OF AIRCRAFT

The critical aircraft, which is evaluated with respect to size, speed, and weight, is important for determining airport design, structural and equipment needs for both the airfield and terminal area. The existing "critical" aircraft family at the Lebanon Airport, which is the largest airplane within a family of aircraft conducting at least 500 itinerant operations per year, is in the Airport Reference Code (ARC) B-II category. This category involves "large" aircraft, including twin-turbine and some small to medium-cabin business jets with less than 10 passenger seats and a maximum takeoff weight greater than 12,500 pounds.

Based on inventory findings, the most demanding ARC B-II aircraft is a medium-cabin business jet. This aircraft, in addition to other similar models, is currently based at the Lebanon Airport.

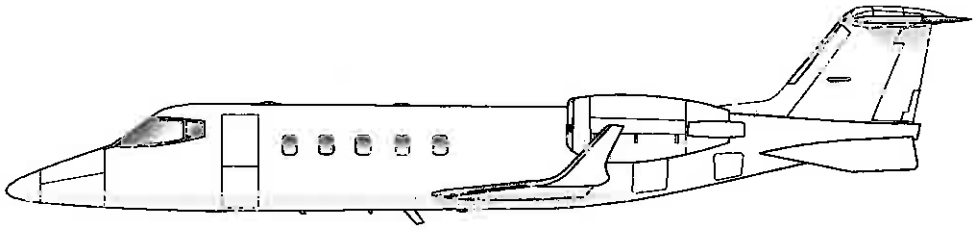
EXISTING REPRESENTATIVE "CRITICAL" AIRCRAFT (ARC B-II)
CESSNA CITATION V



Source: BWR, Aircraft Performance File, 2001.

EXISTING "DEMAND" AIRCRAFT (ARC D-I)

Based on inventory findings, the most demanding business jet currently operating at the Lebanon Airport is a Learjet 35, an ARC D-I medium cabin-class executive business jet transport seating 8-12 passengers in executive cabin class layout.



Source: BWR, Aircraft Performance File, 2001.

Overview of Survey Findings

As part of the inventory process, an airport survey was distributed to identify airport use patterns, current conditions and potential long-range improvement needs and priorities. The Lebanon Pilot Survey was sent to all based aircraft owners, surrounding County registered aircraft owners, and other identified users of the Lebanon Airport, or as requested. Survey responses from the based aircraft owners was very positive with a return rate of approximately 36 percent.

The airport users were asked to prioritize the most important airfield and terminal area factors. The respondents indicated the most important airfield factors are:

1) Automated weather system;
2) Taxiway lighting; and
3) Taxiway system and maneuvering.

The most important terminal area factors are:

1) Hangar availability;
2) Aircraft maintenance and repair;
3) Security fencing and lighting; and
4) Courtesy car.

The following summarizes an additional concern commonly noted on the survey responses:

It was revealed that additional companies are interested in leasing hangar space for large business jet aircraft if hangar space became available at Lebanon. One such company is based in Texas and would lease hangar space to shelter and secure their Lear 35 during corporate visits to Lebanon.

Note: A sample Pilot Survey is attached as an appendix, with all responses held in confidence.

CLIMATIC CHARACTERISTICS

AIRPORT WIND ANALYSIS

Area wind characteristics were studied to determine the impacts of crosswinds on the existing runway alignment. Wind data, during all-weather conditions, was obtained from the nearest first-order National Oceanic and Atmospheric Administration (NOAA) reporting station (Springfield-Branson Regional Airport, 1990-1999). Wind coverage, expressed as a percent of time below an acceptable velocity, is the component of wind speed and relative direction acting at right angles to the runway.

The *desirable* wind coverage is 95 percent for the primary runway, and is computed on the basis of the crosswind component not exceeding 10.5-knots for ARC A-I and B-I aircraft, and 13.0-knots for ARC B-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. The airport layout plan drawing depicts the all-weather and instrument windrose, with the strongest winds occurring as peaks indicated by the percent of observations.

ALL-WEATHER WIND CONDITIONS

Table 2.8 shows the percent of all-weather wind coverage for the 10.5, 13.0, and 16.0-knot wind velocities. Runway 18-36 provides 94.75 percent wind coverage at 10.5 knots for small aircraft (ARC A-I and B-I), while Runway 9-27 provides only 83.99 percent wind coverage at 10.5 knots. Runway 18 would be used nearly 50 percent of the time (southerly winds), while Runway 36 about 24 percent of the time (northerly winds). Combined, Runway 18-36 and Runway 9-27 provide 99.01 percent wind coverage at 10.5 knots for small aircraft.

INSTRUMENT (IFR) WIND CONDITIONS

Table 2.8 also lists the percent of instrument wind coverage for the 10.5, 13.0, and 16.0-knot wind velocities. The Runway 18-36 alignment provides 95.31 percent wind coverage at 10.5 knots (12 miles per hour), which meets the 95 percent wind coverage desired by airport planning standards.

STRONG ALL-WEATHER WIND CONDITIONS

Table 2.8 lists strong wind characteristics (greater than 10.5 knots) during all-weather conditions. Approximately 25 percent of all winds are strong winds. Nearly 51 percent of the strong wind conditions are within 30 degrees of Runway 18-36 centerline alignment. Runway 18 experiences nearly 35 percent of strong wind activity, while Runway 36 experiences nearly 15 percent.

Table 2.8
Percent Crosswind Runway Wind Coverage for All-Weather and IMC Wind Conditions
Floyd W. Jones – Lebanon Airport

Runway Alignment (True Bearing)	Crosswind Component Wind Speed & Corresponding ARC	All-Weather Wind Coverage	Percent IFR/IMC Wind Coverage
Runway 18-36 (181.70°/001.70°)	10.5 knots (A-I and B-I) 13.0 knots (A-II and B-II) 16.0 knots (A-III to D-II)	94.75% 97.74% 99.49%	95.31% 98.30% 99.78%
Runway 9-27 (091.01°/271.01°)	10.5 knots (A-I and B-I) 13.0 knots (A-II and B-II)	83.99% 91.12%	82.34% 90.53%
Combined Runways 18-36 and 9-27	10.5 knots (A-I and B-I) 13.0 knots (A-II and B-II) 16.0 knots (A-III to D-II)	99.01% 99.79% 99.97%	99.26% 99.92% 99.99%
Total – Calm and Light Winds **Total – Strong Winds**		74.86 % 25.14 %	
Optimum All-Weather Primary Runway Alignment		343° (95.64% at 10.5-knots)	
Range of All-Weather 95% Wind Coverage Alignment		328° to 359° (95% at 10.5 knots)	

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. Calm winds = 0 to 10 knots.

Source: National Oceanic & Atmospheric Administration (NOAA)/ Federal Aviation Administration (FAA); First-Order Wind Observing Station (VFR/IFR Winds) – Springfield, Missouri 1990 to 1999 (10 year period).

SOCIO-ECONOMIC CHARACTERISTICS

REGIONAL ECONOMIC INDICATORS

An assessment of regional economic conditions provides an understanding of the relationship between historic and future aviation activity levels within the airport's area of influence. Therefore, the following socio-economic information (population and income distribution) has been collected to understand current conditions, and support assumptions about the forecast number of based aircraft and annual aircraft operations projected for the Lebanon Airport.

THE CITY OF LEBANON AND LACLEDE COUNTY REGIONAL ECONOMY

Laclede County relies on agriculture and tourism to drive employment and earnings. Between 1989 and 1999, earnings increased from $211,176 to $400,289 with an annual growth rate of 6.6 percent. The largest industries in 1999 were durable goods manufacturing; services – 16.6 percent, and retail trade – 16.6 percent. However, the fastest growing over the past 10 years has been transportation and public utilities, which increased an average annual rate of 10.0 percent. Over the past ten years, the civilian labor force has increased 18.6 percent in a region (South-Central Missouri) that experienced only a 12.4 percent increase overall.

The City of Lebanon is an established and well-diversified economic community that ranks among the top 15 overall in statewide manufacturing employment. Among the largest industries in Lebanon is boat manufacturing. Lebanon produces 30 percent of the entire annual production of aluminum boats in the country through eight different manufacturers. The City has had success attracting boat manufacturers to the area rich with skilled people in the boat manufacturing business. Additional major employment-based manufacturers include Independent Stave Company, Carmeco, Inc., Justice Bedding, Justice Furniture Manufacturing, Lee Company, Precision Cutter & Tool Co., Marathon Electric, Copeland (formerly Emerson Electric), Detroit Tool, Durham Company, and Marine Electric Products Inc.

Lebanon has an employment base of approximately 5,300 people with many workers commuting from outside the city. Historically, the City attracts a large industrial firm about every 10 years. The City is currently on schedule to attract another major company in the near future. Although the City is firmly rooted in manufacturing, tourism plays a considerable role in the economy as well providing services to one million annual visitors to the nearby Bennett Springs State Park. Twenty-four aircraft based at Lebanon are tied "directly" to local businesses, including four based business jets. Total employment associated with locally-based companies is around 5,000, including 1,500 by companies with based aircraft at Lebanon, and 3,600 by other locally-based companies with direct or parent company use of the Airport.

POPULATION

Table 2.9 provides population information for city, county and state levels. Population trends and expected rate of change provide insight into a region's economic potential. Past population changes can be used as an indicator with state and national population averages for comparison of overall general aviation trends.

Table 2.9
Historic and Forecast Population Levels
Floyd W. Jones – Lebanon Airport

Year	City of Lebanon Population	Laclede County Population	State of Missouri Population	City To County Population Ratio	County to State Population Ratio
Historic Population Levels					
1970	N/A	19,971	4,684,768	N/A	0.42%
1980	9,477	24,361	4,921,966	38.9%	0.49%
1990	9,983	27,210	5,126,281	36.7%	0.53%
2000	12,155	32,513	5,595,211	37.4%	0.58%

Note: 1970 City population information not found.

Source: State and County information obtained from U.S. Department of Commerce, Bureau of Economic Analysis. City information obtained from U.S. Census Bureau – Internet lookup – September 2001.

INCOME DISTRIBUTION

Table 2.10 displays the distribution of household income for Laclede County, the State of Missouri, and the United States. Using income as a gauge to aviation activity, it is assumed approximately 16.9 percent of the county households earn income $35,000 or more, a segment of the local population considered capable of participating in general aviation activity (rental, ownership, flight training, etc.).

Table 2.10
Household Income Distribution
Floyd W. Jones – Lebanon 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 $35,000
Laclede County	36.5%	25.8%	17.7%	12.4%	4.9%	2.6%	**19.9%**
State of Missouri	28.1%	19.4%	16.5%	17.1%	12.6%	6.3%	**36.0%**
United States	24.3%	17.5%	15.8%	17.9%	15.0%	9.5%	**42.3%**

Note: Based on the dollar value of 1990 / Recent 2000 Census STF-3 data not yet available.

Source: U.S. Department of Commerce, Census Department 1990 Lookup - Internet Site, 2001.

INVENTORY SUMMARY / FINDINGS

Several findings were identified in the inventory section, which are related to the development of aviation facilities at the Floyd W. Jones – Lebanon Airport. As an overview, these findings include:

Airport Role:

- The Lebanon Airport continues to transform from a rural community service facility mostly serving small single and twin-piston aircraft to a regional facility accommodating larger business/corporate aircraft and clientele.

- Based aircraft are closely linked to major local-based industry. Employment related to based or parent company use is over 5,000. Based business aircraft owners have been consistent airport users the past 10-20 years.

Airfield / Navigational Aids:

- Runway 18-36 and Runway 9-27 have safety area issues (RSA, OFA) that do not conform to current FAA / MoDOT airport safety design standards. An improvement to standards and future expansion of Runway 18-36 requires extensive earthwork.

- Runway 18-36 and Runway 9-27 contain natural growth obstructions to the FAR Part 77 (Approach, Transitional, and Primary) air navigation surfaces. Trees obstruct the runway visibility zone (RVZ) between Runway 9 and Runway 18.

- Airport Committee members and users have expressed the desire for lower instrument approach minimums to Runway 18-36.

- Crosswind Runway 9-27 (2,374' x 50') does not meet minimum recommended design criteria for Category A aircraft (3,000' x 60'). In addition, Runway 9-27 line-of-sight is obstructed by grade changes along the runway centerline.

- Runway 18, 9 and 27 runway protection zones (RPZ) are not contained on airport property. Runway 18 and 27 RPZ areas contain structures.

- Non-standard runway to taxiway separation distance (200 feet to 540 feet). Reconstruction of parallel taxiway will require extensive earthwork.

- Runway edge lighting is currently at non-standard heights. Non-standard runway holding position distances (140 feet), markings, and signs. PLASI glide angle does not meet minimum requirements. Non-standard signage along Runway 18-36. Taxiway and hangar taxilane pavement condition is deteriorating.

- Airport fencing inadequate to preclude wildlife from entering airport property and provide a secure environment.

Terminal Area / Landside:

- Pilots, passengers and patrons report uniquely excellent services and amenities provided at Lebanon.

- Additional hangar space is in demand at Lebanon. Future hangar development is constrained due to safety areas, airspace, and topographical features prevalent along the east-side terminal area.

- Access to aircraft apron, taxiways and runways should be controlled by signage, fencing and access gates.

Airport Land Use

- Control of adjacent property recommended for protection against encroachment of incompatible development and preservation of airport safety areas. Additional property acquisition will be necessary for airport expansion.

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CHAPTER THREE - AVIATION DEMAND FORECASTS

3 AVIATION DEMAND FORECASTS

AIRPORT FORECAST METHODOLOGY

Aviation demand forecasts are used to identify future airport infrastructure, equipment and service needs. The *preferred* demand forecasts determine 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 to estimate the financial feasibility of airport development alternatives.

At Lebanon, aviation demand forecasts have been prepared for the following areas of activity:

- Based aircraft
- Critical aircraft family
- Actual instrument approaches
- Aircraft operations (landings & takeoffs)
- Fleet mix by aircraft type

The development of aviation forecasts involves analytical and judgmental assumptions 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. The forecasts are time-based projections that provide a schedule for expecting demand levels in which the forecasts ultimately serve as a guide for development – as demand and facilities warrant. National general aviation trends and forecasts, used to provide a baseline of growth rates, are provided by the FAA *Aviation Forecast (FY 2000-2011)*.

PREVIOUS FORECASTS AND STUDIES

Demand forecasts were previously developed for the Floyd W. Jones – Lebanon Airport as part of an Airport Layout Plan Update Study completed in 1986. The forecasts were developed from a 1984 airport traffic study and data compiled by the Airport Manager. This study indicated that the Lebanon Airport would experience 15,000 operations and have 45 based aircraft by 2000. However, due to changing conditions since the study was completed, these forecasts have not been directly referenced in developing future demand levels at Lebanon.

LOCAL-AREA BASED AIRCRAFT FORECAST FACTORS AND ASSUMPTIONS

Based on information obtained in the inventory analysis, the following factors and assumptions have been incorporated into the forecasts of based aircraft and annual operations at Lebanon:

- The forecast of aviation demand assumes existing facilities remain operational in conjunction with additional airfield facilities and tighter security measures in the airport terminal area for transient aircraft.

- Lebanon and the surrounding area maintains a strong industrial/manufacturing base with significant links to airport usage. The potential for the City to attract additional major employment is a consideration for future based aircraft.

- A modest increase of based single and twin-engine aircraft is anticipated per pilot/user questionnaire responses. The potential for based single and twin-engine piston aircraft comes from business needs, flight training and recreational interests, as demand remains strong for new and used production aircraft, coupled with the presence of a strong general aviation demand in Southwest Missouri. In addition, local charter service (air taxi) is currently not provided at Lebanon; however, future interest in a charter service has been identified from a based aircraft owner.

- Lebanon has accommodated business jet aircraft for over 20 years. Continued growth of existing businesses and the potential for future industrial growth is assumed as part of the increase in based business jet and turboprop activity. There continues to be a "stabilized" group of business jet owners who intend to remain at the Airport in the future. Upgrades to existing local business jets with respect to size, range, and efficiency is anticipated based on personal interviews with local area businesses. In addition, the business aircraft owners have shown a dedication to "same-manufacturer" upgrades in the past, and likely in the future as well.

- The FAA had recently projected the general aviation industry to maintain strong growth during the next 10 years, including aircraft fleet production, annual hourly utilization, used aircraft sales, experimental aircraft production, and a gradual transition to a more complex and sophisticated general aviation fleet. Recent technological advances have produced single-engine aircraft that are more reliable and increasingly efficient to operate, in spite of elevating costs associated with owning and operating a light single and twin-piston aircraft – those operated purely for recreational interests. In regards to personal business users, a twin-engine piston aircraft is considered a reasonable upgrade to a single-engine airplane.

GENERAL AVIATION DEMAND FORECASTS

FORECAST OF BASED AIRCRAFT – FORECAST TECHNIQUES

Table 3.1 summarizes the various forecasts of based aircraft prepared for the Lebanon Airport throughout the 20-year planning period. Overall, the forecast methodologies resulted in a range of 75 to 88 based aircraft by the end of the planning period (2021), equating to a 2.4 to 3.3 percent average annual growth rate, respectively.

The preferred forecast was selected in consideration of the confidence of data used and meeting a reasonable expectation of demand as identified in the inventory. With this, the preferred forecast is the "Adjusted Percentage Growth Rate." This forecast is a somewhat aggressive model, but remains consistent with historical airport trends and previously documented levels of based aircraft.

Table 3.1
Summary of Based Aircraft Forecast - Total Aircraft
Floyd W. Jones – Lebanon Airport

Year	Linear Trend Line	Nationwide Average/Local Demand	Percentage Growth Rate	"Preferred" Adjusted Percentage Growth Rate	Straight Line Growth Rate (2 A/C per year)
2001	46	46	46	**46**	46
2006	49	52	52	**58**	56
2011	58	61	58	**66**	66
2016	68	73	66	**76**	76
2021	77	88	75	**86**	86

Note 1: Forecasts have not been prepared for ultralights, gyrocopters, balloons, or sailplanes.

Source: BWR, Summary Forecast of Based Aircraft, October 2001.

FORECAST OF BASED AIRCRAFT

Table 3.2 provides a detailed breakdown, by aircraft category, of the preferred forecast of based aircraft for the Lebanon Airport.

Preferred Based Aircraft Forecast: The forecast was developed employing aviation utilization growth rates forecast by the FAA in the *Aviation Forecasts: Fiscal Years 2000 to 2011.* The FAA utilization fleet growth rates per category of aircraft were applied to the number of baseline aircraft identified at Lebanon in July 2001, incrementally adjusted with respect to reported hangar waiting list demand and aircraft purchases or upgrades as obtained through survey and interview information.

Table 3.2
Preferred Based Aircraft Forecast - Total Based Aircraft
Floyd W. Jones – Lebanon Airport

Year	Single-Engine Aircraft (A-I)	Multi-Engine Piston (A-I to B-I)	Multi-Engine Turbine (B-I to B-II)	Business Jets (B-I to C-II)	Helicopters	Total Based Fixed-Wing Aircraft
2001	35	1	6	4	0	**46**
2006	45	2	6	5	0	**58**
2011	51	2	8	5	0	**66**
2016	58	3	9	6	0	**76**
2021	65	4	10	7	0	**86**

Note 1: Forecasts have not been prepared for ultralights, gyrocopters, balloons, or sailplanes.

Source: BWR, Forecast of Based Aircraft - October 2001.

AIRCRAFT OPERATIONS FORECAST (PREFERRED)

Table 3.3 summarizes the forecast of annual aircraft operations at the Lebanon Airport for each forecast phase. The forecast of annual operations was determined using the existing Lebanon utilization rate[1] of 448, applied toward all forecast based aircraft. With operations established by this methodology, itinerant and local operations were determined by application of the historical relationship of local, itinerant, and total operations at Lebanon, which is 33 percent local and 67 percent itinerant.

Overall, the operational level is expected to increase at about 3.1 percent annually, recognizing a higher rate of growth to be experienced during the short-term planning period. The operational forecast remains consistent with respect to the growth of based single, multi-engine, and jet aircraft at Lebanon.

Table 3.3
Preferred Aircraft Operations Forecast
Floyd W. Jones – Lebanon Airport

Year	Total Based Aircraft	Utilization Rate	Total Local Operations	Total Itinerant Operations			Total Civilian Forecast Operations
				Military	Air Taxi	Other Itinerant	
2001	46	448	6,810	200	0	13,790	**20,600**
2006	58	448	8,580	200	260	17,160	**26,000**
2011	66	448	9,770	200	280	19,830	**29,600**
2016	76	448	11,220	200	300	22,480	**34,000**
2021	86	448	12,700	200	320	25,480	**38,500**

Note: *Other* itinerant operations include transient general aviation operations.
Note: 2001 level of based aircraft – BWR airport inspection, hangar list and survey responses, July-August 2001.
Note: Military Operations are not included in Total Itinerant Operations.

Forecasts for itinerant and local traffic were calculated as follows:
Total Civilian Operations = Local Operations + Itinerant Operations

Source: BWR, Preferred Aircraft Operational Forecast – October 2001.

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

ANNUAL INSTRUMENT APPROACH (AIA) FORECAST

Table 3.4 summarizes the forecast of annual civilian instrument approaches for the Lebanon Airport throughout the planning period. The forecast of annual instrument approaches[2] (AIA's) provides further guidance in determining requirements for the type, extent, and timing of future navigational (NAVAID) equipment. Instrument meteorological conditions (IMC) in the region are experienced approximately 10 percent of the time (visibility less than 3 nautical miles/ceiling less than 1,000'). The Airport currently offers three published instrument procedures to Runway 36 and one published instrument procedure to Runway 18.

Table 3.4
Annual Instrument Approach Forecast (AIA's)
Floyd W. Jones – Lebanon Airport

Year	Total Other Itinerant	Bus.	Prac.	Air-Taxi	Percent IFR (G.A. Fleet)	Percent IFR Rated Pilots	Percent Marginal VFR	Actual Itinerant AIA Civilian Operations (% of Total Operations)
2001	13,790	3,500	1,700	0	56%	48.3%	10%	**340 (1.64%)**
2006	17,160	3,730	1,810	260	56%	48.6%	10%	**400 (1.55%)**
2011	19,830	3,980	1,930	280	57%	48.9%	10%	**450 (1.52%)**
2016	22,480	4,250	2,060	300	57%	49.1%	10%	**510 (1.48%)**
2021	25,480	4,530	2,200	320	58%	49.4%	10%	**570 (1.47%)**

Total Other Itinerant = Total "other" itinerant operations (x) percent IFR rated pilots (x) percent marginal VFR
Business = Business operations (x) 100% IFR (x) 100% IFR rated pilots (x) percent marginal VFR
Practice = Practice operations (x) percent IFR (x) 100% IFR rated pilots (x) percent marginal VFR
Air Taxi = Air taxi (x) percent IFR (x) 100% IFR rated pilots (x) percent marginal VFR

Note 1: The percent of IFR Rated Pilots is based on FAA Forecasts (2000-2011), and trend line (2012-2021). The increase in the percent of IFR-rated pilots is extrapolated from FAA forecasts, indicating 1.3 percent growth in IFR training during the next 12 years. The percent of IFR Rated Pilots is based on FAA forecasts (2000-2011) and linear trend line (2012-2021).

Note 2: Forecast based on unconstrained condition – IFR flight plans are completed and canceled after executing the full 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 the minimum initial approach altitude. Military operations are not included in the AIA forecast.

Source: BWR, Annual Actual Instrument Approach Forecast – October 2001.
NOAA, International Station Meteorological Climate Summary (Version 4.0, September 1996).

[2] **Instrument Approach** – an approach to an airport, with intent to land in accordance with an instrument flight rule (IFR), when the visibility is less than three miles and/or the ceiling is at or below the minimum initial approach altitude.

AIRCRAFT MIX FORECAST

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

Three predominate categories of small aircraft are forecast to use the airport in the future: **1)** small single and twin-engine aircraft weighing less than 12,500 pounds; **2)** large twin turbo-propeller aircraft weighing more than 12,500 pounds; and **3)** large turbine business jets, with small to medium cabins, weighing less than 30,000 lbs. This class of aircraft ranges from pressurized twin-engine planes to small to large business jets used for business travel.

Table 3.5
Forecast Aircraft Mix by FAA Design Groups
Floyd W. Jones – Lebanon 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 (knots).

Aircraft Approach Category	Existing (2000)	Phase 1 Short-Term (2001-2006)	Phase 2 Mid-Term (2007-2011)	Phase 3 Long-Term (2012-2021)
Category A (Less than 91 Knots)	17,620	22,050	24,570	31,570
Category B (92 – 120 Knots)	2,900	3,790	4,440	5,780
Category C (121 – 140 Knots)	20	80	500	960
Category D (141 – 165 Knots)	60	80	90	190

Airplane Design Group (ADG) - A grouping of aircraft based on wingspan dimension (feet).

Airplane Design Group	Existing (2000)	Phase 1 Short-Term (2001-2006)	Phase 2 Mid-Term (2007-2011)	Phase 3 Long-Term (2012-2021)
Group I (Less than 49')	17,410	21,840	24,270	30,800
Group II (49' to 78')	3,190	4,160	5,330	7,700

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 #6),* *Airport Design*,
BWR Aircraft Mix Forecast – October 2001.

Table 3.6 lists common business and corporate aircraft by airport reference code (ARC) expected to use the Lebanon Airport on a regular basis throughout the forecast period.

Table 3.6
Common General Aviation Aircraft By Airport Reference Code
Floyd W. Jones – Lebanon Airport

Airport Reference Code (B-I)	Airport Reference Code (B-II)	Airport Reference Code (C-I / D-II)
Twin-Engine (Piston) Beech (Baron Series) Beech (Duke) 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 (Chieftan) Piper PA-60-602P (Aerostar) **Small-Cabin Business Jets** Lear (Various Models) Dassault (Falcon 10) Rockwell (Sabre 40/60)	**Twin-Propeller (ARC B-II)** 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) **Small-Medium Business Jets** Cessna Citation 550/560 Series Dassault Falcon 20/ 50 Dassault Falcon 900/ 900EX Westwind Astra SP/SPX	**Med. Business Jets (ARC C-I)** Learjet 24/25/31A/45/54/55/60 Hawker-Siddley 600/ 700 IAI Jet Commander IAI Westwind I/ II Saberliner 75A **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/D-II)** Lear 35/36/60 Gulfstream IV (SP) Gulfstream V

AIRPORT REFERENCE CODE (ARC) CLASSIFICATION

Table 3.7 identifies the airport reference code (ARC) for the Lebanon Airport during each of the planning periods. The FAA/MoDOT has established airport design criteria in accordance with the airport's role and ARC designation, which provides minimum safety standards with respect to the performance characteristics of the family of aircraft represented by the airport's *critical* aircraft. 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.

Table 3.7
Existing and Ultimate Airport Reference Code (ARC)
Floyd W. Jones – Lebanon 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	C-II	C-II
Crosswind Runway	A-I	To be determined		

Note 1: The most demanding (greatest) runway ARC per planning phase indicates the airport's ARC.

Note 2: Aircraft Approach Category groups have the following performance characteristics:
Aircraft Approach Category A = approach speed less than 91 knots.
Aircraft Approach Category B = approach speed of 91 knots or more, but less than 121 knots.
Aircraft Approach Category C = approach speed of 121 knots or more, but less than 141 knots.
Airplane Design Groups are based on aircraft wingspans as follows:
Airplane Design Group I = wingspan up to but not including 49 feet.
Airplane Design Group II = wingspan of 49 feet up to but not including 79 feet.

Source: BWR, Designated Airport Reference Code (ARC) Forecast – September 2001.

Small Aircraft Activity: Small aircraft will assume the majority of based aircraft and operations. However, it is anticipated that a large percentage of the based single-engine aircraft, and annual operations, will increasingly be comprised of more high performance/complex aircraft, including a slight to 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, will achieve greater (more frequent) utilization. These aircraft are expected to increase beyond current activity levels as a percentage of total activity stemming from 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 small *and* large cabin class aircraft used for regional "corporate" travel with up to 10 passenger seats with some weighing in excess of 12,500 pounds.

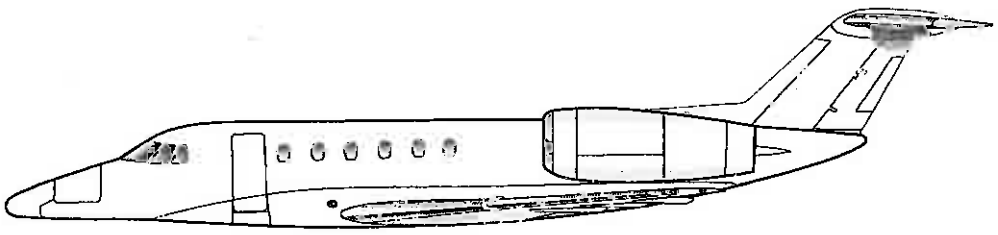
Large Aircraft Activity: The outlook for large aircraft use at Lebanon will increase moderately as a percentage of the total annual operations. A significant increase in the frequency of large aircraft at Lebanon (turboprop and jet) is a reasonable expectation, including an increasing number of ARC Category C and a small percentage of ARC Category D aircraft. An ARC C-II business jet based at Lebanon during the next 3-5 years is a reported possibility. Advanced turbine cabin-class business aircraft have reasonably comparable seating capacity to turboprop aircraft, but significantly improved performance capabilities. The small to medium-cabin business jet demands a greater regional/national marketing capability, and service area exposure through quicker and more convenient point-to-point travel. Business jets in the ARC C-II family of aircraft commonly require up to 6,000 to 6,500 feet for meeting "Accelerate-Stop Distance Available" (ASDA) requirements when the temperature exceeds 90° F.

FUTURE CRITICAL AIRCRAFT (FAMILY)

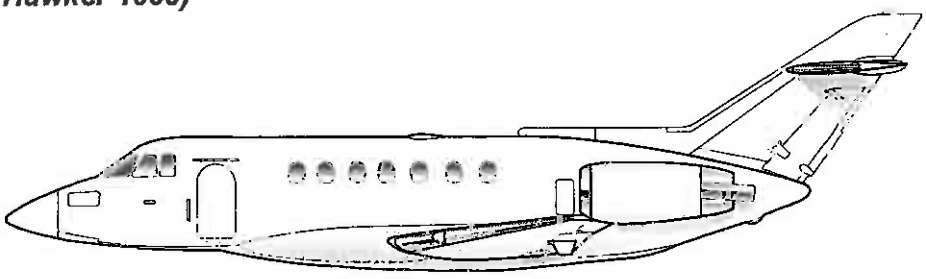
The critical aircraft is the largest airplane within a composite family of aircraft conducting at least 500 itinerant operations (combination of takeoffs and landings) per year at Lebanon. The future critical aircraft is evaluated with respect to size, speed and weight, and is important for determining airport design, structural, and equipment needs for the airfield and terminal area facilities.

The future critical aircraft identified at Lebanon by application of the itinerant forecast of fleet mix (business transport, fuel, and personal-use) is a medium to large cabin business jet in the ARC C-II family of aircraft. This category of business jets represents both 75 and 100 percent of large aircraft under 60,000 lbs. It should be noted that similar-sized aircraft currently operate at Lebanon. A level of 500 ARC C-II operations is expected by Phase 2 of the planning period (6-10 years) as attributed to a combination of ARC B-II, C-I and C-II business jet activity. Trends and reported activity do strongly suggest that a particular aircraft in the ARC C-II category would be based at Lebanon in the mid to long-term planning period (6-10 years), thereby well exceeding 500 annual operations by ARC C-II aircraft.

REPRESENTATIVE FUTURE CRITICAL AIRCRAFT (ARC C-II): (Cessna Citation X)



(Raytheon Hawker 1000)



FORECAST SUMMARY

Table 3.8 summarizes various forecast elements. The forecasts, combined with the inventory data, will be used to identify and develop the facility requirements for the Lebanon Airport. The next chapter, Facility Requirements, identifies the types and extent of facilities required to adequately accommodate the demand levels identified in this chapter.

Table 3.8
Aviation Forecast Summary
Floyd W. Jones – Lebanon Airport

	Existing (2001)	2006 (5 year)	2011 (10 year)	2016 (15 year)	2021 (20 year)
Total Based Aircraft					
Single-Engine Aircraft (A-I & B-I)	35	45	51	58	65
Piston Multi-Engine Aircraft (B-I)	1	2	2	3	4
Turbine Multi-Engine Aircraft (B-II)	6	6	8	9	10
Business Jet Aircraft (B-II to C-II)	4	5	5	6	7
Helicopters/Rotorcraft	0	0	0	0	0
Other (Sailplanes and Ultralights)	0	0	0	0	0
Total Based Aircraft	**46**	**58**	**66**	**76**	**86**
Total Annual Aircraft Operations					
Local Operations	6,810	8,580	9,770	11,220	12,700
Itinerant Operations	13,790	17,160	19,830	22,480	25,480
Air Taxi Operations	0	260	280	300	320
Military Operations	200	200	200	200	200
Total Annual Civilian Operations	**20,600**	**26,000**	**29,600**	**34,000**	**38,500**
Annual Instrument Approaches	340	400	450	500	570

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.

Note: Civilian operations do not include military activity levels.

Source: BWR, Forecast Summary – October 2001.

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CHAPTER FOUR - AIRPORT FACILITY REQUIREMENTS

4 AIRPORT FACILITY REQUIREMENTS

AIRPORT DESIGN FACTORS

This section discusses the runway length requirements to accommodate the forecast critical aircraft at the Floyd W. Jones – Lebanon Airport. The airfield design and site layout has been determined by application of airport design standards contained in the *FAA Advisory Circular 150/5300-13 Change #6, Airport Design, Version 3.0, Computer Airport Design Program Model*. The model calculates the minimum separation distance between the following airfield components:

- Runway/taxiway distance separations;
- Surface grade and airspace slope;
- Runway threshold (length) distances;
- Airfield safety areas (RSA, OFA, OFZ);
- NAVAID siting and safety areas;
- Runway protection zone (RPZ) size.

AIRPORT REFERENCE CODE (ARC) CLASSIFICATION

As identified in the Aviation Demand Forecasts (Chapter 3), the future critical aircraft family at Lebanon is ARC C-II. The FAA/MoDOT has established airport design criteria in accordance with the airport's ARC designation, which provides minimum safety standards with respect to the performance characteristics of the family of aircraft represented by the airport's *critical* aircraft. This particular aircraft, as determined with respect to approach speed and wingspan, is within a design category of airplanes that conduct at least 500 annual itinerant operations (combination of landings and takeoffs). It is forecast that the critical aircraft category at Lebanon in Planning Phase 1 will remain an ARC B-II category. The critical aircraft category in Phase 2 is forecast to be ARC C-II, as likely comprised of a *combination* of operations by ARC B-II, C-I and C-II aircraft. However, Phase 3 will likely accrue a "pure" threshold of activity by a select ARC C-II aircraft, most likely based at Lebanon.

RUNWAY DESIGN STANDARDS

By design, the primary runway normally has the longest runway length, most favorable wind coverage, greatest pavement strength, and lowest straight-in instrument approach minimums. Its length is determined from the greater of the takeoff or landing performance characteristics required by the composite family of airplanes expected to operate at the airport, as represented by the critical aircraft's airport reference code. For aircraft less than 60,000 pounds, the runway design length, as planned, is a function of accommodating a category of aircraft with similar performance characteristics.

Runway design lengths for "large airplanes" (12,500 to 60,000 lbs.) are determined with respect to size and operating attributes as referenced by the performance needs of the critical ARC family of aircraft. For business jets, runway length requirements are a factor of: **1)** the existing

or forecast family of critical aircraft within a composite family representing 75 percent or 100 percent of the business jet fleet (size attribute); and **2)** the existing or forecast critical aircraft operating at 60 percent or 100 percent useful load (operating attribute).

The following is a discussion of runway design length as appropriate to Lebanon:

FAA Composite Runway Length: For general aviation aircraft less than 60,000 pounds, runway design lengths are determined with respect to a "composite" family of aircraft as computed using FAA standards. **Table 4.1** identifies recommended runway lengths for the Lebanon Airport as computed from the *FAA Advisory Circular 150/5325-4A, Runway Length Requirements, Computer Program Version 4.1.*

Design lengths, in order to achieve minimum safety levels, are determined with respect to local conditions, including: **1)** the airport elevation (1,320 feet mean sea level - compensating for the affects of density altitude[1] and no wind); **2)** the average mean maximum daily temperature (89.0°F) for the hottest month (July); **3)** the effective runway gradient between runway ends (13.4' 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.

Based on the FAA runway length model, the ultimate design length for the primary runway at Lebanon is **5,900 feet**. This length accommodates 100 percent of large airplanes (12,500 – 60,000 lbs.) operating at 60 percent useful load on wet and slippery pavement conditions. By function, the 5,900-foot runway length, unrestricted by declared distances (displaced thresholds), accommodates small, medium and large-cabin business jets operating during a mean maximum temperature of less than 89°F. Most small and some medium-cabin business jets in the ARC B-II to C-I category can operate on 5,900 feet at 89°F without significant load restrictions (fuel, and/or passengers). However, this length does not provide for most medium to large-cabin business jets when operating in temperatures above 89°F, including many ARC C-II aircraft – which is the future critical aircraft family at Lebanon.

Note: The FAA design length of 5,500 feet accommodates 75 percent of large airplanes (12,500 – 60,000 lbs.) operating at 60 percent useful load on wet and slippery pavement conditions. This runway length increment could be considered an interim design length, but based on the existing and forecast levels of business jet activity, would not reliably serve as an ultimate runway length at Lebanon.

[1] Density Altitude – is the adjusted altitude for non-standard air density caused by the effects of increased altitude, temperature and humidity. Density altitude reduces aircraft operating performance, in turn, requiring longer runway lengths.

Note: Wet runway length requirements apply since the Lebanon Airport experiences at least 66 days of the year with 0.1 inch or more of rain.

Note: It should be noted that FAA performance factors are used for the design of airport runways, and not as a substitute for calculations required by airplane operating rules.

Note: Proposed regulations under FAR Part 91K would require the aircraft to come to a full-stop within 85 percent of the available runway length, which is a consideration for large aircraft operating during inclement weather and wet pavement conditions.

Table 4.1
Recommended Runway Lengths – FAA Advisory Circular 150/5325-4A
Floyd W. Jones – Lebanon Airport

Airport and Runway Data	**Input**	**Input**
Airport elevation	1,320'	1,320'
Mean daily maximum temperature of the hottest month	89° F	89° F
Maximum difference in runway centerline elevation	13.4'	13.4'
Recommended Primary Runway Length/Corresponding ARC	**Length - Dry**	**Length – Wet**
Small airplanes with less than 10 passenger seats:		
75% of these small airplanes (ARC A-I)	2,940'	2,940'
95% of these small airplanes (ARC B-I)	3,500'	3,500'
100% of these small airplanes (ARC B-II)	4,130'	4,130'
Small airplanes with 10 or more passenger seats (ARC B-II+10)	4,500'	4,500'
Large airplanes of 60,000 pounds or less:		
75% of these large airplanes at 60% useful load	5,010'	5,500'
75% of these large airplanes at 90% useful load	6,870'	7,000'
100% of these large airplanes at 60% useful load	**5,910'**	**5,910'**
100% of these large airplanes at 90% useful load	8,860'	8,860'
Recommended Ultimate Runway Design/Corresponding ARC	**FAA Design Length**	**FAA Design Width**
Ultimate Primary Runway Length (ARC C-II Critical Aircraft)	**5,900'**	**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.*

Runway Performance Length of Critical Aircraft: Runway length requirements when operating during non-standard temperatures demand longer runway distances to accommodate the affects of lost aircraft performance due to ambient conditions - greater than 89°F mean maximum during hottest month. This occurs more than 60 days per year in the Lebanon region. Under this design rationale, runway length requirements are dependent on additional operating and regulatory factors not considered by the FAA runway length model, including: **1)** take-off performance during hotter than standard conditions; **2)** operating regulations and insurance requirements specifying accelerate-stop or balanced field length (FAR Part 91 and 135); and **3)** range for selective payloads to specific destinations.

Table 4.2 provides reference to runway lengths to accommodate various representative families of business jets operating at Lebanon. Particular aircraft (models) selected for comparison are candidate planes being considered by current based operators within the near future (0-5 years), in addition to frequent transient operators. The table provides runway length requirements based on a standard day (59°F) and hot day (90° F) conditions, as published in airplane certification operating handbooks (performance charts). Although under 60,000 pounds, almost all of these aircraft have a takeoff distance and/or accelerate-stop distance (balanced field length) of more than 5,900 feet. As identified, the majority of ARC C-II to D-II general aviation aircraft demand a balanced field length (accelerate–stop distance) of between 5,500 to 6,500 feet.

Note: Runway performance lengths have been determined from obtaining specific pilot operating handbook information for common ARC B-II to C-II general aviation aircraft models. Although generally informed through Airport Survey information and interviews, no one particular operator has offered specific aircraft performance information regarding their particular aircraft operating configuration at Lebanon (model, engines, takeoff configuration, operating weights, range, etc.).

Note: It should be noted that FAA performance factors are used for the design of airport runways, and not as a substitute for calculations required by airplane operating rules.

Note: For planning purposes, "unrestricted" runway length does not employ provisions of declared distances (displaced land or takeoff threshold).

Note: FAR Part 135 regulates commercial operators (on-demand service) holding an Air Taxi/Commercial Operator Certificate. Based businesses at Lebanon operate under Part 135, which mandates more stringent runway takeoff and landing length requirements based on aircraft operating rules, and meeting minimum insurance requirements for particular aircraft. Aircraft operating under FAR Part 135 are required to satisfy balanced field length requirements (decision speeds based on V_1, V_2 and Vr), which involves the aircraft being able to accelerate to rotation speed, and then decelerate *and* stop prior to the departure end of the runway.

Table 4.2
Typical ARC Aircraft Information
Floyd W. Jones – Lebanon Airport

Aircraft	ARC	Maximum Gross Takeoff Weight	Runway Takeoff Length Requirement - Standard Day (59° F at Sea Level - ISO) 60% - 100% Useful Load	Runway Takeoff Length Requirement – Hot Day (90° F at 1,320' MSL) 60% Useful Load
Existing Runway 10-28 Use				
Cessna Citation 500 Series	B-II	13,300 lbs.	3,100' – 3,600'	3,200'
Hawker 800 Series	B-II	28,120 lbs.	4,900' – 5,400'	6,300'
Anticipated Future Runway 10-28 Use				
I.A.I. Westwind 1	C-I	22,850 lbs.	4,000' – 5,000'	6,000'
Raytheon Hawker 1000	C-II	31,000 lbs.	4,900' – 7,500'	6,250'
Cessna Citation 600/700 Series	C-II	36,100 lbs.	4,900' – 5,700'	6,500'
Learjet 30/40/50 Series	C-I/ D-I	20,200 lbs.	3,400' – 5,400'	6,000'
I.A.I Astra I.A.I Galaxy	C-I C-II	23,500 lbs. 34.850 lbs.	5,300' – 5,500'	6,600' 6,300'
Canadair Challenger Series	C-II	47,600 lbs.	5,700' – 6,100'	5,900'

Note: The temperature reaches or exceeds 90°F at Lebanon an average of 58 days each year.

Source: BWR – Aircraft Performance Files – October 2001.

SUMMARY OF PRIMARY RUNWAY LENGTH REQUIREMENTS

Based on inventory and forecast findings, the future recommended runway lengths at Lebanon per planning period are as follows:

5,500' - FAA design length required to accommodate existing based & transient aircraft.
75% of business jet fleet at 60% useful load - 89°F
Development period (0-3 years)

5,900' - FAA design length required to accommodate future based aircraft.
100% of business jet fleet at 60% useful load - 89°F
Development period (5-10 years)

6,500' - Length to accommodate performance takeoff distances of future based aircraft.
100% of business jet fleet at 60% useful load – balanced-field length at - 89°F
Development period (10-20 years)

CROSSWIND RUNWAY LENGTH REQUIREMENTS

During the initial stages of this Airport Master Plan Update, the City of Lebanon has elected to close the Crosswind Runway 9-27 due to adequate crosswind coverage from the Primary Runway 18-36, and to facilitate future airport expansion.

TAXIWAY REQUIREMENTS

The forecast level of annual operations and existing line-of-sight criteria indicate a full-length parallel taxiway system is required to serve the primary runway. Any future runway extension should include a planned extension of the taxiway system to the usable runway end.

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 131 feet wide along the taxiway centerline. Several existing hangar taxiways do not have the minimum safety areas or object free areas outlined in the airport design standards. Existing and planned taxiways and taxiway safety areas are revealed on the Airport Layout and Terminal Area Drawings per FAA airport design standards.

Taxiway Design Standards: Based on FAA design standards, Design Group II aircraft require a 35-foot taxiway width and 75-foot turning radius. The minimum separation distance between the runway and taxiway centerline for an ARC C-II straight-in instrument runway with not less than one mile visibility is 300 feet. Hold position line markings should be marked a minimum of 250 feet perpendicular to the runway centerline. The existing parallel taxiway contains an area 500 feet in length that exceeds the runway centerline elevation by up to four feet. Airport design standards indicate that at any point on a taxiway centerline, the allowable difference in elevations between the taxiway and the corresponding point on the associated parallel runway, taxiway, or apron edge is 1.5 percent. This elevation difference is acceptable according to the airport design standards.

RUNWAY AND TAXIWAY PAVEMENT STRENGTH STANDARDS

Table 4.2 lists common ARC B-II to C-II business jet weights at maximum takeoff weight. These aircraft range from 22,000 to nearly 50,000 pounds, with most aircraft over 20,000 pounds configured with dual-wheel gear. Based on this information, the recommended pavement strength for the primary runway and associated taxiway system is 60,000 pounds dual wheel gear.

RUNWAY AND TAXIWAY SURFACE GRADIENT REQUIREMENTS

Table 4.3 displays the runway grade standards for ARC Category C and D aircraft. This criteria is an important planning aspect with regard to the extension of runway and taxiway systems.

Table 4.3
Runway and Taxiway Surface Gradient Requirements (ARC C / D Category Aircraft)
Floyd W. Jones – Lebanon Airport

Surface	Longitudinal Grade	Maximum Allowable Grade Change	Vertical Curves for Longitudinal Change	Transverse Grade Limitations	Shoulder Grade Limitations
Runway	± 1.5% (not exceed ± 0.8 in first and last quarter of runway)	± 1.5%	1,000' per 1% of change	1%-1.5%	1.5%-3% (4:1 Slope)
Associated Taxiway	1.5%	3%	100' per 1% of change	1%-2%	3% -5% within 10'; 1.5%-5% until edge of taxiway safety area
Apron	N/A	2% in any direction	N/A	N/A	N/A
Runway Safety Area	No penetration of approach surface permitted	2% per 100'	0%-3% for first 200' beyond runway	5% (see note)	N/A

Note: According to airport design criteria, transverse slopes should be adequate to prevent the accumulation of water on the pavement surface. It is desirable to maintain a 5 percent slope for the first 10' of unpaved surface immediately adjacent to the paved surface, after which a maximum slope of 4:1 is recommended. Runways, taxiways and apron areas should conform to local drainage requirements. At any point on a taxiway centerline, the allowable difference in elevation between the taxiway and a perpendicular point on the associated parallel runway, taxiway, or apron edge is 1.5 percent of the shortest distance between the points. Runway and taxiway surface gradient requirements apply to the design of airport surfaces required for the landing, takeoff, and ground movement of airplanes. Slope and line-of-site requirements are in accordance with ARC Category C and D aircraft.

Source: FAA Advisory Circular 150/5300-13, Change #6, *Airport Design* -2001.

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 depicted by the following exhibits, are established from FAA Advisory Circular 150/5300-13, *Change #6, Airport Design* and FAR Part 77, *Objects Affecting Navigable Airspace*, and should conform to FAA airport design criteria without modifications to design standards.

Runway Safety Area (RSA): The runway safety area (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. Under dry conditions, the RSA must support an airplane without causing structural damage to the airplane or injury to the occupants. The runway and taxiway safety areas 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 (Refer to Table 4.3 for minimum grading specifications for the RSA). The existing RSA is 300 feet in length, extending from each runway end, and 150 feet in width which is considered non-standard given the type of critical aircraft currently using the Lebanon Airport (reference MoDOT, Aviation Section airport inspection, December 15, 1999). In order to accommodate future critical aircraft at the Lebanon Airport, the ultimate length of the RSA will extend to 1,000 feet past each runway end with a width of 500 feet, centered on the runway centerline. The entire RSA must be owned by the airport in fee simple.

Object Free Area (OFA): The object free area (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 purposes, 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 entire OFA must be owned by the airport in fee simple. The OFA areas are depicted on the Airport Layout Drawing.

Building Restriction Line (BRL): The BRL represents the boundary that separates the airside and landside of the airport, and identifies suitable building area locations based on airspace and visibility criteria. The BRL, recommended to provide at 35.0-foot clearance, is established with reference to FAR Part 77 criteria, in addition to other design factors. The BRL is depicted on the Airport Layout Drawing.

Runway Protection Zone (RPZ): The runway protection zone (RPZ), formerly the clear zone, 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. The RPZ size is determined by the type of airplanes expected to operate at the airport (small or large) and the type of approach planned for the runway ends (visual; non-precision not lower than 1 mile; ¾ mile ; or lower than ¾ mile).

Avigation easements, at a minimum, should be obtained by the sponsor to control the use of the airspace within the RPZ and approach surface (beyond the BRL) when fee simple ownership is not possible (beyond natural and man-made barriers such as roads). Typically, aviation/avigation easements vary upon the extent to which they restrict structures, control right-of-way entry, and limit electromagnetic interference.

Obstacle Free Zone (OFZ): The obstacle free zone (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 *and* inner approach OFZ is applicable.

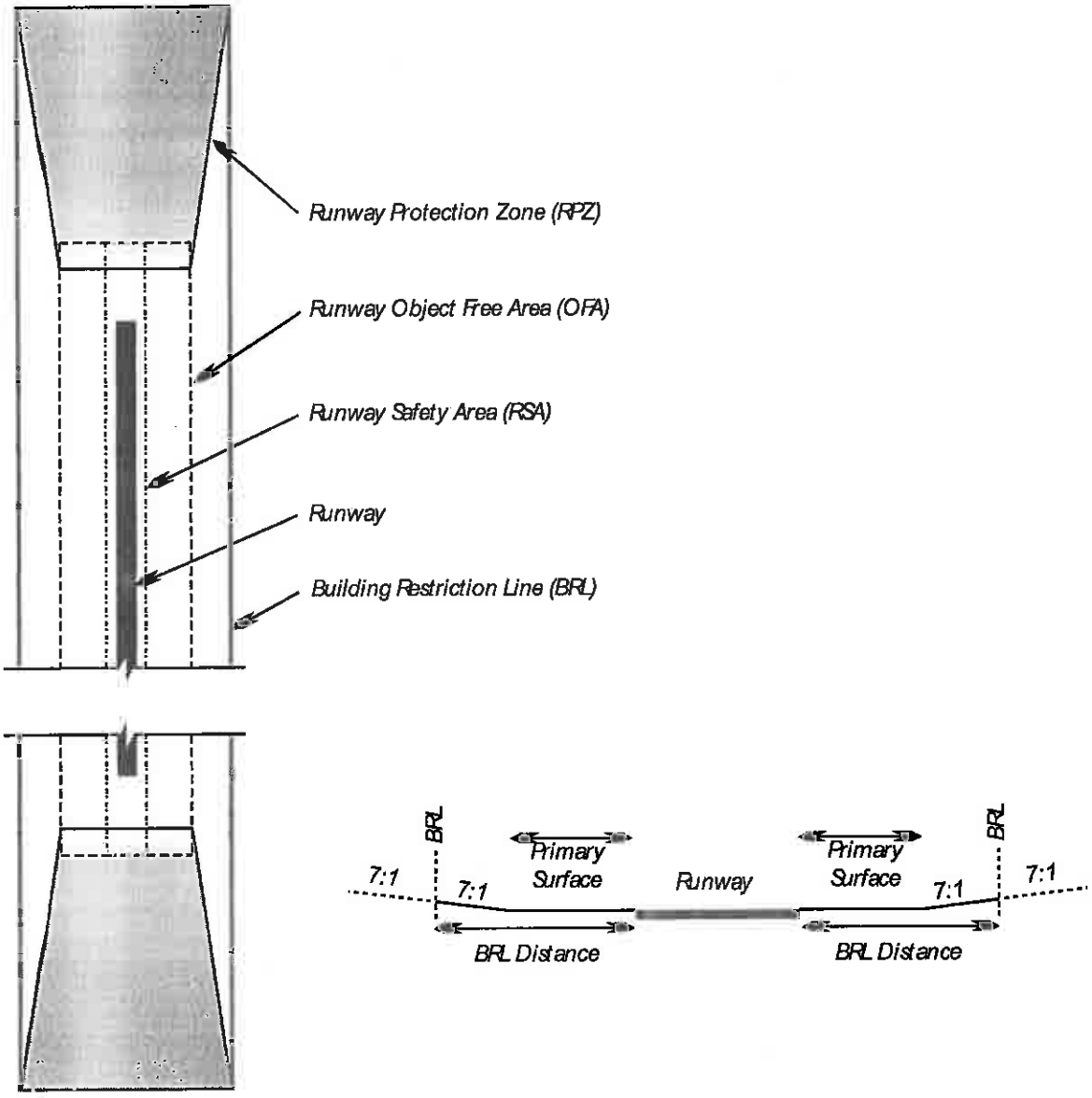
Runway Approach Slope/Surface: The approach slope is a three-dimensional FAR Part 77 trapezoid area beyond each runway end having a defined slope for clearance over structures and objects beyond the runway threshold. The purpose of the approach surface/slope is to provide proper clearance for the safe approach and landing of aircraft.

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.

Crop Restriction Line (CRL): The CRL is used to control concurrent on-airport agricultural areas in order to achieve unobstructed safety 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.

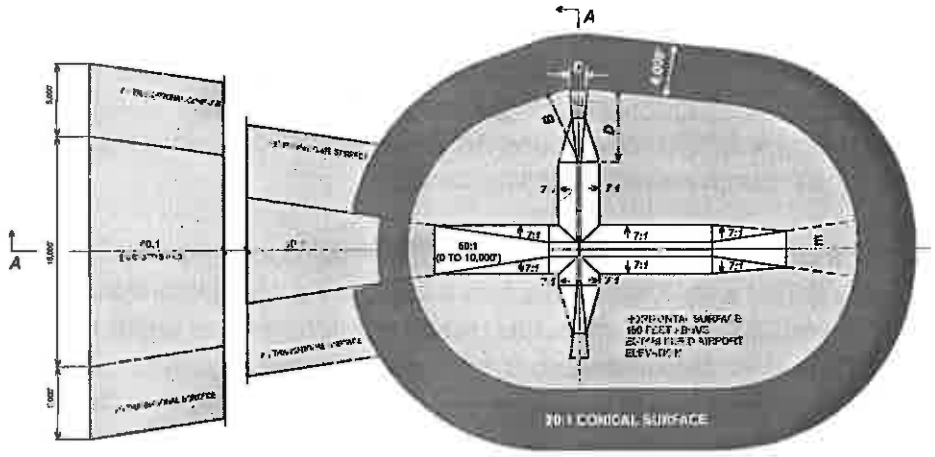
Figure 4.1 depicts the geometric dimensions of the RPZ, OFA, RSA and BRL. **Figure 4.2** depicts the FAR Part 77 imaginary airspace surfaces, including the primary and transitional surface and approach slopes.

FIGURE 4.1: RUNWAY SAFETY AREA REQUIREMENTS



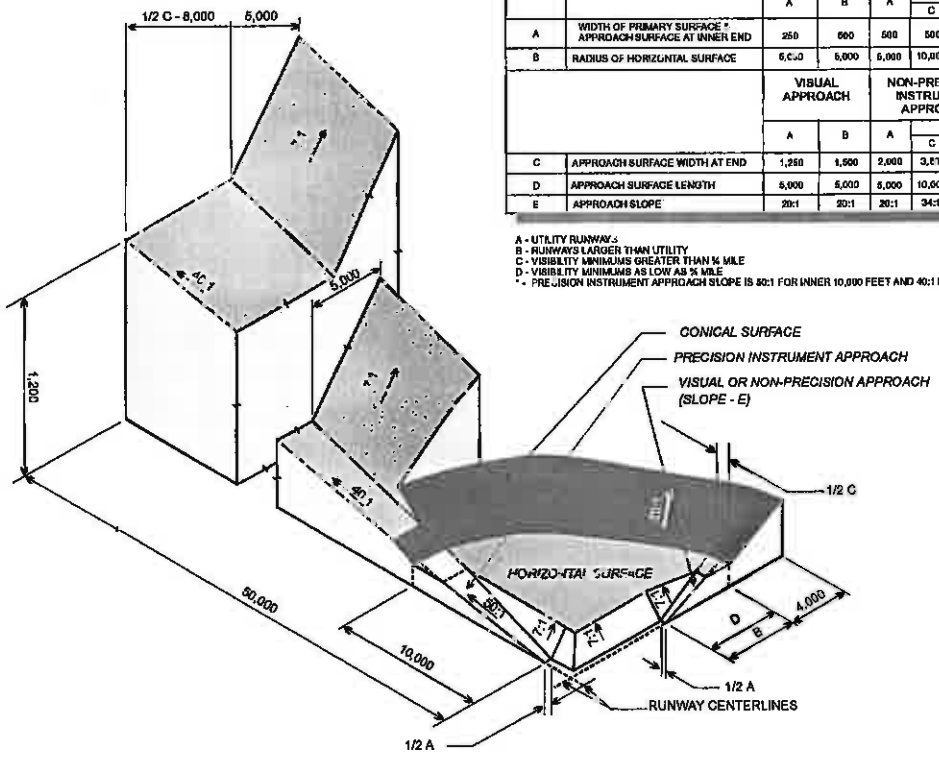
Source: FAA FAR Part 77, Objects Affecting Navigable Airspace, 1978

FIGURE 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		
					C	D	
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
		VISUAL APPROACH		NON-PRECISION INSTRUMENT APPROACH			PRECISION INSTRUMENT RUNWAY
		A	B	A	B		
					C	D	
C	APPROACH SURFACE WIDTH AT END	1,250	1,500	2,000	3,500	4,000	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 ¾ MILE
D - VISIBILITY MINIMUMS AS LOW AS ¾ 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 7031.2C, 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 Lebanon Airport, with some already in place, include:

Runway Lighting/Pavement Marking (MIRL): Pilot-controlled medium intensity runway lighting (MIRL) with "distance to go" lenses is recommended as the standard replacement lighting system to define the lateral and longitudinal limits of the primary and crosswind runways. Depending on the mechanical and electronic condition of the existing airport electrical system, upgrades to the runway lighting system may require electrical work to the existing vault, or the installation of a new vault system. Some of the runway edge lights are lower than the allowable 14 inches above the finished grade of the safety area. Runway pavement markings should follow requirements as prescribed in *FAA Advisory Circular 150/5340-1H, Standards for Airport Markings* (numbers, centerline, threshold and aiming point).

Taxiway Lighting/Pavement Marking (MITL): Medium intensity taxiway lights (MITL) are recommended as the lighting system for all taxiway sections and turning radius associated with the primary runway. MITL radius can also be pilot-controlled and wired to the same remote system as the runway lights. 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. It is recommended that REIL be installed at both ends of an instrument runway serving turbojet traffic, particularly for runways with straight-in approach procedures in cases where there is a lack of visual acuity and contrast with the surrounding landscape. The existing REIL's, in fair condition, are in a non-standard location and should be replaced/relocated.

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 or four lamp housing units installed 600 to 800 feet down the runway and offset 50 feet to the left side. The Lebanon Airport has a pulsating VASI system (PLASI), which is similar to the regular VASI, but uses a single light unit that pulsates red when below the minimum glideslope. The threshold crossing height for the visual glide angle should be 40 feet. During an inspection of the PLASI (May 19, 1998) it was noted that the threshold crossing height for Runway 18

was 37 feet, and the threshold crossing height for Runway 36 was 27 feet. It is recommended each end of the primary runway contain visual guidance indicators with the correct visual glide angle.

Airport Signs: Standard airport signs provide runway and taxiway location, direction and mandatory instructions for aircraft movement on the ground. Distance-to-go markers, which indicate remaining runway length in 1,000-foot intervals, are recommended for both runway ends. A system of standard signs is recommended to indicate runway, taxiway and aircraft parking destinations. An inspection of the Airport found the "distance remaining signs" along Runway 18-36 need to be placed on low impact resistant supports and repainted. *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 Tee/Segmented Circle/Airport Beacon: A segmented circle with a lighted wind tee is recommended as the standard indication of the winds and airport traffic pattern. The existing segmented circle should be relocated beyond the ultimate runway visibility zone (RVZ). The airport beacon, located next to the airport terminal building, is used for visual airport identification.

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 which offer high output.

OTHER AIRFIELD REQUIREMENTS

LAND ACQUISITION REQUIREMENTS

The acquisition of airport property is largely defined by the building restriction line (BRL) and runway protection zones (RPZ). The FAA/MoDOT mandates "fee simple" ownership of the "landing area" including the runway safety area (RSA), object free area (OFA), obstacle free zone (OFZ) and runway visibility zone (RVZ).

"Fee simple" ownership is also strongly encouraged for the entire runway protection zone (RPZ). However, RPZ areas beyond natural property boundaries (roads, streams, etc.) are sometimes more practical through the conveyance of avigation/aviation easements. Easements obtained for the RPZ (formally identified as "Clear Zone") should be positive easements with appropriate access and maintenance rights.

AIRFIELD FENCING REQUIREMENTS

Perimeter fencing, emergency gates, and landside fencing between airport property and public areas are strongly recommended to discourage access of non-users and wildlife to the airfield. Fencing, auto access gates, emergency gates, and signage within the terminal area is also strongly recommended to discourage access of non-users and wildlife. For general aviation airports such as Lebanon, the specific location, type and height normally depends on local security requirements and fencing established by adjacent property owners; otherwise, the fence line usually is situated along the property line. The minimum recommended fence height to restrict deer is 8 feet.

AIRFIELD/TERMINAL AREA DRAINAGE

The airfield design should be planned to utilize existing drainage patterns and not increase storm-water runoff onto adjacent properties and areas that include adjacent aircraft parking aprons, taxiways, and taxilanes. On-airport farming practices should be managed to lessen the accumulation of silt and other debris in and around storm-water inlets. Currently, the airport sponsor is considering creating a watershed area in the northeast quadrant of the airfield to lessen the impacts of flooding in areas adjacent to the airport property boundary. When planning for such a solution, consideration should be given to the affects of storm-water holding basins. Storm-water basins, by design and nature, attract migratory waterfowl, creating a potential wildlife hazard to aircraft operating in the vicinity of the Airport.

SUMMARY OF AIRSIDE FACILITY REQUIREMENTS

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

Table 4.4
Summary of Airside Facility Requirements
Floyd W. Jones - Lebanon Airport

Airport Component	Existing	Phase 1 Short-Term (0-5 Years)	Phase 2 Mid-Term (6-10 Years)	Phase 3 Long-Term (11-20 Years)
RUNWAY 18-36	5,000' x 75' ARC B-II	5,500' x 100' ARC C-II	5,900' x 100' ARC C-II	6,500' x 100' ARC C-II
Runway Strength	54,000 lbs. (dwg)	54,000 lbs. (dwg)	60,000 lbs. (dwg)	60,000 lbs. (dwg)
Runway Marking	Non Precision	Non Precision	Non Precision	Non Precision
Runway Lights	MIRL	MIRL	MIRL	MIRL
Visual Guidance	REIL – 36 PLASI – 18 & 36	REIL – 18 & 36 PAPI(4L) – 18 & 36 Distance to Go Airfield Signage	REIL – 18 & 36 PAPI(4L) – 18 & 36 Distance to Go Airfield Signage	REIL - 18 PAPI(4L) – 18 & 36 Distance to Go Airfield Signage
Approach Lighting				MALSF - 36
Taxiway System	Full Parallel	Full Parallel (300')	Full Parallel (300')	Full Parallel (300')
Taxiway Lighting	(non-standard) Reflectors	MITL/Reflectors	MITL/Reflectors	MITL/Reflectors
RUNWAY 9-27	2,374' x 50' ARC A-I	CLOSED	CLOSED	CLOSED
Runway Strength	12,500 lbs. (swg)			
Runway Marking	Visual			
Runway Lights	None			
Visual Guidance	None			
Taxiway System	None			
Taxiway Lighting	None			
Airport Navigational & Weather Aids	GPS (VNAV) NDB, SDF	GPS (VNAV) NDB, SDF AWOS Super Unicom	GPS (WAAS) AWOS Super Unicom	GPS (WAAS) AWOS Super Unicom

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
(SDF) simplified directional facility
(MALSF) – Medium intensity approach lighting system with runway alignment flashers (1,400')

Source: BWR, Airport Facility Requirement Summary – August, 2000.
FAA Advisory Circular 150/5300-13, Change #6, *Airport Design*, 2000.

TERMINAL AREA REQUIREMENTS

The landside facility requirements for the Lebanon Airport throughout the 20-year planning period are summarized in **Table 4.5**. The major terminal area facility requirements, as depicted on the Airport Layout and Terminal Area Drawings, are developed in consideration of the following general landside design concepts:

- Future terminal area development should be centralized and allow for incremental linear expansion of facilities *and* services in a modular fashion along an established flightline. Main design concepts include: minimizing earthwork/grading; avoiding flood-prone areas; integrating existing paved areas to reduce pavement (taxilane) costs; and minimize the taxiing distance to and from the airfield and other terminal area facilities, equipment and services.

- Terminal expansion should provide secure pilot and passenger processing.

- Future terminal area development should enhance safety and 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 as the main functional and social center for the operation, promotion, and identity of the Airport. Based on an assessment of general aviation demands, the following individual terminal building components were identified based on the average peak-hour activity forecast during the planning period:

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

FIXED BASE OPERATOR (FBO) REQUIREMENTS

The fixed base operator (FBO) generally requires space for pilot and passenger needs as well as to accommodate the variety of line services and staff activities offered at the airport. Future FBO expansion may be brought about internally through the introduction of new support-services and/or a growth in operations attributed to local-area demands.

Similar to a private enterprise, the expansion of FBO services, equipment and facilities is determined on a financial analysis. The FBO must weigh the balance of its partnership with the airport sponsor, shared-risk for existing and future investments, and the affect of competing interests of private investment. For Lebanon, FBO expansion considerations might include the following:

- Expansion that coincides with growth in airport activity, which is expected to increase moderately for twin turboprop aircraft and business jets;
- The addition of facilities in a specified area and in modular fashion when demand warrants, and incrementally coordinated with increasing space requirements;
- Continuing to provide airport line services for the mix of aircraft currently using the Lebanon Airport as well as provide for future airport users; and
- Maintaining the responsibility for the promotion and identity of the Airport.

AIRCRAFT HANGAR REQUIREMENTS

Table 4.5 reveals the existing and future hangar space requirements throughout the 20-year planning period. Future hangar areas should balance the need between maintaining an unobstructed expansion area, minimizing pavement development, and allowing convenient access. For planning purposes, hangars should accommodate at least 95 percent of all based general aviation aircraft. Typically, single-engine planes demand approximately 1,200 square feet, twin-propeller aircraft demand from 1,200 to 2,500 square feet, and business jet aircraft require 2,400 to 4,000 square feet. The following guidelines should be used:

- Hangars *should* be constructed beyond the established building restriction line (BRL) surrounding the runway and taxiway areas, and *must* be built beyond the runway obstacle free zone (OFZ), runway and taxiway object free area (OFA), and the runway visibility zone (RVZ);

- The minimum recommended clearance between T-hangars is 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;

- Hangar expansion is anticipated to occur on the east side of the terminal area in the short term (0-5 year) planning period. The area reserved for terminal area expansion on the west side of the Airport may be used for additional T-hangars and private common hangar development;

- Expansion of the terminal area facilities should include the replacement of hangar units that are in poor condition;

- Hangar development should provide 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; and

- Future aircraft hangars should be segregated based on the hangar type and function. From a planning standpoint, hangars should be centralized in terms of auto access, and located along the existing flight line to minimize the construction costs associated with access, drainage, utility and auto parking expansion.

AIRCRAFT APRON FACILITY REQUIREMENTS

Existing and future apron space requirements throughout the 20-year planning period are provided in **Table 4.5**. 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 planning and design considerations are as follows:

- All apron areas must remain beyond all airfield safety areas per airport design requirements (RSA, OFA, RPZ, OFZ and RVZ);

- Design standards require a minimum of 300 feet runway centerline to aircraft parking area separation for ARC C-II runways with approach visibility minimums "not lower than ¾ mile;" and

- The aircraft parking area (paved or non-paved) should provide adequate taxiing and maneuvering space to enter and exit without risk of structural damage, and allow for safe passage of aircraft leading to the connecting taxiway. Ideally, the main apron should remain centralized along the runway mid-section, and allow for a

continuation of building and hangar expansion adjacent to the terminal area flight line when demand warrants.

FUEL STORAGE REQUIREMENTS

Table 4.5 shows the existing and future fuel storage capacity requirements throughout the 20-year planning period. Fuel storage requirements are based on the forecast of annual operations, aircraft utilization, and the average fuel consumption rates for the different types of general aviation aircraft using the airfield. The typical single-engine airplane consumes an average of 12.0 gallons of fuel per hour and flies approximately 183 nautical miles (1.6 to 1.8 hours) per flight. Based turboprop aircraft average 71 gallons of fuel per hour, and business jet aircraft consume an average of 197 gallons of fuel per hour. The average distance flown by the based turboprop and business aircraft is 528 nautical miles. Recommended fuel facility planning and design considerations include:

- Maintaining aircraft fueling facilities in a visible location and in close proximity to the airport terminal building for security purposes;
- Providing fuel storage capacity to accommodate average peak-month activity, which normally occurs during the summer months;
- Preserving minimum wing-tip clearance to other structures, aircraft parking areas (tie-downs), frequently used maneuvering areas, and object free area (OFA) separation; and
- Locating any additional fuel facilities beyond the runway safety areas and building restriction line (BRL), as recommended by the FAA. In addition, all fuel storage tanks should be equipped with monitors to meet current state and EPA regulations, and sited in accordance with local fire codes.

AUTO PARKING, CIRCULATION AND ACCESS REQUIREMENTS

Existing and future auto parking requirements throughout the 20-year planning period are shown in **Table 4.5**. The number of parking spaces is calculated using 1.4 spaces per design hour passenger, which is typical for smaller, non-towered general aviation airports. For based aircraft owners, pilots commonly park in their individual hangars while flying for extended periods. Other recommended facility planning and design considerations include:

- Maintaining adequate access for fuel supply trucks to replenish the underground storage tanks located in the terminal area; and
- Allowing based pilots auto access to their hangar, as they frequently park inside the hangar while flying. This practice should not interfere with other terminal area functions.

TERMINAL AREA FENCING/SECURITY REQUIREMENTS

Perimeter fencing, gates and terminal fencing between airport property and public areas are recommended to discourage access of people and wildlife to the runway, taxiway, and terminal area. Additional security fencing is recommended around the aircraft parking area to protect based and transient aircraft using that space. The specific terminal area fence location, type and height normally depend on FAA security requirements, and fencing previously established by adjacent property owners. Recommended facility planning and design considerations include:

- Controlling auto access to the apron and hangar areas by employing security gate(s) and assigning identification pass(es);
- Installing perimeter fencing specifically designed for exclusion of wildlife;
- Installation of restrictive signs and pavement markings in appropriate locations to prevent auto-aircraft conflicts; and
- Implementing routine security patrol checks to be conducted on a regular basis.

SUMMARY OF TERMINAL AREA FACILITY REQUIREMENTS

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

Table 4.5
Summary – Landside/Terminal Facility Requirements
Floyd W. Jones – Lebanon Airport

Facility	Existing	Phase 1 (0-5) Short-Term	Phase 2 (6-10) Mid-Term	Phase 3 (11-20) Long-Term
Based Aircraft	**46**	**58**	**66**	**86**
Annual Operations	**20,600**	**26,000**	**29,600**	**38,500**
Peak Hour Passengers	**28.9**	**36.7**	**44.9**	**68.8**
Apron Tie-Down Area	**20,160 S.Y.**	**18,171 S.Y.**	**20,883 S.Y.**	**26,967 S.Y.**
Apron Tie-Downs	**34**	**47**	**54**	**70**
T-Hangars	12,678 S.F.	63,000 S.F.	71,400 S.F.	78,000 S.F.
Common/Corporate Hangars	61,460 S.F.	56,240 S.F.	59,600 S.F.	81,680 S.F.
Total Hangar Space	**74,138 S.F.**	**123,640 S.F.**	**131,000 S.F.**	**159,680 S.F.**
Terminal Building Size	**1,800 S.F.**	**2,291 S.F.**	**2,809 S.F.**	**4,300 S.F.**
Fuel Storage:				
Total Annual Fuel Sales	200,000 Gal.	233,100 Gal.	271,700 Gal.	369,000 Gal.
Average Monthly Fuel Sales	16,667 Gal.	19,425 Gal.	22,642 Gal.	30,750 Gal.
Storage Volume (100LL)	12,000 Gal.	12,000 Gal.	12,000 Gal.	12,000 Gal.
Storage Volume (Jet A)	12,000 Gal.	24,000 Gal.	24,000 Gal.	30,000 Gal.
Total Fuel Storage Volume	**24,000 Gal.**	**36,000 Gal.**	**36,000 Gal.**	**36,000 Gal.**
Paved Auto Parking Area	**3,472 S.F.**	**4,411 S.F.**	**5,407 S.F.**	**8,278 S.F.**
Auto Parking Spaces	**16**	**20**	**25**	**38**

Note: Apron tie-downs based on small aircraft (single and light twin-propeller aircraft less than 12,500 lbs).
Note on hangar ownership: Hangars assume public and private ownership.

Source: BWR, Facility Requirement Summary – March 2002.

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5

CHAPTER FIVE - AIRPORT ALTERNATIVES ANALYSIS

5 AIRPORT ALTERNATIVES ANALYSIS

ALTERNATIVE EVALUATION ANALYSIS

This chapter is dedicated to presenting and evaluating various airfield designs in an effort to meet facility design requirements outlined in the previous chapter. Each alternative is evaluated with respect to feasibility and function to the overall design concept. The preferred alternative will become the basis of the airport development plan, as depicted in the Airport Layout Plan (ALP).

As a rule, the airport plan is 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 local planning policies, and be consistent with social, economic, political and environmental goals. 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 design standards and airspace criteria;*
- *Maintain compatibility with existing and proposed on- and off-airport land uses;*
- *Consider short and long-term development costs; and*
- *Minimize the consequences of environmental impacts and potential mitigation.*

AIRFIELD ALTERNATIVES

The major airfield design concepts include the following alternatives:

ALTERNATIVE A: Maintain Runway 18-36 (ARC B-II - 5,000' x 75).
ALTERNATIVE B: Construct ARC C-II Runway.
Option 1: 5,500' x 100'
Option 2: 5,900' x 100'
Option 3: 6,500' x 100'
ALTERNATIVE C: Instrument Approach Minimums Lower Than One Mile

ALTERNATIVE A: Maintain Runway 18-36 (ARC B-II - 5,000' x 75)

Alternative "A" maintains the Runway 18-36 length and width at 5,000' x 75' (60,000 lbs DWG). This alternative includes a new full-length parallel taxiway built to the same pavement strength (60,000 lbs DWG) as the Runway 18-36.

Design Considerations: Maintaining the current ARC B-II airport design standards would preclude purchasing additional land for airport expansion and development. A full-length parallel taxiway (5,000' x 35') would be constructed at 300 feet offset from the runway centerline. This taxiway would replace the existing parallel taxiway that varies from 200 feet to 540 feet separation from the runway centerline, and contains excessive centerline curves.

Conclusion: This alternative would continue to serve the existing mix of aircraft currently using Lebanon, with many large business aircraft operating at significantly reduced payloads to remain within safe operating parameters.

ALTERNATIVE B: Improve Primary Runway 18-36 to Accommodate ARC C-II Aircraft

According to the airport surveys and telephone interviews conducted as part of this Master Plan Study, it was indicated that the existing airport facilities limit the types and frequency of business jet operations at the Lebanon Airport, especially during hot weather. In order to satisfy the forecast levels of activity for the Lebanon Airport, a primary runway to accommodate ARC C-II aircraft is needed during the 20-year planning period. These design requirements will be incorporated into each of the options discussed in this section.

Design Considerations: A 5,500-foot or larger runway length corresponds to the ARC C-II "business" jet designation, which requires additional runway safety areas (RSA), runway protection zones (RPZ), centerline separations and building setback minimums compared to the existing ARC B-II standards. The ARC C-II designation is used to accommodate aircraft with larger wing spans and higher approach speeds. A full-length parallel taxiway would be constructed to serve Runway 18-36. The airport site is constrained by topography, utilities, and a public road. The following is a list of critical site factors that must be considered in order to meet minimum safety and design requirements for the larger ARC C-II runway:

- Acquire additional property and avigation easements;
- Fill and grade considerable amounts of earthwork to meet minimum line-of-sight standards, longitudinal and transverse grade requirements, and vertical curve minimums for the runway environment;
- Relocate north end threshold (approximately 650 feet to the south) to acquire the minimum runway safety area distance beyond the runway threshold;
- Clear trees and brush;
- Remove/relocate various structures and fencing;
- Close Fremont Road to all public and private traffic;
- Relocate or encase three 18-inch underground sewage lines;

ALTERNATIVE A

DECLARED DISTANCE TABLE

EXISTING					ULTIMATE				
RUNWAY	TORA	TODA	ASDA	LDA	RUNWAY	TORA	TODA	ASDA	LDA
9	2,300'	2,300'	2,300'	2,300'	9	N/A	N/A	N/A	N/A
27	2,300'	2,300'	2,300'	2,300'	27	N/A	N/A	N/A	N/A
18	5,000'	5,000'	5,000'	5,000'	18	5,000'	5,000'	5,000'	5,000'
36	5,000'	5,000'	5,000'	5,000'	36	5,000'	5,000'	5,000'	5,000'

DECLARED DISTANCE INFORMATION OBTAINED FROM THE AERONAUTICAL DATA SHEET (11/05/99), AND GEO83A GEODETIC CALCULATION IN NORTH AMERICAN DATUM (NAD83). DECLARED DISTANCES IN ACCORDANCE WITH AC 150/5300-13, CHANGE #8.

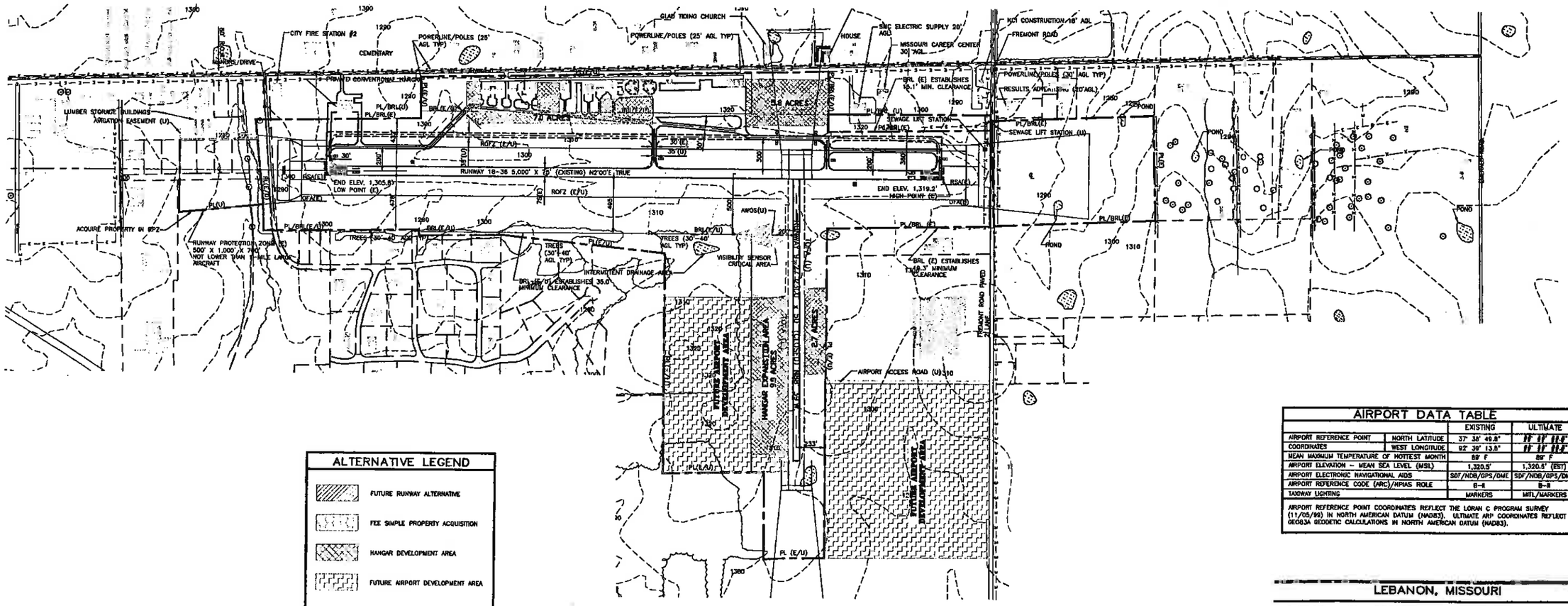
LEGEND

EXISTING	ULTIMATE	
		FACILITIES
BLDG	BLDG	BUILDINGS/STRUCTURES
APT PROP	APT PROP	AIRPORT PROPERTY LINE
AVIG EASE	AVIG EASE	AVIATION EASEMENTS
BRL(E)	BRL(U)	BUILDING RESTRICTION LINE (BRL)
RSA/OFA(E)	RSA/OFA(U)	RUNWAY SAFETY AREA (RSA)/OBJECT FREE AREA (OFA)
RPZ(E)	RPZ(U)	RUNWAY PROTECTION ZONE (RPZ)
OFZ(E)	OFZ(U)	OBSTACLE FREE ZONE (OFZ)
RVZ(E)	RVZ(U)	RUNWAY VISIBILITY ZONE (RVZ)
		AIRPORT REFERENCE POINT (ARP)
		BENCHMARK
		ROTATING BEACON
		PRECISION APPROACH PATH INDICATORS (PAPI)
		PULSATING VISUAL APPROACH SLOPE INDICATORS (PLASI)
		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/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
		WATER LINE
		SEWAGE LINE
		LOCALIZER ANTENNA
		MEDIUM INTENSITY APPROACH LIGHTING SYSTEM (MALS)
		POND/BODY OF WATER
		SECTION CORNER

RUNWAY DATA TABLE

	RUNWAY 9-27				RUNWAY 18-36			
	EXISTING		ULTIMATE		EXISTING		ULTIMATE	
APPROACH CATEGORY/DESIGN GROUP	A-I (SMALL AIRCRAFT)		CLOSE		B-II		B-II	
RUNWAY LENGTH/WIDTH	2,300' X 50'		---		5,000' X 75'		5,000' X 75'	
RUNWAY LIGHTING	NONE		---		MIRL		MIRL	
RUNWAY TYPE/MARKINGS	BASIC		---		NPI		NPI	
EFFECTIVE RUNWAY GRADIENT (%)	0.3%		---		0.3%		0.3%	
PAVEMENT MATERIAL	ASPHALT		---		ASPHALT		ASPHALT	
PAVEMENT STRENGTH (,000 LBS)	12.5 (S)		---		33.0 (S)/54.0 (D)		60.0 (D)	
RUNWAY SAFETY AREA (RSA) LENGTH	2,780'		---		5,800'		5,800'	
RUNWAY SAFETY AREA (RSA) WIDTH	120'		---		150'		150'	
OBJECT FREE AREA (OFA) LENGTH	2,700'		---		5,400'		5,400'	
OBJECT FREE AREA (OFA) WIDTH	250'		---		400'		400'	
OBSTACLE FREE ZONE (OFZ) LENGTH	2,780'		---		5,800'		5,800'	
OBSTACLE FREE ZONE (OFZ) WIDTH	250'		---		500'		500'	
HOLDING POSITION	125'		---		125' (NSTD)		200'	
TAXIWAY WIDTH	N/A		---		33'/40'		35'	
	9	27	9	27	18	36	18	36
INSTRUMENT APPROACH AIDS	NONE	NONE	---	---	GPS	SDF/NDB/GPS/DME	GPS	SDF/NDB/GPS/DME
VISUAL APPROACH AIDS	NONE	NONE	---	---	PLASI	PLASI	PAPI(4L)	PAPI(4L)/REIL
RUNWAY VISIBILITY MINIMUMS	VISUAL	VISUAL	---	---	1-MILE	1-MILE	1-MILE	1-MILE
FAR PART-77 APPROACH SLOPE	20:1	20:1	---	---	20:1	20:1	34:1	34:1
TOUCHDOWN ZONE ELEVATION (TDZE)	1,316.8'	1,316.8'	---	---	1,315.9'	1,320.5'	1,315.9' (EST)	1,320.5' (EST)

(S)=SINGLE WHEEL GEAR (D)=DUAL WHEEL GEAR (DT)=DUAL TANDEM WHEEL GEAR
RUNWAY END AND TOUCHDOWN ZONE ELEVATIONS REFLECT AERONAUTICAL DATA SHEET (11/05/99).
* FAA/STATE ELIGIBLE RUNWAY



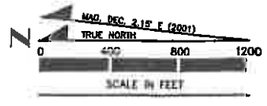
ALTERNATIVE LEGEND

- FUTURE RUNWAY ALTERNATIVE
- FEE SIMPLE PROPERTY ACQUISITION
- HANGAR DEVELOPMENT AREA
- FUTURE AIRPORT DEVELOPMENT AREA
- PROPERTY TRACTS
- EXISTING AIRPORT PROPERTY BOUNDARY

AIRPORT DATA TABLE

		EXISTING	ULTIMATE
AIRPORT REFERENCE POINT	NORTH LATITUDE	37° 38' 49.8"	PF 37° 38' 11.2"
COORDINATES	WEST LONGITUDE	92° 39' 13.5"	PF 92° 39' 21.2"
MEAN MAXIMUM TEMPERATURE OF HOTTEST MONTH		89° F	89° F
AIRPORT ELEVATION - MEAN SEA LEVEL (MSL)		1,320.5'	1,320.5' (EST)
AIRPORT ELECTRONIC NAVIGATIONAL AIDS		SDF/NDB/GPS/DME	SDF/NDB/GPS/DME
AIRPORT REFERENCE CODE (ARC)/NPIAS ROLE		B-II	B-II
TAXIWAY LIGHTING		MARKERS	MITL/MARKERS

AIRPORT REFERENCE POINT COORDINATES REFLECT THE LORAN C PROGRAM SURVEY (11/05/99) IN NORTH AMERICAN DATUM (NAD83). ULTIMATE ARP COORDINATES REFLECT GEO83A GEODETIC CALCULATIONS IN NORTH AMERICAN DATUM (NAD83).



LEBANON, MISSOURI

FLOYD W. JONES - LEBANON AIRPORT

ALTERNATIVE A

JOB NO. 2001349.05	DESIGNED BY: RWC	DATE: 2/21/02	REVISIONS
DRAWING NO. 2	DRAWN BY: RWC	DATE: 2/21/02	
SCALE AS SHOWN	CHECKED BY: ***	DATE: MM/DD/YY	
SHEET 2 OF #	BUCHER, WILLIS & RATLIFF CORPORATION		

ALTERNATIVE B OPTION 1

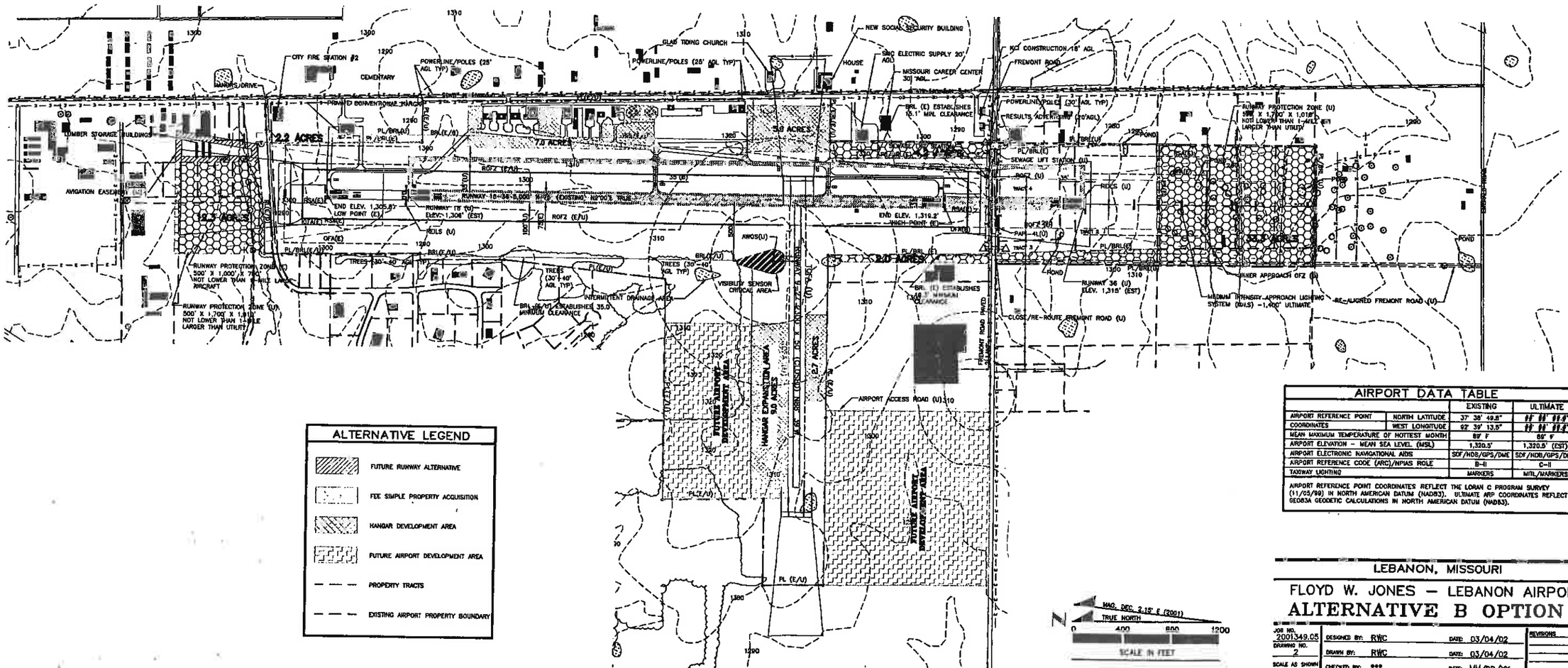
DECLARED DISTANCE TABLE									
	EXISTING				ULTIMATE				
RUNWAY	TORA	TODA	ASDA	LDA	RUNWAY	TORA	TODA	ASDA	LDA
9	2,300'	2,300'	2,300'	2,300'	9	N/A	N/A	N/A	N/A
27	2,300'	2,300'	2,300'	2,300'	27	N/A	N/A	N/A	N/A
18	5,000'	5,000'	5,000'	5,000'	18	5,500'	5,500'	5,500'	5,500'
36	5,000'	5,000'	5,000'	5,000'	36	5,500'	5,500'	5,500'	5,500'

DECLARED DISTANCE INFORMATION OBTAINED FROM THE AERONAUTICAL DATA SHEET (11/05/99), AND GEO83A GEODETIC CALCULATION IN NORTH AMERICAN DATUM (NAD83). DECLARED DISTANCES IN ACCORDANCE WITH AC 150/5300-13, CHANGE #8.

LEGEND		
EXISTING	ULTIMATE	
		FACILITIES
		BUILDINGS/STRUCTURES
PL(E)	PL(U)	AIRPORT PROPERTY LINE
		AVIATION EASEMENTS
BRL(E)	BRL(U)	BUILDING RESTRICTION LINE (BRL)
RSA/OFA(E)	RSA/OFA(U)	RUNWAY SAFETY AREA (RSA)/OBJECT FREE AREA (OFA)
RPZ(E)	RPZ(U)	RUNWAY PROTECTION ZONE (RPZ)
OFZ(E)	OFZ(U)	OBSTACLE FREE ZONE (OFZ)
RVZ(E)	RVZ(U)	RUNWAY VISIBILITY ZONE (RVZ)
		AIRPORT REFERENCE POINT (ARP)
		BENCHMARK
		ROTATING BEACON
		PRECISION APPROACH PATH INDICATORS (PAPI)
		PULSATING VISUAL APPROACH SLOPE INDICATORS (PLASI)
		GUIDANCE/DIRECTIONAL/HOLD POSITION SIGN
		HOLD POSITION MARKING
		WIND CONE & SEGMENTED CIRCLE
		RUNWAY THRESHOLD LIGHTS
		RUNWAY END IDENTIFIER LIGHTS (REIL)
		GROUND CONTOUR (USGS MAP)
XX	XX	FENCING
		PAVED/DIRT ROAD
		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
		WATER LINE
		SEWAGE LINE
		LOCALIZER ANTENNA
		MEDIUM INTENSITY APPROACH LIGHTING SYSTEM (MALS)
		POND/BODY OF WATER
		SECTION CORNER

RUNWAY DATA TABLE								
	RUNWAY 9-27				RUNWAY 18-36			
	EXISTING		ULTIMATE		EXISTING		ULTIMATE	
APPROACH CATEGORY/DESIGN GROUP	A-I (SMALL AIRCRAFT)		CLOSE		B-II		C-II	
RUNWAY LENGTH/WIDTH	2,300' X 50'		---		5,000' X 75'		5,500' X 100'	
RUNWAY LIGHTING	NONE		---		MIRL		MIRL	
RUNWAY TYPE/MARKINGS	BASIC		---		NPI		NPI	
EFFECTIVE RUNWAY GRADIENT (%)	0.3%		---		0.3%		0.2% (EST)	
PAVEMENT MATERIAL	ASPHALT		---		ASPHALT		ASPHALT	
PAVEMENT STRENGTH (,000 LBS)	12.5 (S)		---		33.0 (S)/54.0 (D)		60.0 (D)	
RUNWAY SAFETY AREA (RSA) LENGTH	2,780'		---		5,800'		7,500'	
RUNWAY SAFETY AREA (RSA) WIDTH	120'		---		150'		500'	
OBJECT FREE AREA (OFA) LENGTH	2,700'		---		5,400'		5,900'	
OBJECT FREE AREA (OFA) WIDTH	250'		---		400'		400'	
OBSTACLE FREE ZONE (OFZ) LENGTH	2,780'		---		5,800'		7,500'	
OBSTACLE FREE ZONE (OFZ) WIDTH	250'		---		500'		800'	
HOLDING POSITION	125'		---		125' (NSTD)		250'	
TAXIWAY WIDTH	N/A		---		35'/40'		35'	
	9	27	9	27	18	36	18	36
INSTRUMENT APPROACH AIDS	NONE	NONE	---	---	GPS	SDF/NDB/GPS/DME	GPS	SDF/NDB/GPS/DME
VISUAL APPROACH AIDS	NONE	NONE	---	---	PLASI	PLASI	PAPI(4L)/REIL	PAPI(4L)/MALS
RUNWAY VISIBILITY MINIMUMS	VISUAL	VISUAL	---	---	1-MILE	1-MILE	1-MILE	1-MILE
FAR PART-77 APPROACH SLOPE	20:1	20:1	---	---	20:1	20:1	34:1	34:1
TOUCHDOWN ZONE ELEVATION (TDZE)	1,316.8'	1,316.8'	---	---	1,315.8'	1,320.8'	1,315.8' (EST)	1,320.5' (EST)

(S)=SINGLE WHEEL GEAR (D)=DUAL WHEEL GEAR (DT)=DUAL TANDEM WHEEL GEAR
RUNWAY END AND TOUCHDOWN ZONE ELEVATIONS REFLECT AERONAUTICAL DATA SHEET (11/05/99).
* FAA/STATE ELIGIBLE RUNWAY



ALTERNATIVE LEGEND
FUTURE RUNWAY ALTERNATIVE
FEE SIMPLE PROPERTY ACQUISITION
HANGAR DEVELOPMENT AREA
FUTURE AIRPORT DEVELOPMENT AREA
PROPERTY TRACTS
EXISTING AIRPORT PROPERTY BOUNDARY

AIRPORT DATA TABLE			
		EXISTING	ULTIMATE
AIRPORT REFERENCE POINT	NORTH LATITUDE	37° 38' 49.8"	** ** **.*
COORDINATES	WEST LONGITUDE	92° 39' 13.5"	** ** **.*
MEAN MAXIMUM TEMPERATURE OF HOTTEST MONTH		89° F	89° F
AIRPORT ELEVATION - MEAN SEA LEVEL (MSL)		1,320.5'	1,320.5' (EST)
AIRPORT ELECTRONIC NAVIGATIONAL AIDS		SDF/NDB/GPS/DME	SDF/NDB/GPS/DME
AIRPORT REFERENCE CODE (ARC)/NPIAS ROLE		B-II	C-II
TAXIWAY LIGHTING		MARKERS	MITL/MARKERS

AIRPORT REFERENCE POINT COORDINATES REFLECT THE LORAN C PROGRAM SURVEY (11/05/99) IN NORTH AMERICAN DATUM (NAD83). ULTIMATE ARP COORDINATES REFLECT GEO83A GEODETIC CALCULATIONS IN NORTH AMERICAN DATUM (NAD83).

LEBANON, MISSOURI

FLOYD W. JONES – LEBANON AIRPORT

ALTERNATIVE B OPTION 1

JOB NO. 2001349.05	DESIGNED BY: RWC	DATE: 03/04/02	REVISIONS
DRAWING NO. 2	DRAWN BY: RWC	DATE: 03/04/02	
SCALE AS SHOWN	CHECKED BY: ***	DATE: MM/DD/YY	
SHEET: 2 OF #	BUCHER, WILLIS & RATLIFF CORPORATION		

ALTERNATIVE B OPTION 2

DECLARED DISTANCE TABLE

	EXISTING				ULTIMATE				
RUNWAY	TORA	TODA	ASDA	LDA	RUNWAY	TORA	TODA	ASDA	LDA
9	2,300'	2,300'	2,300'	2,300'	9	N/A	N/A	N/A	N/A
27	2,300'	2,300'	2,300'	2,300'	27	N/A	N/A	N/A	N/A
18	5,000'	5,000'	5,000'	5,000'	18	5,900'	5,900'	5,900'	5,900'
36	5,000'	5,000'	5,000'	5,000'	36	5,900'	5,900'	5,900'	5,900'

DECLARED DISTANCE INFORMATION OBTAINED FROM THE AERONAUTICAL DATA SHEET (11/05/99), AND GEO83A GEODETIC CALCULATION IN NORTH AMERICAN DATUM (NAD83). DECLARED DISTANCES IN ACCORDANCE WITH AC 150/5300-13, CHANGE #6.

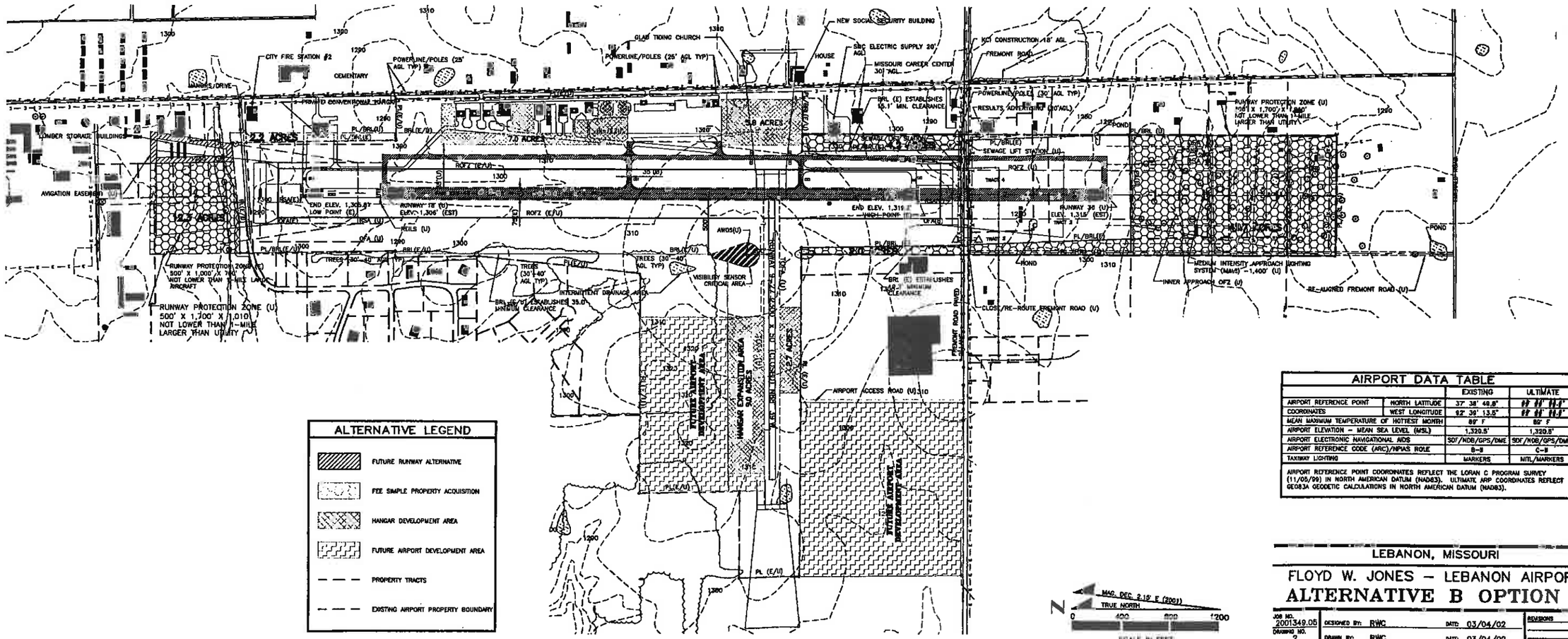
LEGEND

EXISTING	ULTIMATE	
		FACILITIES
		BUILDINGS/STRUCTURES
PL(E)	PL(U)	AIRPORT PROPERTY LINE
		AVIATION EASEMENTS
BRL(E)	BRL(U)	BUILDING RESTRICTION LINE (BRL)
RSA/OFA(E)	RSA/OFA(U)	RUNWAY SAFETY AREA (RSA)/OBJECT FREE AREA (OFA)
RPZ(E)	RPZ(U)	RUNWAY PROTECTION ZONE (RPZ)
OFZ(E)	OFZ(U)	OBSTACLE FREE ZONE (OFZ)
RVZ(E)	RVZ(U)	RUNWAY VISIBILITY ZONE (RVZ)
		AIRPORT REFERENCE POINT (ARP)
		BENCHMARK
		ROTATING BEACON
		PRECISION APPROACH PATH INDICATORS (PAPI)
		PULSATING VISUAL APPROACH SLOPE INDICATORS (PLASI)
		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/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
		WATER LINE
		SEWAGE LINE
		LOCALIZER ANTENNA
		MEDIUM INTENSITY APPROACH LIGHTING SYSTEM (MALS)
		POND/BODY OF WATER
		SECTION CORNER

RUNWAY DATA TABLE

	RUNWAY 9-27				RUNWAY 18-36			
	EXISTING		ULTIMATE		EXISTING		ULTIMATE	
APPROACH CATEGORY/DESIGN GROUP	A-I (SMALL AIRCRAFT)		ABANDONED		B-II		C-II	
RUNWAY LENGTH/WIDTH	2,300' X 50'		--		5,000' X 75'		5,900' X 100'	
RUNWAY LIGHTING	NONE		--		MIRL		MIRL	
RUNWAY TYPE/MARKINGS	BASIC		--		NPI		NPI	
EFFECTIVE RUNWAY GRADIENT (%)	0.3%		--		0.3%		0.2% (EST)	
PAVEMENT MATERIAL	ASPHALT		--		ASPHALT		ASPHALT	
PAVEMENT STRENGTH (,000 LBS)	12.5 (S)		--		33.0 (S)/54.0 (D)		60.0 (D)	
RUNWAY SAFETY AREA (RSA) LENGTH	2,780'		--		5,800'		7,900'	
RUNWAY SAFETY AREA (RSA) WIDTH	120'		--		150'		500'	
OBJECT FREE AREA (OFA) LENGTH	2,700'		--		5,400'		8,300'	
OBJECT FREE AREA (OFA) WIDTH	250'		--		400'		400'	
OBSTACLE FREE ZONE (OFZ) LENGTH	2,780'		--		5,800'		7,900'	
OBSTACLE FREE ZONE (OFZ) WIDTH	250'		--		500'		800'	
HOLDING POSITION	125'		--		125' (NSTD)		250'	
TAXIWAY WIDTH	N/A		--		33'/40'		35'	
	9	27	9	27	18	36	18	36
INSTRUMENT APPROACH AIDS	NONE	NONE	--	--	GPS	SDF/NDB/GPS/DME	GPS	SDF/NDB/GPS/DME
VISUAL APPROACH AIDS	NONE	NONE	--	--	PLASI	PLASI	PAPI(4L)/REIL	PAPI(4L)/MALS
RUNWAY VISIBILITY MINIMUMS	VISUAL	VISUAL	--	--	1-MILE	1-MILE	1-MILE	1-MILE
FAR PART-77 APPROACH SLOPE	20:1	20:1	--	--	20:1	20:1	34:1	34:1
TOUCHDOWN ZONE ELEVATION (TDZE)	1,316.8'	1,318.8'	--	--	1,315.9'	1,320.5'	1,315.9' (EST)	1,320.5' (EST)

(S)=SINGLE WHEEL GEAR (D)=DUAL WHEEL GEAR (DT)=DUAL TANDEM WHEEL GEAR
RUNWAY END AND TOUCHDOWN ZONE ELEVATIONS REFLECT AERONAUTICAL DATA SHEET (11/05/99).
* FAA/STATE ELIGIBLE RUNWAY



ALTERNATIVE LEGEND

- FUTURE RUNWAY ALTERNATIVE
- FEE SIMPLE PROPERTY ACQUISITION
- HANGAR DEVELOPMENT AREA
- FUTURE AIRPORT DEVELOPMENT AREA
- PROPERTY TRACTS
- EXISTING AIRPORT PROPERTY BOUNDARY

AIRPORT DATA TABLE

		EXISTING	ULTIMATE
AIRPORT REFERENCE POINT	NORTH LATITUDE	37° 38' 48.8"	## ## ##.#
COORDINATES	WEST LONGITUDE	92° 36' 13.5"	## ## ##.#
MEAN MAXIMUM TEMPERATURE OF HOTTEST MONTH		89° F	89° F
AIRPORT ELEVATION - MEAN SEA LEVEL (MSL)		1,320.5'	1,320.5'
AIRPORT ELECTRONIC NAVIGATIONAL AIDS		SDF/NDB/GPS/DME	SDF/NDB/GPS/DME
AIRPORT REFERENCE CODE (ARC)/NPIAS ROLE		B-II	C-II
TAXIWAY LIGHTING		MARKERS	MIRL/MARKERS

AIRPORT REFERENCE POINT COORDINATES REFLECT THE LORAN C PROGRAM SURVEY (11/05/99) IN NORTH AMERICAN DATUM (NAD83). ULTIMATE ARP COORDINATES REFLECT GEO83A GEODETIC CALCULATIONS IN NORTH AMERICAN DATUM (NAD83).

LEBANON, MISSOURI

FLOYD W. JONES - LEBANON AIRPORT

ALTERNATIVE B OPTION 2

JOB NO. 2001349.05	DESIGNED BY: RWC	DATE: 03/04/02	REVISIONS
DRAWING NO. 2	DRAWN BY: RWC	DATE: 03/04/02	
SCALE AS SHOWN	CHECKED BY: ***	DATE: MM/DD/YY	
SHEET: 2 OF #	BUCHER, WILLIS & RATLIFF CORPORATION		

ALTERNATIVE B OPTION 3

DECLARED DISTANCE TABLE

EXISTING					ULTIMATE				
RUNWAY	TORA	TODA	ASDA	LDA	RUNWAY	TORA	TODA	ASDA	LDA
9	2,300'	2,300'	2,300'	2,300'	9	N/A	N/A	N/A	N/A
27	2,300'	2,300'	2,300'	2,300'	27	N/A	N/A	N/A	N/A
18	5,000'	5,000'	5,000'	5,000'	18	6,500'	6,500'	6,500'	6,500'
36	5,000'	5,000'	5,000'	5,000'	36	6,500'	6,500'	6,500'	6,500'

DECLARED DISTANCE INFORMATION OBTAINED FROM THE AERONAUTICAL DATA SHEET (11/05/99), AND GEO83A GEODETIC CALCULATION IN NORTH AMERICAN DATUM (NAD83). DECLARED DISTANCES IN ACCORDANCE WITH AC 150/5300-13, CHANGE #6.

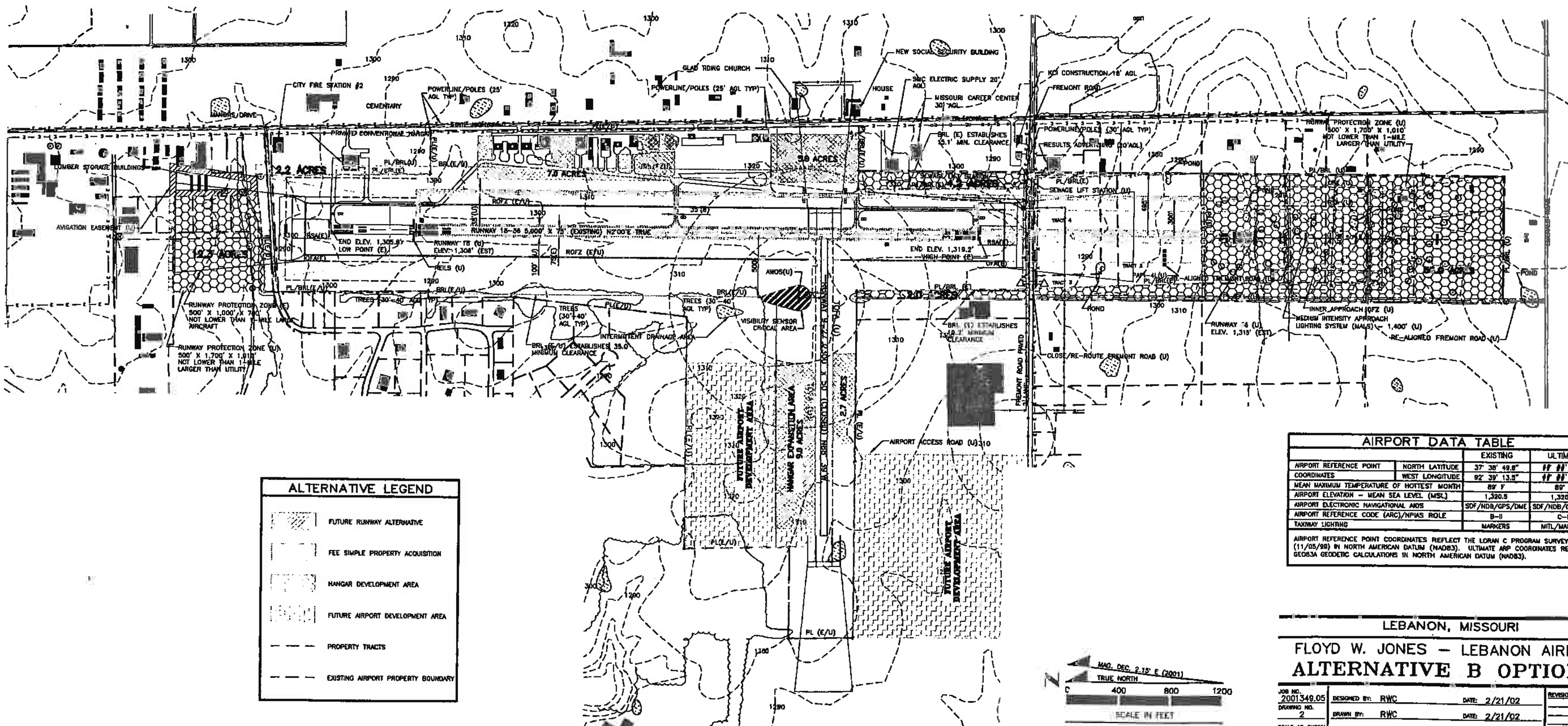
LEGEND

EXISTING	ULTIMATE	
		FACILITIES
		BUILDINGS/STRUCTURES
PL(E)	PL(U)	AIRPORT PROPERTY LINE
		AVIATION EASEMENTS
BRL(E)	BRL(U)	BUILDING RESTRICTION LINE (BRL)
RSA/OFA(E)	RSA/OFA(U)	RUNWAY SAFETY AREA (RSA)/OBJECT FREE AREA (OFA)
RPZ(E)	RPZ(U)	RUNWAY PROTECTION ZONE (RPZ)
OFZ(E)	OFZ(U)	OBSTACLE FREE ZONE (OFZ)
RVZ(E)	RVZ(U)	RUNWAY VISIBILITY ZONE (RVZ)
		AIRPORT REFERENCE POINT (ARP)
		BENCHMARK
		ROTATING BEACON
		PRECISION APPROACH PATH INDICATORS (PAPI)
		PULSATING VISUAL APPROACH SLOPE INDICATORS (PLASI)
		GUIDANCE/DIRECTIONAL/HOLD POSITION SIGN
		HOLD POSITION MARKING
		WIND CONE & SEGMENTED CIRCLE
		RUNWAY THRESHOLD LIGHTS
		RUNWAY END IDENTIFIER LIGHTS (REIL)
		GROUND CONTOUR (USGS MAP)
X	XX	FENCING
		PAVED/DIRT ROAD
		CREEK/INTERMITTENT DRAINAGE
E		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
		WATER LINE
		SEWAGE LINE
		LOCALIZER ANTENNA
		MEDIUM INTENSITY APPROACH LIGHTING SYSTEM (MALS)
		POND/BODY OF WATER
		SECTION CORNER

RUNWAY DATA TABLE

	RUNWAY 9-27				RUNWAY 18-36			
	EXISTING		ULTIMATE		EXISTING		ULTIMATE	
APPROACH CATEGORY/DESIGN GROUP	A-I (SMALL AIRCRAFT)		CLOSE		B-II		C-II	
RUNWAY LENGTH/WIDTH	2,300' X 50'		--		5,000' X 75'		6,500' X 100'	
RUNWAY LIGHTING	NONE		--		MIRL		MIRL	
RUNWAY TYPE/MARKINGS	BASIC		--		NPI		NPI	
EFFECTIVE RUNWAY GRADIENT (%)	0.3%		--		0.3%		0.1% (EST)	
PAVEMENT MATERIAL	ASPHALT		--		ASPHALT		ASPHALT	
PAVEMENT STRENGTH (,000 LBS)	12.5 (S)		--		33.0 (S)/54.0 (D)		60.0 (D)	
RUNWAY SAFETY AREA (RSA) LENGTH	2,780'		--		5,600'		8,500'	
RUNWAY SAFETY AREA (RSA) WIDTH	120'		--		150'		500'	
OBJECT FREE AREA (OFA) LENGTH	2,700'		--		5,400'		6,900'	
OBJECT FREE AREA (OFA) WIDTH	250'		--		400'		400'	
OBSTACLE FREE ZONE (OFZ) LENGTH	2,780'		--		5,600'		8,500'	
OBSTACLE FREE ZONE (OFZ) WIDTH	250'		--		500'		800'	
HOLDING POSITION	125'		--		125' (NSTD)		250'	
TAXIWAY WIDTH	N/A		--		33'/40'		35'	
	9	27	9	27	18	36	18	36
INSTRUMENT APPROACH AIDS	NONE	NONE	--	--	GPS	SDF/NDB/GPS/DME	GPS	SDF/NDB/GPS/DME
VISUAL APPROACH AIDS	NONE	NONE	--	--	PLASI	PLASI	PAPI(4L)/MALS	PAPI(4L)/MALS
RUNWAY VISIBILITY MINIMUMS	VISUAL	VISUAL	--	--	1-MILE	1-MILE	1-MILE	1-MILE
FAR PART-77 APPROACH SLOPE	20:1	20:1	--	--	20:1	20:1	34:1	34:1
TOUCHDOWN ZONE ELEVATION (TDZE)	1,316.8'	1,316.8'	--	--	1,315.9'	1,320.5'	1,315.9' (EST)	1,320.5' (EST)

(S)=SINGLE WHEEL GEAR (D)=DUAL WHEEL GEAR (DT)=DUAL TANDEM WHEEL GEAR
RUNWAY END AND TOUCHDOWN ZONE ELEVATIONS REFLECT AERONAUTICAL DATA SHEET (11/05/99).
* FAA/STATE ELIGIBLE RUNWAY



ALTERNATIVE LEGEND

- FUTURE RUNWAY ALTERNATIVE
- FEE SIMPLE PROPERTY ACQUISITION
- HANGAR DEVELOPMENT AREA
- FUTURE AIRPORT DEVELOPMENT AREA
- PROPERTY TRACTS
- EXISTING AIRPORT PROPERTY BOUNDARY

AIRPORT DATA TABLE

		EXISTING	ULTIMATE
AIRPORT REFERENCE POINT COORDINATES	NORTH LATITUDE	37° 38' 49.6"	##° ##' ##.#"
	WEST LONGITUDE	92° 39' 13.5"	##° ##' ##.#"
MEAN MAXIMUM TEMPERATURE OF HOTTEST MONTH		89° F	89° F
AIRPORT ELEVATION - MEAN SEA LEVEL (MSL)		1,320.5	1,320.5'
AIRPORT ELECTRONIC NAVIGATIONAL AIDS		SDF/NDB/GPS/DME	SDF/NDB/GPS/DME
AIRPORT REFERENCE CODE (ARC)/NPIAS ROLE		B-II	C-II
TAXIWAY LIGHTING		MARKERS	MITL/MARKERS

AIRPORT REFERENCE POINT COORDINATES REFLECT THE LORAN C PROGRAM SURVEY (11/05/99) IN NORTH AMERICAN DATUM (NAD83). ULTIMATE ARP COORDINATES REFLECT GEO83A GEODETIC CALCULATIONS IN NORTH AMERICAN DATUM (NAD83).

LEBANON, MISSOURI

FLOYD W. JONES – LEBANON AIRPORT

ALTERNATIVE B OPTION 3

JOB NO. 2001349.05
DRAWING NO. 2
SCALE AS SHOWN
SHEET: 2 OF #

DESIGNED BY: RWC DATE: 2/21/02
DRAWN BY: RWC DATE: 2/21/02
CHECKED BY: *** DATE: MM/DD/YY

REVISIONS

BUCHER, WILLIS & RATLIFF CORPORATION

ALTERNATIVE C: Instrument Approach Minimums Lower Than One Mile

With regards to the level of existing and forecast business jets operating at the Lebanon Airport, consideration must be given to the prospect of acquiring an instrument approach procedure lower than the current 1-mile visibility minimum. In addition, the airport users have identified the desire to obtain improved instrument approach procedures to both runway ends. Typically, airports that support airport approach category "C" (medium and large cabin business) aircraft typically will have at least one published instrument approach with visibility minimums "as low as ¾ mile."

Design Considerations: A runway with instrument approach minimums "as low as ¾ mile" would require substantially larger runway protection zones (RPZ), an increase in protected airspace surfaces, and greater separation and structure/object set-back distances. The FAR Part 77 Primary Surface would increase from the existing 500 feet to 1,000 feet along the runway centerline, which, in turn, would increase the building restriction line (BRL) from the current 495 feet to 795 feet. No structures, including terrain, can be higher than the runway centerline elevation within the 1,000-foot primary surface.

Conclusion: The Lebanon Airport cannot readily accommodate instrument approach minimums "as low as ¾ mile" as the result of more restrictive design requirements and additional impacts to the surrounding areas. The RPZ would contain non-compatible uses (ie. places of public assembly, residences) that would require removal. The BRL would extend onto Highway 5 on the east side of the Airport and into the residential area on the west side. Parts of the terminal area would require relocation to obtain the FAR Part 77 Transitional Surface clearance requirements (7:1) for all buildings and hangar structures. Moreover, much of the forested area on the west side of the runway would have to be cleared, which also would include the removal of several homes from the existing neighborhood.

TERMINAL AREA ALTERNATIVES

The size of the terminal area is a function of peak-hour demand levels forecast from aviation activity. Ultimate terminal area development will consider the airport users needs and services currently provided. Expansion of the existing terminal area is slightly limited due to topographical issues and existing facilities on the Airport. However, the recent closure of the crosswind runway on the west side of the Airport allows for additional future hangar development and effectively utilizes the existing pavement. The previous Alternative exhibits illustrate potential terminal expansion areas available at the Lebanon Airport.

TERMINAL BUILDING

The current terminal building size and services are adequate to serve the existing needs of the Airport and its users. However, over the 20-year planning period, an increase in terminal building size is anticipated. The current terminal building is 1,800 S.F. and long-term forecasts indicate the need for 4,300 S.F. to adequately serve future airport users.

FUTURE HANGAR DEVELOPMENT

Forecasts of based aircraft indicate the need for an additional 85,500 S.F. of hangar space to accommodate the needs of the airport users. **Exhibit 5.1** illustrates areas suitable for additional hangar development. Over the 20-year planning period, it is expected that 159,680 S.F. of total hangar space will be needed, with almost half the space dedicated to T-hangars.

T-Hangars: The expansion of T-hangars is proposed to occur along the existing pavement, on the west side of the Airport, in an area that was used for the crosswind runway. The orientation of the T-hangars should occur in a linear fashion and provide for adequate taxilane clearance and aircraft maneuvering between the hangars. Electricity and water should be available for the new hangars.

Corporate/Common Hangars: Additional corporate hangar development is expected to occur during the 20-year planning period. The corporate hangars should be developed to take advantage of existing parking apron and pavement in the terminal area. It is expected that additional corporate hangar development will occur mainly in the existing terminal area.

Maintenance Hangar: Lebanon Airport does not currently have a maintenance hangar. The airport surveys indicated the need for aircraft maintenance and repair. A new common maintenance hangar with attached workshop and storage area could be constructed near the main terminal area.

AIRCRAFT PARKING APRON

The existing aircraft parking apron (20,160 S.F.) is adequate to meet the needs of the Airport users in the short-term planning period. It is anticipated that 26,967 S.Y. of pavement will be needed for the long-term (11-20 year) planning period to allow for adequate maneuvering area for the mix of aircraft expected to use the Airport. Airport design requirements specify that the aircraft parking apron must remain beyond all airfield safety areas (RSA, OFA, RPZ, and OFZ). In addition, aircraft tie-downs, located on the aircraft parking apron, should accommodate small to medium sized aircraft.

ALTERNATIVES SUMMARY

A meeting was convened regarding the airport alternatives and options between the Airport Advisory Committee and BWR, to determine the "*preferred*" alternative for the City of Lebanon (airport sponsor) to pursue. It was decided by the Committee to pursue Alternative 2, Option 3 as the ultimate airport design to accommodate future aviation needs at the Lebanon Airport. The remainder of this Study is directed towards the goal of achieving the "*preferred*" course of action chosen by the planning committee.

6

CHAPTER SIX - ENVIRONMENTAL REVIEW

6 ENVIRONMENTAL REVIEW

INTRODUCTION

This Environmental Review (ER) provides an assessment of significant potential impacts to environmental resources resulting from the planned development at the Lebanon Airport. This study has been prepared in accordance with FAA Order 5050.4A, *Airport Environment Handbook*, and FAA's *"Tips for Airport Sponsors and Their Consultants in Documenting the Need for Preparing Environmental Assessments."* This Review was specifically prepared in reference to the Categorical Exclusion (CE) checklist, utilized by MoDOT, Aviation Section.

REVIEW PURPOSE

The objective of this chapter is to assemble and document environmental coordination completed during the course of the Master Plan Update. The main purpose is to identify any significant impacts that may require additional consideration, or the need for a full Environmental Assessment of the planned ultimate development. The data contained in this review is primarily for informational purposes and to point out areas of environmental concerns as expressed by state and federal agencies from which correspondence was obtained. The environmental review 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 Lebanon 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 by providing access for business travel, agricultural use, emergency medical services as well as training and recreational flying. In order to accommodate current and future aviation activity, improvements are needed at the Airport. Major improvements involve the relocation of the Runway 18 threshold and extension of Runway 18-36 from 5,000 feet to 6,500 feet, along with the construction of a full-length parallel taxiway. Additional improvements include land acquisition, terminal area expansion, and an approach lighting system.

CATEGORICAL EXCLUSION CHECKLIST

The Categorical Exclusion Checklist (CE) is used by MoDOT, Aviation Section to identify whether or not projects may be eligible for "categorical exclusion" under the *National Environmental Policy Act* (NEPA), and to ensure that the proposed project will not violate requirements of the *Endangered Species Act*, the *Historic Preservation Act*, or *Section 404 of the Clean Water Act*. Application of the CE at the Lebanon Airport 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.

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. Therefore, the project area should undergo an archaeological 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..."* 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 *Farmland Protection Policy Act.*
  - 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 45 out of 100 points, and *Total Site Assessment* totaled 47 out of 160 points. The total sum of the *Farmland Conversion Impact Rating* is 92 out of 260 points. Since the total sum is well below the minimum impact rating threshold, 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:

Airport Advisory Committee: Through public meetings, have indicated their approval of the proposed development alternative for the Lebanon Airport.

City Council: Members of the Lebanon City Council were in agreement with the preferred development alternative for the Lebanon Airport. The proposed airport alternatives were presented during a public meeting April 30, 2002.

Public Objection: To date, no significant public objection, oral or written, has been received as part of the Lebanon 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) and *Missouri Department of Conservation* were contacted for comments and information regarding potential impacts regarding the population and location of wildlife, waterfowl resources and aquatic life in the vicinity of the proposed airport site.

Correspondence from the USFWS indicated that *"no federally listed species or designated critical habitat occurs within the project area...and no further review of this project is necessary."* A letter 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...referenced site. 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."* The use of wetland and soil maps as well as an on-site inspection should be considered to ensure there are no unnecessary impacts to sensitive species or communities.

(6) RELOCATION OF HOUSING

Relocation of housing is an induced socioeconomic impact on a community that can create controversial outcomes as a result from proposed airport development. The proposed project is not anticipated to be highly controversial since it will not require the relocation of housing.

(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 create the potential for direct and indirect social impacts in the local community. Ultimate airport development will result in the re-alignment of Fremont Road, between Highway 5 and the National Guard Armory. Overall, airport improvements are not expected to directly result in any appreciable change in local-area population, housing, employment or transportation patterns.

The City of Lebanon 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 towards encouraging the continuation of compatible land use in the area around the Airport.

(8) NOISE

Noise exposure from aircraft is often the most objectionable interference of an airport with the surrounding environment. FAA Order 5050.4A indicates that a *"noise analysis is needed for proposals involving airport reference code (ARC) Design Group I and II airplanes on utility or transport type airports whose forecast operations in the period covered by the environmental assessment exceed 90,000 annual adjusted propeller operations or 700 annual adjusted jet operations."* The currently accepted 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 span of one year. Forecast

annual jet operations are expected to exceed 6,000 annual operations at Lebanon Airport during the 20-year planning period; therefore, a full noise analysis will be needed to meet the requirements of FAA Order 5050.4A. This analysis should include a Noise Exposure Map (NEM) indicating the limits of each noise contour on or near the Airport.

(9) AIR QUALITY

The existing and ultimate forecast level of operations determines the requirement for an air quality analysis. FAA Order 5050.4A, Paragraph (e)(5), 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."* The Order also 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."* Since the forecast for operations at the Lebanon Airport is only 38,500 operations by the end of the 20-year planning period, an air quality analysis should not be required.

(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 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" or direct impact of a wetlands area. The Army Corps of Engineers has regulatory jurisdiction over wetlands and waters of the United States pursuant to the provisions of *Section 404 of the Clean Water Act* (33 CFR 320-330). The Corps of Engineers and the USFWS were notified concerning the possible impact to wetlands near the Lebanon Airport.

A response from the Corps of Engineers has not been received within the 30-day window; therefore, it is anticipated that the project does not affect *Section 404 of the Clean Water Act.* Correspondence from the USFWS indicated *"no federally listed species or designated critical habitat occurs within the project area...and no further review of this project is necessary."*

Correspondence from the *Missouri Department of Transportation, District* 8 requests the opportunity to review a stormwater drainage report and plans for appropriate stormwater improvements should the airport improvements result in a significant increase in stormwater drainage. Also, the sewer lift station should not be relocated in the Highway 5 right-of-way.

(11) CONSISTENCY

The proposed project will be consistent with any Federal, state, or local law or administrative determination relating to the environment. In addition, the project will be consistent with community plans.

(12) CUMULATIVE IMPACTS CONSIDERED

The overall cumulative impact of the proposed action and the consequences of subsequent related actions have been considered, and are not considered to be collectively significant.

SUMMARY

The goal of this ER is to provide a review of significant potential impacts to environmental resources resulting from planned airport growth and development. In order to use State Block Grant Program funds (SBGP) for airport development, all environmental clearances must be received. Since the ultimate planned development will involve additional land acquisition, major earthwork, and runway extension, a full environmental assessment (EA) will be required. This EA will need to address the following items:

- Archaeological survey to identify any sites of interest in the project area.
- A complete noise analysis including a Noise Exposure Map (NEM).

AGENCIES CONTACTED AND REQUIRED PERMITS/AUTHORIZATIONS

Table 6.1 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 6.1
State/Federal Agencies Contacted
Floyd W. Jones – Lebanon 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. Mary Lyon Policy Analyst Department of Conservation P.O. Box 180 Jefferson City, Missouri 65102-0180
Mr. Robert Ruf Environmental Officer Department of Army Kansas City District Office Corps of Engineers 700 Federal Building Kansas City, Missouri 64106-2896	✓ Mr. David W. Wolf State Soil Scientist Camdenton Soil Survey Office Natural Resource Conservation Service 350 W. Highway 54, Unit 7 Camdenton, Missouri 65020
✓ Ms. Claire F. Blackwell, Director Historic Preservation Officer Department of Natural Resources P.O. Box 176 Jefferson City, Missouri 65102	✓ Mr. Scott Hamilton Environmental Specialist Water Quality Management Section NPDES Department of Natural Resources P.O. Box 176 Jefferson City, Missouri 65102
✓ Mr. Dale L. Ricks District Engineer Missouri Department of Transportation 3025 East Kearney Street P.O. Box 868 Springfield, Missouri 65801	
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, June 2002.

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7

CHAPTER SEVEN - AIRPORT DEVELOPMENT PLAN

7 AIRPORT DEVELOPMENT PLAN

INTRODUCTION

This chapter of the Airport Master Plan Update integrates the facility requirements for the Floyd W. Jones – Lebanon Airport into a 20-year phased development plan in accordance with the preferred future airport development alternatives discussed in Chapter Five. 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 long-term role of the airport.

Projects have been identified in order to preserve the integrity of the airport as well as satisfying airport design standards and allow for future facility expansion. Each development phase consists of a series of projects as part of the ultimate development concept. The scheduling of projects within each development phase is prioritized to permit improvements in a coordinated manner. Each project is prioritized with respect to existing and projected needs, as identified by **1)** airport safety-related requirements, **2)** demand levels, **3)** environmental compatibility, **4)** potential revenue sources, including MoDOT programming and funding levels, and **5)** recognition of other airport improvements and major public work programs and projects. The development plan is structured so projects can be re-prioritized to meet specific design and funding considerations.

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

Each phase 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

For the Phase I (0-5 Year) Development Period, we have listed the airport projects by priority and need as identified in the Inventory (Chapter 2) and Facility Requirements (Chapter 4). Runway 9-27 was closed during the Study process and will be converted into an access taxiway connecting the west side of the airport with Runway 18-36 and the main terminal area. The primary goal of the development program will be the eventual extension and construction of Runway 18-36 to 6,500' x 100'. Additional projects are listed that will accompany, or are complimentary, to the ultimate airport development and expansion. These items include aircraft parking, additional aircraft storage (hangars), normal pavement maintenance (overlays, crackseals, marking), and lighting replacement/refurbishment.

From the survey, there is also a desire by a local business to occupy a larger hangar on the Airport in the near future. The construction of a large common hangar is shown during the Phase I period. Since the construction of the hangar and hangar pad is not eligible for MoDOT/FAA funding, it is expected that local funding through conventional methods or private investment will be utilized.

PHASE I (0-5 YEARS)

PROPERTY AND EASEMENTS

- Tract B – 1.5 Acres (AWOS Clear Area), Fee Simple
- Tract M – 10.7 Acres (AWOS Clear Area), Avigation Easement

RUNWAY AND TAXIWAY

- Convert Runway 9-27 to Taxiway "C" (1,970' x 35'; 12,500 SWG)
- Construct Full-Parallel Taxiway (4,753' x 35'; 54,000 lbs DWG)
  - Install MITL on Taxiway Radius
- Construct Connector Taxiway to Private Hangar (1,197 S.Y.; 30,000 lbs SWG)
- Install "Deer-Proof" Fencing (8 Foot) Along Airport Perimeter (16,589 L.F)
- Install Taxiway Hold Position and Directional Signs for Runway 18-36

TERMINAL AREA

- Install Aircraft Parking Apron Lighting
- Construct Aircraft Parking and Hangar Taxilane (13,775 S.Y.)
- Construct 8-Unit Nested T-Hangar (12,150 S.F.) and Hangar Pad
- Construct 10-Unit Nested T-Hangar (14,850 S.F.) and Hangar Pad
- Grade / Pave Auto Access and Parking
- Construct Aircraft Taxilane and Taxiway Access Connector (7,953 S.Y.)
- Rehabilitate Common Hangar Access Taxiways and Approaches (4,797 S.Y.)
- Construct Common Hangar (10,000 S.F.) and Hangar Pad
- Construct Common Hangar (10,000 S.F.) and Hangar Pad
- Construct Common Hangar Apron (3,280 S.Y.)

OTHER PROJECTS

- Install Automated Weather Observation System (AWOS)
- Install 12,000 Gal. Above-Ground Jet-A Fuel Tank with Containment Walls
- Install Segmented Circle and Lighted Wind Cone
- Conduct Environmental Assessment for Future Airport Improvements

OTHER NON-CAPITAL PROJECTS

- Adopt "Airport Height and Hazard Zoning" Based on Current FAR Part 77 Airspace Drawing
- Implement Fuel Spill Prevention Plan with Appropriate Local and State Agencies

Table 7.1
Phase I Development Plan (0-5 Year)
Floyd W. Jones – Lebanon Airport

Project Description	Local/Private Cost	MoDOT/FAA Cost	Total Cost
Property and Easements			
Fee Simple / Avigation Easement	$1,820	$16,380	$18,200
		Total	**$18,200**
Runways and Taxiways			
Convert Closed Runway 9-27 to Taxiway "C"	$4,061	$36,545	$40,606
Construct Full-Parallel Taxiway System	$72,450	$650,248	$724,498
Grade/Pave connector Taxiway to Private Hangar	$5,689	$51,199	$56,888
Install "Deer-Proof Fencing	$18,430	$165,871	$184,301
Install Taxiway Holding and Directional Signs – RW 18-36	$5,460	$49,140	$54,600
		Total	**$1,060,892**
Terminal Area			
Install Aircraft Parking Apron Security Lighting	$1,200	$10,800	$12,000
Grade/Pave Aircraft Parking Apron and Hangar Taxilane	$30,207	$271,862	$302,069
Construct 8-Unit Nested T-Hangar and Hangar Pad*	$288,415	$0	$288,415
Construct 10-Unit Nested T-Hangar and Hangar Pad*	$352,240	$0	$352,240
Grade/Pave Auto Access and Parking*	$45,363	$0	$45,363
Grade/Pave Aircraft Taxilane and Taxiway Access	$22,638	$203,742	$226,380
Rehabilitate Common Hangar Access Taxiways/Approaches	$6,968	$27,870	$34,838
Construct Common Hangars (2 ea) and Hangar Pads*	$676,888	$0	$676,888
Construct Common Hangar	$18,454	$166,084	$184,538
		Total	**$2,092,730**
Other Projects			
Install Automated Weather Observation System (AWOS)	$10,000	$90,000	$100,000
Install 12,000 Gal. Above-Ground Jet-A Fuel Tank*	$53,400	$0	$53,400
Install Segmented Circle and Lighted Wind Cone	$,500	$4,500	$5,000
Conduct Environmental Assessment	$4,000	$36,000	$40,000
		Total	**$198,400**
Subtotal Project Costs	**$1,587,816**	**$1,778,765**	**$3,366,581**
Engineering, Administrative and Legal Costs (25%)	$396,954	$444,691	$841,645
Total Phase I Project Costs	**$1,984,770**	**$2,223,456**	**$4,208,227**

Note: Eligible projects reflect funding at 90% State / 10% Local, unless otherwise noted.
Note: "*" indicates local/private funding.

PHASE II (6-10 YEARS)

LAND AND EASEMENTS

✓ ➢ Purchase Property (Fee Simple):

- Tract A – 4.2 acres
- Tract C – 12.4 acres
- Tract D – 6.4 acres
- Tract E – 6.2 acres
- Tract F – 3.2 acres
- Tract G – 3.1 acres
- Tract H – 12.7 acres
- Tract I – 3.8 acres
- Tract J – 3.9 acres
- Tract K – 3.3 acres

Total 59.2 acres

➢ Purchase Air Rights (Avigation Easement):

- Tract L – 1.3 acres
- Tract O – 0.5 acres
- Tract N1 – 2.2 acres
- Tract N2 – 2.5 acres

Total 6.5 acres

RUNWAY AND TAXIWAY

➢ Runway 18-36 Improvements:

- Widen Runway to 100 feet
- Extend Runway to 5,500' x 100'
- Overlay Runway 18-36 (5,500' x 100'; 54,000 lbs DWG)
- Remove Old Taxiway and Runway Pavement
- Extend Parallel Taxiway 1,150' x 35'; 54,000 lbs DWG)

➢ Relocate Sewage Lift Station
➢ Encase Sewage Collection System (2,200 L.F.)
➢ Encase 6" and 12" Water Distribution System (1,000 L.F.)
➢ Reroute Two City-Owned, Underground Power Distribution Lines (6,600 L.F.)
➢ Bury City-Owned Overhead Power Line (6,600 L.F.)
➢ Close / Reroute Fremont Road (3,950 L.F.)
➢ Remove 17 Various Structures within the Ultimate BRL / RPZ
➢ Install Runway End Identifier Lights (REILS) – Both Ends
➢ Install Precision Approach Path Indicator (PAPI-4L) Lights – Both Ends

TERMINAL AREA

➢ Construct 4-Unit Span Hangar (10,416 S.F.) and Hangar Pad
➢ Grade / Pave Span Hangar Access Taxilane (1,672 S.Y.)
➢ Overlay / Mark Main Terminal Entrance Road and Parking (3,482 S.Y.)
➢ Construct Maintenance Hangar (20,000 S.F.) with Hangar Pad
➢ Grade / Pave Maintenance Hangar Parking Apron (4,309 S.Y.) – 54,000 lbs DWG

Table 7.2
Phase II Development Plan (6-10 Years)
Floyd W. Jones – Lebanon Airport

Project Description	Local/Private Cost	MoDOT/FAA Cost	Total Cost
Property and Easements			
Fee Simple / Avigation Easement	$24,200	$217,800	$242,000
		Total	**$242,000**
Runways and Taxiways			
Runway 18-36 Improvements	$532,311	$4,790,794	$5,323,105
Relocate Sewage Lift Station	$4.000	$36,000	$40,000
Encase Sewage collection System	$17,000	153,000	$170,000
Encase 6" and 12" Water Distribution System	$16,500	$148,500	$165,000
Reroute Two City-Owned, Underground Power Lines	$7,100	$63,900	$71,000
Bury/City-Owned Overhead Powerline	$1,500	$13,500	$15,000
Reroute County-Owned Overhead/Underground Powerline	$7,100	$63,900	$71,000
Close/Reroute Fremont Road	$39,850	$358,650	$398,500
Remove 17 Various Structures Within the Ultimate BRL/RPZ	$850	$7,650	$8,500
Install MITL on Taxiway Radius	$1,385	$12,465	$13,850
Install MIRL and Threshold Lighting	$10,500	$94,500	$105,000
Install Runway End Identifier Lights (REILS) – Rwy 18 & 36	$1,600	$14,400	$16,000
Install Precision Approach Path Indicator Lights (PAPI-4L)	$8,288	$74,588	$82,875
		Total	**$6,493,680**
Terminal Area			
Construct 4-Unit Span Hangar*	$276,590	$0	$276,590
Grade/Pave span Hangar Access Taxilane	$19,211	$172,900	$192,111
Overlay/Mark Main Terminal Entrance Road and Parking*	$348,498	$0	$348,498
Construct Maintenance Hangar with Hangar Pad*	$577,311	$0	577,311
Grade/Pave Maintenance Hangar Parking Apron	$25,235	$227,115	$252,350
		Total	**$1,646,860**
Other Projects			
None	$0	$0	$0
		Total	**$0**
Subtotal Project Costs	**$1,920,413**	**$6,462,127**	**$8,382,540**
Engineering, Administrative and Legal Costs (25%)	$480,103	$1,615,532	$2,095,635
Total Phase I Project Costs	**$2,400,516**	**$8,077,659**	**$10,478,175**

Note: Eligible projects reflect funding at 90% State / 10% Local, unless otherwise noted.
Note: "*" indicates local/private funding.

PHASE III (11-20 YEARS)

LAND AND EASEMENTS

- Tract P – 1.5 acres (Hangar Access Road), Fee Simple – West Side

RUNWAY AND TAXIWAY

- Runway 18-36 Improvements:
  - Extend Runway 18-36 1,000' x 100'
  - Overlay Runway 18-36 (6,500' x 100'; 60,000 lbs DWG)
  - Extend Parallel Taxiway 1,000' x 35'
  - Overlay Taxiway and Connectors (6,900' x 35'; 60,000 lbs DWG)
- Crack Seal / Overlay Taxiway "C" (1,970' x 35'; 60,000 lbs DWG)
- Install Medium Intensity Approach Lighting System with Sequenced Flashers (MALSF)

TERMINAL AREA

- Rehabilitate / Expand Main Aircraft Parking Apron:
  - Rehabilitate Main Aircraft Parking Apron (19,428 S.Y.; 60,000 lbs DWG)
  - Expand Main Aircraft Parking Apron (6,153 S.Y.; 60,000 lbs DWG)
- Overlay Maintenance Hangar Parking Apron (4,309 S.Y.; 60,000 lbs DWG)
- Grade / Pave Auto Access and Parking (2,944 S.Y.)
- Construct 10-Unit T-Hangar (14,648 S.F.) with Hangar Pad
- Construct 10-Unit T-Hangar (14,648 S.F.) with Hangar Pad
- Construct 10-Unit T-Hangar (14,648 S.F.) with Hangar Pad
- Construct 10-Unit T-Hangar (14,648 S.F.) with Hangar Pad
- Grade / Pave T-Hangar Taxilane (34,816 S.Y.; 12,500 lbs SWG)
- Grade / Pave T-Hangar Access and Parking Area (2,864 S.Y.)
- Construct Common Hangar (3,600 S.F.) with Hangar Pad
- Construct Common Hangar (3,600 S.F.) with Hangar Pad
- Construct Common Hangar (3,600 S.F.) with Hangar Pad
- Construct Common Hangar (3,600 S.F.) with Hangar Pad
- Grade / Pave Hangar Approach Taxilanes (900 S.Y.; 60,000 lbs DWG)
- Construct Common Hangar (6,400 S.F.) with Hangar Pad
- Construct Common Hangar (6,400 S.F.) with Hangar Pad
- Grade / Pave Common Hangar Approach Taxilanes (600 S.Y.; 12,500 lbs SWG)
- Grade / Pave Common Hangar Access and Parking Area (3,008 S.Y.)

OTHER PROJECTS

- Refurbish Airport Rotating Beacon

Table 7.3
Phase III Development Plan (11-20 Years)
Floyd W. Jones – Lebanon Airport

Project Description	Local/Private Cost	MoDOT/FAA Cost	Total Cost
Property and Easements			
Fee Simple / Avigation Easement	$600	$5,400	$6,000
		Total	**$6,000**
Runways and Taxiways			
Runway 18-36 Extension to 6,500 Feet	$151,725	$1,365,527	$1,517,253
Crackseal/Overlay Taxiway "C"	$8,228	$74,049	$82,276
Install Medium Intensity Approach Lighting System (MALSF)	$10,250	$74,049	$102,500
		Total	**$1,702,029**
Terminal Area			
Rehabilitate/Expand Main Aircraft Parking Apron	$171,793	$687,174	$858,967
Overlay Maintenance Hangar Parking Apron	$12,284	$110,559	$122,843
Grade/Pave Auto Access and Parking*	$59,052	$0	$59,052
Construct 10-Unit T-Hangars (4 ea) with Hangar Pads*	$1,384,832	$0	$1,384,832
Grade/Pave T-Hangar Taxilane	$62,272	$560,444	$622,715
Grade/Pave T-Hangar Access and Parking*	$310,084	$0	$310,084
Construct Common Hangars (4 ea) with Hangar Pads*	$407,600	$0	$407,600
Grade/Pave Hangar Approach Taxilanes	$3,826	$34,431	$38,256
Construct Common Hangars (2 ea) with Hangar Pads*	$328,040	$0	$328,040
Grade/Pave Common Hangar Approach Taxilanes	$7,765	$69,885	$77,650
Grade/Pave Common Hangar Access and Parking Area*	$59,608	$0	$59,608
		Total	**$4,268,567**
Other Projects			
Refurbish Airport Rotating Beacon	$120	$1,080	$1,200
		Total	**$1,200**
Subtotal Project Costs	**$2,975,648**	**$3,002,148**	**$5,977,796**
Engineering, Administrative and Legal Costs (25%)	$743,912	$750,537	$1,494,449
Total Phase I Project Costs	**$3,719,560**	**$3,752,685**	**$7,472,245**

Note: Eligible projects reflect funding at 90% State / 10% Local, unless otherwise noted.
Note: "*" indicates local/private funding.

8

CHAPTER EIGHT - AIRPORT FINANCING PLAN

8 AIRPORT FINANCING PLAN

INTRODUCTION

The purpose of this chapter is to identify, estimate, and project the financial obligation for owning and operating the Floyd W. Jones – Lebanon Airport. The financing chapter explores the relationship between potential airport revenue sources and projected airport expenditures, airport pricing, and lease structures.

The intention of the financial analysis section is to outline methods to assist the Airport Sponsor in the phased implementation of the Airport Master Plan program. At Lebanon, a combination of federal, state, and local funding, in addition to private financing, would be required over the 20-year planning period to implement the proposed airport development program. The management section outlines ownership, management, and operating principles recommended for the Airport.

This chapter is organized in the following manner:

- Funding Sources and Options
- Projected Airport Revenue and Expenditures

FUNDING SOURCES AND OPTIONS

Funding for general aviation airports is typically available from federal, state, and local sources. The Lebanon Airport is recognized 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 distribution of grants under the AIP is normally administered by the FAA; however, as of 1989, the MoDOT, Aviation Section assumed the authority to direct AIP monies to general aviation airports within the State of Missouri. In the case of Missouri, letters of interest, grant assurances, planning reviews and other regulatory requirements relating to the airport projects will be administered and coordinated through the MoDOT, Aviation Section.

FEDERAL AVIATION ADMINISTRATION (FAA) FUNDING

The *Airport Improvement Program* (AIP) provides federal planning and development grants to public-use airports included in the *National Plan of Integrated Airport Systems (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). The current system of federal airport funds is distributed by formula *and* discretion in accordance with provisions contained in the *Airport and Airways Improvement Act of 1982*, as amended. FAA Order 5100.38A, *Airport Improvement Program (AIP) Handbook*, provides guidance and describes polices and administrative procedures for funding AIP projects.

General Aviation Entitlement Funds: The Lebanon Airport, as a general aviation airport identified in the FAA *National Plan of Integrated Airport Systems (NPIAS)*, is eligible to receive entitlement funds as authorized under the *Aviation Investment and Reform Act of the 21st Century* (AIR-21). The maximum entitlement level is $150,000 per year through FY 2003, 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 MoDOT, Aviation Section, as part of the SBGP. Under this 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 would be funded at 90 percent federal with a 10 percent local match.

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 within the state. State CIP funds are issued on a cost sharing grant basis of 90 percent state and 10 percent local. The program is open to all publicly-owned airports as well as those privately-owned airports that are designated by the FAA as a reliever airport.

MoDOT Airport Maintenance Program – This program assists eligible 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 of 90 percent state and 10 percent local. The program is open to all publicly-owned airports as well as these privately-owned airports that are designated by the FAA as a reliever airport.

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

LOCAL FUNDING

The local funding requirement for eligible AIP or State-funded projects normally totals 10 percent of the total project development cost. However, funding for non-eligible airport projects (such as auto parking, hangars, fuel facilities) typically requires 100 percent local funding, and can be a significant portion of total airport development costs. The airport operates from a dedicated airport fund which derives its funds through City revenue collections, airport income/ground lease revenues, and grants.

THIRD-PARTY FINANCING

Additional sources of revenue and assistance have historically been used at general aviation airports to fund or finance airport improvements. These funds are sometimes generated through public agencies in the form of donations, grants, leases, or other means such as:

- Private/Commercial Financing
- Residence lease/rental
- Non-profit authorizations
- Sale of land for commercial purposes
- State rural/industrial bonds
- Bank loans
- Business license tax
- Display/advertisement rental

Money from private sources has traditionally been used to construct hangar facilities, terminal buildings, install pilot equipment, and in some instances, has supported costs associated with runway and taxiway maintenance and repair projects. Private financing is common at general aviation airports that serve diverse proprietary needs, or are beyond the financial resources of the Airport Sponsor.

On-Site Commercial / Industrial Leases

The opportunity exists at Lebanon Airport to set aside land for commercial and industrial uses on the west side of the Airport. These businesses may be aviation-related such as aircraft service, maintenance, or parts supply. The aviation-related businesses are normally located closer to the aviation activities; however, non-aviation-related business could be located further away to the west side of the Airport. With the closure of Runway 9-27, the opportunity exists to lease land on the west side for non-aviation-related business.

Fixed-Base Operator (FBO) Leases

Currently, there is one FBO operating at the Lebanon Airport that provides fueling and other services for itinerant and based aircraft. Services provided by fixed base operators are a major factor in the successful operation of the airport. The more services offered at an airport translate directly to higher usage rates. Facilities and/or land can be leased to an FBO to operate or expand a business. Areas available for lease and development are shown on the Terminal Area Drawing.

Hangar / Ground Leases

All T-hangars at the Airport are owned by the City and leased to airport users based on the size of each hangar. Airport ground leases are renewed annually and lease rates are based on the amortization of the fair market value of land at the Lebanon Airport over a 25-year period.

PROJECTED AIRPORT REVENUE AND EXPENDITURES

The ideal and ultimate goal of any airport should be the capability of supporting its own operation and development solely through airport revenues. Nevertheless, there are only a few general aviation airports that are capable of operating at a self-sufficient rate. In order to help bridge the gap between expenditures and revenues, a periodic audit of lease rates is recommended to ensure the fair market value is being assessed to the airport tenants. Often the airport fee structure does not maintain rates equal to the regional inflationary rate. This fact makes it difficult for cities to justify investment of public money in the airport unless the public recognizes the overall value added to the community. Therefore, by establishing a more reasonable rate structure the airport will gain a more positive position in the community even though these fees may not be enough to offset the cost differences to reach the break-even point.

Operating Revenue

It is expected that the major components of future operating revenue at Lebanon would be similar to national trends and include lease revenues, operations fees, and commissions on merchandise sold (fuel flowage fee). Every effort should be made to make the Airport as self-sufficient as possible.

Airport Lease Agreements

Those areas on the airport which are not expressly required for aeronautical purposes should provide income to the airport through a variety of lease agreements. Property leases range from ground leases for those individuals wanting to build hangars on the airport to commercial or industrial leases. Based on user revenue rates developed from the analysis of regional U.S. airports, the following rates are suggested for future airport leases.

Private Hangar Ground Lease Areas

The construction of privately-financed hangars should be continued to satisfy space requirements for aircraft storage and maintenance purposes, accommodate individual aircraft with unique storage needs, expansion of tenants, and dedicated hangar/building facilities for special purpose flight institutions, clubs and organizations. Such hangars can also be subleased to accommodate other based aircraft.

The following are suggested ground lease rates for privately-owned hangars:

2000 – $0.13 square foot/year
2007 – $0.15 square foot/year
2012 – $0.17 square foot/year
2022 – $0.23 square foot/year

Note: Annual hangar rental rates should be adjusted using a gross percentage increase or consumer price index rate tied to State figures.

Note: Due to the investment of non-local funds on unsecured property, the ground lease rental rate for privately-owned hangars should be lower than those of any airport-owned hangar to encourage future development beyond the airport resources. These rates allow collecting direct fees for normal operation of the airport, defray the cost of regular maintenance and upkeep assumed by the City, and assist in offsetting the maintenance costs associated with providing public investment to support proprietary facilities.

Private Commercial Hangar Ground Lease Areas

The intermediate and long-term development of common or conventional hangars financed through private investment at Lebanon is a reasonable expectation with the anticipated arrival of more sophisticated single and twin-engine aircraft based at the airport, and the possible development of limited commercial (FBO) expansion of the terminal area.

The following are suggested ground lease rates for privately-owned commercial-use hangars:

2002 – $0.27 square foot/year
2007 – $0.32 square foot/year
2012 – $0.33 square foot/year
2022 – $0.35 square foot/year

Note: Build-and-lease-back agreements can be used for hangar development either as a pledge-revenue to support bond issues, or against mortgages on facilities constructed for a particular tenant. Ground lease rates are nominal to reflect outstanding debt risk to the investor. The major disadvantage to this method is higher interest rates, and the non-assignable or restricted leasehold which remains conditionally unsecured by the financing institution.

Note: All future hangar and terminal area development (publicly and privately financed) should occur on airport property. Commercial-type hangar ground lease terms should extend, at minimum, beyond five (5) years to promote long-term private hangar development.

AIRPORT TERMINAL BUILDING/OFFICE REVENUES

The existing terminal building was constructed in 1998 and contains a foyer area, service/sales counter area, office, kitchen, dining area, weather briefing room, and restroom facilities. The following suggested rate structure includes rental of space plus utilities per square foot per year.

Suggested ground lease rates for terminal building space are as follows:

2002 – $5.50 square foot/year
2007 – $6.00 square foot/year
2012 – $6.75 square foot/year
2022 – $8.25 square foot/year

Note: Annual terminal building leases should be adjusted using a gross percentage increase or consumer price index rate tied to State figures.

AIRPLANE TIE-DOWN REVENUES

Tie-Downs – Aircraft tie-down fees are normally collected at general aviation airports for long-term, and sometimes short-term (overnight) parking. When controlled by the FBO, fees for short-term parking are often waived in exchange for fuel sales or other concessions which attract a higher revenue or profit margin (fuel, catering, maintenance, etc.); therefore, tie-downs are typically viewed as an attraction to services rather than a cost of business. When applicable, the following are suggested user revenue rate for aircraft tie-downs:

Based Aircraft:	Itinerant Aircraft:
2002 – $22/month	2002 – $6/night
2007 – $25/month	2007 – $7/night
2012 – $28/month	2012 – $8/night
2022 – $34/month	2022 – $10/night

Note: Annual terminal building leases should be adjusted using a gross percentage increase or consumer price index rate tied to State figures.

Note: Significant revenues from tie-downs should not be expected since most airplane owners prefer an enclosed/sheltered hangar (environmental and security reasons) as a major factor in selecting an airport as a base location.

Note: The potential for based flight training aircraft is an opportunity for future tie-down revenues. Aircraft tie-down rates should be adjusted using a gross percentage increase or consumer price index rate tied to State figures, or set based on a reasonable percentage of hangar rates (typically around 20% to 25%).

FUEL SALE REVENUES

Lebanon Aviation Services Inc. is responsible for distribution, purchasing and pricing of the aviation fuel sold at Lebanon. A portion of the fuel sales goes to the City as annual income from the Airport. The City of Lebanon owns the fuel storage system and fuel trucks. It is recommended the City retain possession of the fuel storage equipment and allowing for additional storage capacity in the near future.

The following is a suggested fuel flowage rate per gallon of fuel sold:

2002 – $0.04 per gallon of fuel sold
2007 – $0.06 per gallon of fuel sold
2007 – $0.08 per gallon of fuel sold
2007 – $0.10 per gallon of fuel sold

Note: Fuel flowage fees should be adjusted using a gross percentage increase or consumer price index rate tied to State figures. Adjustments should be made a minimum of every 3 years.

Note: Provisions, based on minimum operating standards, should continue to permit an FBO to retain control of fueling practices as appropriately regulated under local and state law.

AIRPORT OPERATING EXPENSES

In general, airport operating expenses reflect the extent of services offered and coincide with the number of based aircraft and sustained level of activity by larger corporate aircraft. In addition, expenses may vary depending on the local financing mechanisms and inflation rates. Furthermore, as airport activity increases and planned airfield improvements are completed, additional local-sponsored improvements will likely be required. Operating expenses at general aviation airports, including the Lebanon Airport, normally fall into four main categories: 1) administration, 2) maintenance, 3) utilities, and 4) supplies and miscellaneous.

Administration – Administrative costs include items such as employee salaries, benefits, liability insurance, professional/organizational dues, etc. Administrative costs should remain relatively low since the City does not have a salaried Airport Manager under contract.

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 and Repairs normally require a substantial amount of capital costs for upkeep and routine rehabilitation of existing and future pavements, equipment and structures.

Utilities – Electricity for airfield lighting – runway and taxiway lights, rotating beacon, terminal building requirements, etc. - will 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.

Supplies and Miscellaneous – This general category includes those items and commodities required for the day-to-day operation of the airport. These include office supplies, solvents, equipment, postage, etc. At general aviation airports, these costs are normally about 10 percent of total operating expenses.

9

CHAPTER NINE - AIRPORT PLANS

9 AIRPORT PLANS

AIRPORT PLANS

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

Airport Layout Plan Drawing (ALP) – A single-page scaled drawing that depicts the existing and proposed phased development. This drawing provides a comprehensive view of the primary airport facilities and equipment. In addition, the ALP depicts minimum separation and clearance criteria for future unrestricted development of the airport and navigational (NAVAID) facilities. The layout is the result of a series of discussions and analysis with the Planning Advisory Committee (PAC) to establish a safe facility that meets minimum operational requirements. 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 - A three-dimensional depiction showing the land use area covered by FAR Part 77 imaginary surface criteria, which is used as a federal guideline to determine whether existing or proposed structures represent obstructions to air navigation. Once approved by the FAA, the FAR Part 77 airspace is reserved for aeronautical purposes. Therefore, it is recommended that the City of Lebanon re-adopt the FAR Part 77 Airspace Drawing as its *Height and Hazard* zoning document. This document shows the recommended boundaries for the height of structures and objects of natural growth as appropriate within the airspace drawing.

Runway Inner Portion of the Approach Surface Drawing -- A scaled drawing showing the plan and profile view of the approach surfaces and runway protection zones. The plans are designed to identify current and potential obstructions to air navigation (roadways, power lines, trees, etc.) in relation to the existing and ultimate runway threshold, and to determine the height elevations (clearance or violation) along the extended runway centerline approach slope. Each violation and/or obstruction is identified, with appropriate future mitigation recommendations.

Terminal Area Plan Drawing – A close-in drawing of the terminal area showing existing facilities and future terminal area requirements. The primary features of this plan include airport access, automobile parking, terminal building, aircraft parking areas, fueling facilities, and various hangars. The ultimate planned design for the terminal area is to provide adequate functional layout for aircraft parking, maneuvering, hangar and building development, and other related development. Additionally, the plan will include minimum separation and clearances for future development of all terminal facilities and equipment.

Airport Land Use Plan Drawing – This drawing shows the various existing land uses adjacent to the airport property boundary. The objective of the land use plan is to coordinate the best uses conducive to the functional design of the airport facility. Airport land-use planning is also important for the orderly development and efficient use of available spaces. This drawing depicts airport and adjacent 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.

Airport Property Plan Drawing - A single-page drawing showing an overlay of all relevant tracts of existing and ultimate airport property and easement interests, including the size (acres), date (grant agreement), and existing ownership status of proposed airport property acquisition.

APPENDIX A

LEBANON AIRPORT SURVEY (FLOYD W. JONES FIELD)

Airport Master Plan Study

Dear Airport User / Aircraft Owner:

The City of Lebanon is preparing an Airport Study to identify improvements to the Lebanon Airport (LBO). 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: (816) 363-2696: Jeffrey Smith, C.M. – Project Planner

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

PILOT & AIRCRAFT ACTIVITY

1. Years you, or your business, have used or based a plane at the Lebanon Airport (LBO)? _____

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

2. Indicate the type *and* percent of your aircraft activity at the Lebanon Airport LBO?

[ ] Pleasure / Recreational	_____%	[ ] Agricultural	_____%
[ ] Personal Business	_____%	[ ] Flight Training	_____%
[ ] Corporate (Part 135)	_____%	[ ] Military	_____%
[ ] Cargo	_____%	[ ] Other:_____	_____%

3.
   - Average number of flights at Lebanon Airport LBO per month? _____
   - Average touch & gos at LBO per month? _____
   - Average instrument approaches conducted at LBO per month? _____
   - Average flight distance from LBO? _____
   - Average number of passengers per flight? _____

   Indicate your annual runway use at the (total of runway ends = 100%)?

   - Percent Runway 18 usage? _____ % / Percent Runway 36 usage? _____ %
   - Percent Runway 09 usage? _____ % / Percent Runway 27 usage? _____ %

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

5. Projected airport activity at the Lebanon Airport (LBO)? [ ] Increase [ ] Same [ ] Decline

AIRPORT PILOT/PASSENGER SERVICES

6. Are existing pilot services at the Lebanon Airport (LBO) 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 the Lebanon Airport? [ ] Yes [ ] No
   Is the size and location of the Lebanon Airport adequate for your business? [ ] Yes [ ] No

   Projected business-related use of the Lebanon Airport? [ ] Increase [ ] Same [ ] Decline

   Business-related destinations _____, _____, _____

AIRPORT FACILITIES

9. Rate airport facilities & equipment in terms of importance (5=most needed; 1= least needed)

========== Airfield Conditions and Factors ==========

Runway Length / Width	_____	Airfield Pavement Strength / Condition	_____
Crosswind Runway Needs	_____	Airfield Pavement Markings	_____
Runway Lighting System	_____	Taxiway System / Maneuvering	_____
Runway Visual Aids (PAPI/REIL)	_____	Taxiway Lighting System	_____
Airfield Visibility	_____	Airport Traffic Patterns	_____
Instrument Procedures	_____	Airspace / Approach Obstructions	_____
NAVAIDS / Radar / Radio Coverage	_____	Automated Weather Reporting	_____

========== Terminal Area Conditions and Factors ==========

Terminal Building Accommodations	_____	Apron Tie-Down / Parking Space	_____
Fuel Dispensing / Availability	_____	Hangar Space / Availability	_____
Aircraft Maintenance / Repair	_____	Courtesy / Rental Car Availability	_____
Terminal Security / Fencing / Lighting	_____	Regulations / Contracts / Leases	_____
Water Drainage / Flooding	_____	Auto Access / Parking	_____

GENERAL COMMENTS

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

_____

_____

_____

_____

_____

_____

_____

Thank you for your time!

APPENDIX B

ALL-WEATHER WINDS (OBSERVATIONS)										
Type of Wind Data:			All-Weather			Revision Date:		10/16/03		
Wind Station:			Springfield, MO			Period of Record:		1990-1999		
Number of Observations:			87,203			Airport:		Floyd W. Jones		
	98	555	744	389	36	0	0	0	0	1,822
	77	501	608	258	20	1	0	0	0	1,465
	87	539	623	186	7	1	0	0	0	1,443
	88	499	569	205	8	0	0	0	0	1,369
	79	551	552	154	10	0	0	0	0	1,346
	68	537	518	132	7	0	0	0	0	1,262
	70	473	451	109	5	1	0	0	0	1,109
	66	486	358	71	8	1	0	0	0	990
	99	467	341	97	5	1	0	0	0	1,010
	69	389	331	96	1	1	1	0	0	888
	106	426	371	115	11	1	0	0	0	1,030
	137	637	633	264	23	5	0	0	0	1,699
	158	812	1014	524	58	4	0	0	0	2,570
	177	1077	1377	939	98	14	1	0	0	3,683
	211	1278	2275	1574	166	8	0	0	0	5,512
	213	1617	3311	2250	231	15	2	0	0	7,639
	220	1775	3159	2008	195	22	1	0	0	7,380
	226	1568	2238	1301	170	14	1	0	0	5,518
	168	867	1317	859	130	12	0	0	0	3,353
	154	703	855	561	100	5	0	0	0	2,378
	113	565	640	397	77	7	0	0	0	1,799
	119	486	617	362	63	16	0	0	0	1,663
	111	486	477	251	25	8	0	0	0	1,358
	101	385	458	240	39	8	0	0	0	1,231
	73	326	328	182	22	1	0	1	0	933
	84	343	369	214	22	2	0	0	0	1,034
	85	364	397	229	28	6	0	0	0	1,109
	109	432	522	274	59	2	0	0	0	1,398
	97	495	654	397	46	3	0	0	0	1,692
	101	585	700	478	60	4	0	0	0	1,928
	125	585	791	546	74	10	2	0	0	2,133
	106	592	759	554	86	9	0	0	0	2,106
	111	601	762	548	88	7	1	0	0	2,118
	93	638	867	574	63	8	2	0	0	2,245
	114	587	907	512	41	2	0	1	0	2,164
	127	716	999	542	25	3	0	0	0	2,412
	5203	1211	0	0	0	0	0	0	0	6,414
Total	**9,443**	**25,154**	**31,892**	**18,392**	**2,107**	**202**	**11**	**2**	**0**	**87,203**

Calm Wind Observations (0 - 3 knots):	9,443	10.83%
Light Wind Observations (3 - 10.5 knots):	55,835	64.03%
Calm and Light Winds (0 - 10.5-knots)	65,278	74.86%

ALL-WEATHER WINDS (PERCENT OF OBSERVATIONS)										
Type of Wind Data:			All-Weather			Revision Date		10/16/03		
Wind Station			Springfield, MO			Period of Record		1990-1999		
Number of Observations			87,203			Airport		Floyd W. Jones		
	0.1	0.6	0.9	0.4	0.0	0.0	0.0	0.0	0.0	2.09%
	0.1	0.6	0.7	0.3	0.0	0.0	0.0	0.0	0.0	1.68%
	0.1	0.6	0.7	0.2	0.0	0.0	0.0	0.0	0.0	1.65%
	0.1	0.6	0.7	0.2	0.0	0.0	0.0	0.0	0.0	1.57%
	0.1	0.6	0.6	0.2	0.0	0.0	0.0	0.0	0.0	1.54%
	0.1	0.6	0.6	0.2	0.0	0.0	0.0	0.0	0.0	1.45%
	0.1	0.5	0.5	0.1	0.0	0.0	0.0	0.0	0.0	1.27%
	0.1	0.6	0.4	0.1	0.0	0.0	0.0	0.0	0.0	1.14%
	0.1	0.5	0.4	0.1	0.0	0.0	0.0	0.0	0.0	1.16%
	0.1	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	1.02%
	0.1	0.5	0.4	0.1	0.0	0.0	0.0	0.0	0.0	1.18%
	0.2	0.7	0.7	0.3	0.0	0.0	0.0	0.0	0.0	1.95%
	0.2	0.9	1.2	0.6	0.1	0.0	0.0	0.0	0.0	2.95%
	0.2	1.2	1.6	1.1	0.1	0.0	0.0	0.0	0.0	4.22%
	0.2	1.5	2.6	1.8	0.2	0.0	0.0	0.0	0.0	6.32%
	0.2	1.9	3.8	2.6	0.3	0.0	0.0	0.0	0.0	8.76%
	0.3	2.0	3.6	2.3	0.2	0.0	0.0	0.0	0.0	8.46%
	0.3	1.8	2.6	1.5	0.2	0.0	0.0	0.0	0.0	6.33%
	0.2	1.0	1.5	1.0	0.1	0.0	0.0	0.0	0.0	3.85%
	0.2	0.8	1.0	0.6	0.1	0.0	0.0	0.0	0.0	2.73%
	0.1	0.6	0.7	0.5	0.1	0.0	0.0	0.0	0.0	2.06%
	0.1	0.6	0.7	0.4	0.1	0.0	0.0	0.0	0.0	1.91%
	0.1	0.6	0.5	0.3	0.0	0.0	0.0	0.0	0.0	1.56%
	0.1	0.4	0.5	0.3	0.0	0.0	0.0	0.0	0.0	1.41%
	0.1	0.4	0.4	0.2	0.0	0.0	0.0	0.0	0.0	1.07%
	0.1	0.4	0.4	0.2	0.0	0.0	0.0	0.0	0.0	1.19%
	0.1	0.4	0.5	0.3	0.0	0.0	0.0	0.0	0.0	1.27%
	0.1	0.5	0.6	0.3	0.1	0.0	0.0	0.0	0.0	1.60%
	0.1	0.6	0.7	0.5	0.1	0.0	0.0	0.0	0.0	1.94%
	0.1	0.7	0.8	0.5	0.1	0.0	0.0	0.0	0.0	2.21%
	0.1	0.7	0.9	0.6	0.1	0.0	0.0	0.0	0.0	2.45%
	0.1	0.7	0.9	0.6	0.1	0.0	0.0	0.0	0.0	2.42%
	0.1	0.7	0.9	0.6	0.1	0.0	0.0	0.0	0.0	2.43%
	0.1	0.7	1.0	0.7	0.1	0.0	0.0	0.0	0.0	2.57%
	0.1	0.7	1.0	0.6	0.0	0.0	0.0	0.0	0.0	2.48%
	0.1	0.8	1.1	0.6	0.0	0.0	0.0	0.0	0.0	2.77%
	6.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.36%
Total	10.83%	28.85%	36.57%	21.09%	2.42%	0.23%	0.01%	0.00%	0.00%	100.00%

Percent Calm Winds (winds less than 11 knots): 76.25%

Runway 18	49.42%	
Runway 36	23.94%	73%
Runway 9	12.54%	
Runway 27	14.09%	27%

IMC WINDS (OBSERVATIONS)										
Type of Wind Data:			IFR				Revision Date:		10/16/03	
Wind Station:			Springfield, MO				Period of Record:		1990-1999	
Number of Observations:			5,315				Airport:		Floyd W. Jones	
	6	55	116	95	10	0	0	0	0	282
	4	56	85	46	8	0	0	0	0	199
	2	54	78	19	3	0	0	0	0	156
	7	48	61	26	0	0	0	0	0	142
	3	52	44	15	2	0	0	0	0	116
	6	44	58	14	0	0	0	0	0	122
	2	25	42	12	0	0	0	0	0	81
	4	26	35	5	0	0	0	0	0	70
	4	21	22	6	0	0	0	0	0	53
	5	13	16	2	0	0	0	0	0	36
	8	26	18	5	0	0	0	0	0	57
	7	20	35	21	1	0	0	0	0	84
	4	25	49	43	1	0	0	0	0	122
	4	40	64	62	2	0	0	0	0	172
	5	30	102	95	17	1	0	0	0	250
	9	53	128	112	6	0	0	0	0	308
	5	54	102	58	0	0	0	0	0	219
	5	51	55	12	0	0	0	0	0	123
	7	34	24	4	1	0	0	0	0	70
	8	26	15	2	0	0	0	0	0	51
	8	20	16	2	0	0	0	0	0	46
	9	15	12	2	0	0	0	0	0	38
	2	13	12	3	0	1	0	0	0	31
	3	16	13	3	0	0	0	0	0	35
	4	16	18	4	1	0	0	0	0	43
	3	28	10	4	0	0	0	0	0	45
	3	21	13	10	0	0	0	0	0	47
	5	27	40	15	1	0	0	0	0	88
	8	31	61	29	1	0	0	0	0	130
	8	51	71	41	7	0	0	0	0	178
	3	50	77	69	1	0	0	0	0	200
	10	54	73	66	5	0	0	0	0	208
	7	53	103	71	7	1	0	0	0	242
	10	60	109	101	10	0	0	0	0	290
	14	42	147	104	7	1	0	0	0	315
	20	70	165	120	6	0	0	0	0	381
	259	26	0	0	0	0	0	0	0	285
Total	**481**	**1,346**	**2,089**	**1,298**	**97**	**4**	**0**	**0**	**0**	**5,315**

Calm Wind Observations (winds less than 11 knots): 3,916
Percent Calm Winds (winds less than 11 knots): 73.68%

IMC WINDS (OBSERVATIONS)										
Type of Wind Data:	IFR					Revision Date:	10/16/03			
Wind Station:	Springfield, MO					Period of Record:	1990-1999			
Number of Observations:	5,315					Airport:	Floyd W. Jones			
	0.1	1.0	2.2	1.8	0.2	0.0	0.0	0.0	0.0	5.31%
	0.1	1.1	1.6	0.9	0.2	0.0	0.0	0.0	0.0	3.74%
	0.0	1.0	1.5	0.4	0.1	0.0	0.0	0.0	0.0	2.94%
	0.1	0.9	1.1	0.5	0.0	0.0	0.0	0.0	0.0	2.67%
	0.1	1.0	0.8	0.3	0.0	0.0	0.0	0.0	0.0	2.18%
	0.1	0.8	1.1	0.3	0.0	0.0	0.0	0.0	0.0	2.30%
	0.0	0.5	0.8	0.2	0.0	0.0	0.0	0.0	0.0	1.52%
	0.1	0.5	0.7	0.1	0.0	0.0	0.0	0.0	0.0	1.32%
	0.1	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	1.00%
	0.1	0.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.68%
	0.2	0.5	0.3	0.1	0.0	0.0	0.0	0.0	0.0	1.07%
	0.1	0.4	0.7	0.4	0.0	0.0	0.0	0.0	0.0	1.58%
	0.1	0.5	0.9	0.8	0.0	0.0	0.0	0.0	0.0	2.30%
	0.1	0.8	1.2	1.2	0.0	0.0	0.0	0.0	0.0	3.24%
	0.1	0.6	1.9	1.8	0.3	0.0	0.0	0.0	0.0	4.70%
	0.2	1.0	2.4	2.1	0.1	0.0	0.0	0.0	0.0	5.79%
	0.1	1.0	1.9	1.1	0.0	0.0	0.0	0.0	0.0	4.12%
	0.1	1.0	1.0	0.2	0.0	0.0	0.0	0.0	0.0	2.31%
	0.1	0.6	0.5	0.1	0.0	0.0	0.0	0.0	0.0	1.32%
	0.2	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.96%
	0.2	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.87%
	0.2	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.71%
	0.0	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.58%
	0.1	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.66%
	0.1	0.3	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.81%
	0.1	0.5	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.85%
	0.1	0.4	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.88%
	0.1	0.5	0.8	0.3	0.0	0.0	0.0	0.0	0.0	1.66%
	0.2	0.6	1.1	0.5	0.0	0.0	0.0	0.0	0.0	2.45%
	0.2	1.0	1.3	0.8	0.1	0.0	0.0	0.0	0.0	3.35%
	0.1	0.9	1.4	1.3	0.0	0.0	0.0	0.0	0.0	3.76%
	0.2	1.0	1.4	1.2	0.1	0.0	0.0	0.0	0.0	3.91%
	0.1	1.0	1.9	1.3	0.1	0.0	0.0	0.0	0.0	4.55%
	0.2	1.1	2.1	1.9	0.2	0.0	0.0	0.0	0.0	5.46%
	0.3	0.8	2.8	2.0	0.1	0.0	0.0	0.0	0.0	5.93%
	0.4	1.3	3.1	2.3	0.1	0.0	0.0	0.0	0.0	7.17%
	4.9	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.36%
Total	**4.2**	**24.8**	**39.3**	**24.4**	**1.8**	**0.1**	**0.0**	**0.0**	**0.0**	**100.00%**

Percent Calm Winds (winds less than 11 knots): 68.3%

APPENDIX C

Trend Line - Based Aircraft | Trend Line - Based Aircraft

	Total Airport Based Aircraft						County Registered Aircraft		
	Single Engine	Twin Prop	Twin Turbine	Jet	Total	Rotorcraft	County	Total County	% of County
1990	18	3	4	1	**26**	**0**	36	**36**	72%
1991	18	3	4	1	**26**	**0**	32	**32**	81%
1992	18	3	4	1	**26**	**0**	34	**34**	76%
1993	17	3	4	1	**25**	**0**	N/A	**N/A**	
1995	17	4	7	1	**29**	**0**	N/A	**N/A**	
1997	17	4	6	2	**29**	**0**	N/A	**N/A**	
1999	27	1	4	4	**36**	**0**	N/A	**N/A**	
2000	27	1	4	4	**36**	**0**	N/A	**N/A**	
2001	35	1	6	4	**46**	**0**	46	**46**	100%
Average	**21.6**	**2.6**	**4.8**	**2.1**	**31.0**	**0.0**	37.0	34.0	82%

Linear Trend Line (1990-2021 data points)

2001	35.0	1.0	6.0	4.0	**46.0**
2002	30.1	1.0	5.5	4.3	**40.9**
2003	31.4	1.0	5.6	4.6	**42.6**
2004	32.7	2.0	5.7	4.9	**45.3**
2005	34.0	2.0	5.8	5.3	**47.0**
2006	35.3	2.0	5.9	5.6	**48.7**
2007	36.6	3.0	6.0	5.9	**51.4**
2008	37.8	3.0	6.1	6.2	**53.2**
2009	39.1	3.0	6.2	6.6	**54.9**
2010	40.4	3.0	6.3	6.9	**56.6**
2011	41.7	3.0	6.4	7.2	**58.3**
2012	43.0	4.0	6.5	7.5	**61.0**
2013	44.3	4.0	6.6	7.9	**62.7**
2014	45.6	4.0	6.7	8.2	**64.4**
2015	46.8	4.0	6.8	8.5	**66.2**
2016	48.1	4.0	6.9	8.8	**67.9**
2017	49.4	5.0	7.0	9.2	**70.6**
2018	50.7	5.0	7.1	9.5	**72.3**
2019	52.0	5.0	7.2	9.8	**74.0**
2020	53.3	5.0	7.3	10.1	**75.7**
2021	54.6	5.0	7.4	10.5	**77.4**

FAA Growth Rates - Nationwide Average Local Demand (Source: 2000 FAA Aviation Forecasts)

FAA Aircraft Fleet Forecasts (Average Annual Growth Rates):

Single-Engine Piston Production/Single-Engine Experimental	1.80%
Twin Engine - Piston	2.50%
Twin Engine - Turbine	8.00%
Jet - Turbine/Turbojet	4.90%
Rotorcraft	4.50%

Year	Single Engine	Twin Prop	Twin Turbine	Jet	Rotorcraft	Total
2001	35.0	1.0	6.0	4.0	0.0	**46.0**
2002	35.6	1.0	6.0	4.0	0.0	**46.7**
2003	36.3	1.1	6.5	4.2	0.0	**48.0**
2004	36.9	1.1	7.0	4.4	0.0	**49.4**
2005	37.6	1.1	7.6	4.6	0.0	**50.9**
2006	38.3	1.1	8.2	4.8	0.0	**52.4**
2007	39.0	1.2	8.8	5.1	0.0	**54.0**
2008	39.7	1.2	9.5	5.3	0.0	**55.7**
2009	40.4	1.2	10.3	5.6	0.0	**57.5**
2010	41.1	1.2	11.1	5.9	0.0	**59.3**
2011	41.8	1.3	12.0	6.2	0.0	**61.3**
2012	42.6	1.3	13.0	6.5	0.0	**63.3**
2013	43.4	1.3	14.0	6.8	0.0	**65.5**
2014	44.1	1.4	15.1	7.1	0.0	**67.7**
2015	44.9	1.4	16.3	7.4	0.0	**70.1**
2016	45.7	1.4	17.6	7.8	0.0	**72.6**
2017	46.6	1.5	19.0	8.2	0.0	**75.3**
2018	47.4	1.5	20.6	8.6	0.0	**78.1**
2019	48.3	1.6	22.2	9.0	0.0	**81.0**
2020	49.1	1.6	24.0	9.5	0.0	**84.2**
2021	50.0	1.6	25.9	9.9	0.0	**87.5**

Percentage Growth Rate FAA Based Aviation Forecasts

FAA General Aviation Fleet Utilization Growth Rate: (2001-2011)	2.40%
Estimated General Aviation Fleet Utilization Growth Rate: (2012-2016)	2.60%
Estimated General Aviation Fleet Utilization Growth Rate: (2017-2021)	2.50%

Year		Total Aircraft
2001	==>	46.0
2002	==>	47.1
2003	==>	48.2
2004	==>	49.4
2005	==>	50.6
2006	==>	51.8
2007	==>	53.0
2008	==>	54.3
2009	==>	55.6
2010	==>	56.9
2011	==>	58.3
2012	==>	59.8
2013	==>	61.4
2014	==>	63.0
2015	==>	64.6
2016	==>	66.3
2017	==>	68.0
2018	==>	69.7
2019	==>	71.4
2020	==>	73.2
2021	==>	75.0

Adjusted Percentage Growth Rate from FAA General Aviation Forecasts:

FAA General Aviation Fleet Utilization Growth Rate: (2001-2011)	2.40%
Estimated General Aviation Fleet Utilization Growth Rate: (2012-2016)	2.60%
Estimated General Aviation Fleet Utilization Growth Rate: (2017-2021)	2.50%

Year		Total Aircraft
2001	==>	46.0
2002	==>	47.1
2003	==>	48.2
2004	==>	49.4
2005	==>	50.6
2006	==>	56.0
2007	==>	59.4
2008	==>	60.8
2009	==>	62.3
2010	==>	63.8
2011	==>	66.0
2012	==>	67.7
2013	==>	69.5
2014	==>	71.3
2015	==>	73.1
2016	==>	76.0
2017	==>	78.0
2018	==>	79.9
2019	==>	81.9
2020	==>	84.0
2021	==>	86.0

Straight Line Growth Rate (aircraft/year)

2001	==>	46.0
2002	==>	48.0
2003	==>	50.0
2004	==>	52.0
2005	==>	54.0
2006	==>	56.0
2007	==>	58.0
2008	==>	60.0
2009	==>	62.0
2010	==>	64.0
2011	==>	66.0
2012	==>	68.0
2013	==>	70.0
2014	==>	72.0
2015	==>	74.0
2016	==>	76.0
2017	==>	78.0
2018	==>	80.0
2019	==>	82.0
2020	==>	84.0
2021	==>	86.0

APPENDIX D

AIRPORT PARAMETRIC CAPACITY CHARACTERISTICS					
Description	Existing	2006	2011	2016	2021
Total Annual "Civilian" Aircraft Operations	20,600	26,000	29,600	34,000	38,500
Peak Month Operations	2,266	2,860	3,256	3,740	4,235
Peak Average Day Operations	74	94	107	123	139
Peak Hour Operations	11.1	14.1	16.1	18.5	20.9
Passengers Per Aircraft Operation	2.60	2.60	2.80	3.00	3.30
Design Hour Passengers	**28.9**	**36.7**	**44.9**	**55.4**	**68.8**

TERMINAL BUILDING REQUIREMENTS						
Item	S.F.	Existing	2006	2011	2016	2021
Design Hour Passengers		28.9	36.7	44.9	55.4	68.8
Pilot Lounge/Flight Planning Area	24.0	693	880	1,079	1,328	1,651
Administrative/Management Office Area	10.5	303	385	472	581	722
Restrooms	2.0	58	73	90	111	138
Restrooms	2.0	58	73	90	111	138
Dining/Kitchen/Meeting Area	16.0	462	587	719	886	1,101
Utility Room	2.0	58	73	90	111	138
Equipment/Storage/Mechanical/Circulation	6.0	173	220	270	332	413
Fixed Based Operator (FBO) Area	0.0	N/A	0	0	0	0
Restroom	0.0	N/A	0	0	0	0
General Meeting Room Area (Optional)	0.0	N/A	0	0	0	0
Restaurant/Kitchen (Optional)	0.0	N/A	0	0	0	0
Classroom Area (Optional)	0.0	N/A	0	0	0	0
Total Terminal Building Area (S.F.)		**1,804**	**2,291**	**2,809**	**3,459**	**4,300**

PUBLIC AUTOMOBILE PARKING REQUIREMENTS					
Item	Existing	2006	2011	2016	2021
Design Hour Passengers	28.9	36.7	44.9	55.4	68.8
Parking Space Factor (Cars Per Passenger)	0.55	0.55	0.55	0.55	0.55
Public Automibile Parking Spaces	16	20	25	30	38
Size of Parking Area Per Space (S.F.)	175	175	175	175	175
Parking Area (S.F.)	2,778	3,529	4,325	5,327	6,622
Manuevering and Access Area @ 25%	694	882	1,081	1,332	1,656
Total Automibile Parking Area (S.F.)	**3,472**	**4,411**	**5,407**	**6,659**	**8,278**

AIRCRAFT APRON REQUIREMENTS					
Item	Existing	2006	2011	2016	2021
Total Based Aircraft	46	58	66	76	86
Based Demand for Apron Tie-Down (%)	25%	25%	25%	25%	25%
Apron Area - Based (2,700 S.F./Aircraft)	31,050	39,150	44,550	51,300	58,050
Apron Manuevering/Taxiing Area @ 50% (S.F.)	15,525	19,575	22,275	25,650	29,025
Total - Based Aircraft Apron Area (S.F.)	**46,575**	**58,725**	**66,825**	**76,950**	**87,075**
Annual Itinerant Operations	13,790	17,160	19,830	22,480	25,480
Peak Month - Itinerant Operations	827	1,030	1,190	1,349	1,529
Peak Day - Itinerant Operations	27.6	34.3	39.7	45.0	51.0
40% of Peak Day - Itinerant Facility Demand	11.03	13.73	15.86	17.98	20.38
Itinerant Apron Demand (3,240 S.F./Small)	17,872	22,239	25,700	29,134	33,022
Itinerant Apron Demand (6,400 S.F./Large)	35,302	43,930	50,765	57,549	65,229
Apron Manuevering/Taxiing Area @ 50% to 75% (S.F.	31,055	38,644	44,657	50,625	57,381
Total - Itinerant Apron Area (S.F.)	**84,229**	**104,813**	**121,122**	**137,308**	**155,632**
Total Apron Area (S.F.)	**130,804**	**163,538**	**187,947**	**214,258**	**242,707**
Total Apron Area (S.Y.)	**14,534**	**18,171**	**20,883**	**23,806**	**26,967**
Total Tie-Downs	**37**	**47**	**54**	**61**	**70**

Item	Existing	2006	2011	2016	2021
(A) Single-engine	35	45	51	58	65
(A) Twin-engine (piston)	1	2	2	3	4
(A) Twin-engine (turbine)	6	6	8	9	10
(A) Jet	4	5	5	6	7
(A) Helicopter	0	0	0	0	0
Other					
Total Based Aircraft --->	**46**	**58**	**66**	**76**	**86**
Single-engine aircraft (1,200 S.F.)	0	0	0	0	0
Twin-engine aircraft (1,400 S.F.)	7	8	10	12	14
Jet (6,400 S.F.)	4	5	5	6	7
Helicopter (2,000 S.F.)	0	0	0	0	0
Standard Aircraft Conventional Hangar Area (S.F.)	35,400	43,200	46,000	55,200	64,400
Office/Storage/Utility Hangar Space (20%)	7,080	8,640	9,200	11,040	12,880
Total Conventional Hangar Area (S.F.)	**42,480**	**51,840**	**55,200**	**66,240**	**77,280**
Single-engine aircraft (1,200 S.F.)	35	45	51	58	65
Twin-engine aircraft (1,400 S.F.)	0	0	0	0	0
Total T-Hangar Area (S.F.)	**42,000**	**63,000**	**71,400**	**81,200**	**78,000**
Single-engine aircraft (1,000 S.F.)	2	2	2	2	2
Twin-engine aircraft (1,200 S.F.)	2	2	2	2	2
Total Common Hangar Area (S.F.)	**4,400**	**4,400**	**4,400**	**4,400**	**4,400**
Total Usable Hangar Area	**81,600**	**110,600**	**121,800**	**140,800**	**146,800**
Total Hangar Area	**88,880**	**119,240**	**131,000**	**151,840**	**159,680**
Total T-Hangar Area (S.F.)	42,000	63,000	71,400	81,200	78,000
Total Common/Corporate Area (S.F.)	46,880	56,240	59,600	70,640	81,680

Item	Existing	2006	2011	2016	2021
Annual Aircraft Operations	20,600	26,000	29,600	34,000	38,500
Average Monthly Operations	1,717	2,167	2,467	2,833	3,208
Percent Annual Jet/Turbine Operations	8.2%	8.2%	8.2%	8.2%	8.2%
Annual Jet/Turbine Operations	1,689	2,132	2,427	2,788	3,157
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	40.0%	40.0%	35.0%	30.0%	30.0%
Percent Jet A "Domicile" Fueling	60.0%	60.0%	65.0%	70.0%	70.0%
Yearly JET A Demand (gallons)	**102,163**	**138,154**	**165,656**	**184,426**	**218,780**
Monthly JET A Demand (gallons)	**8,514**	**11,513**	**13,805**	**15,369**	**18,232**
Percent Piston Operations	85.5%	84.8%	83.0%	82.0%	80.0%
Annual Piston Operations	17,613	22,048	24,568	27,880	30,800
Average Flight Distance (NM)	192	195	200	205	210
Average Flight Hour Per Operation	1.6	1.6	1.7	1.8	2.0
Average Gallons/Operation - AVGAS	12.0	13.0	14.0	14.5	15.0
Percent "Itinerant" Fueling	40.0%	40.0%	40.0%	40.0%	40.0%
Percent "Domicile Airport" Fueling	60.0%	60.0%	60.0%	60.0%	60.0%
Yearly AVGAS Demand	**50,725**	**68,790**	**82,548**	**97,022**	**110,880**
Monthly AVGAS Demand	**4,227**	**5,732**	**6,879**	**8,085**	**9,240**
Total Monthly Fuel Storage (gallons)	**12,741**	**17,245**	**20,684**	**23,454**	**27,472**
Total Yearly Fuel (gallons)	**152,888**	**206,943**	**248,205**	**281,449**	**329,660**

Calculation Notes:

Normal fueling at the domicile airport occurs 50-70% of the time.
Passenger Per Aircraft Operation Ration is derived from survey and typical general aviation data.
Average Passenger/Operation ratio is between 1.5 and 2.2 for non-air taxi general aviation airports.
Average Passenger/Operation ratio is between 2.2 and 3.7 for non-air taxi general aviation airports.
Average parking space factor for general aviation airports is between 0.9 and 1.2.

APPENDIX E

STATE OF MISSOURI

Bob Holden, Governor • Stephen M. Mahfood, Director

DEPARTMENT OF NATURAL RESOURCES

May 20, 2002

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

Re: **SHPO Project Number: 008-LC-02** - Proposed expansion of Floyd W. Jones – Lebanon Airport in Laclede County, Missouri (FAA)

Dear Mr. Crain:

Thank you for submitting information concerning 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 historic properties.

After reviewing the information provided, staff of the State Historic Preservation Office has determined that there is medium to high probability for archaeological sites in the project area. Therefore, the project area should undergo an archaeological survey prior to the initiation of project-related activities. Please be sure to include an architectural survey of all structures in the proposed project limits and adjacent to the project limits.

A list of independent archaeological contractors and architectural historians who can perform such services is available from the Department of Natural Resources' General Services Program. The list can be obtained by calling (573) 522-5492 and requesting the "archaeological contractors list" and the "architectural historians list." Note that any 36 CFR 61 qualified archaeologist or architectural historian may perform such a survey. If you chose a contractor not on the list, please be certain to include his or her curriculum vitae in the report.

The State Historic Preservation Office would appreciate two (2) copies of the final cultural resource assessment so that we may complete the review and comment process.

If you have any questions or additional information that would affect our request for a survey, please write or call Brant Vollman at (573) 526 - 1680 and refer to **SHPO Project Number: 008-LC-02**. If the information is provided via telephone call, please follow up in writing for our files.

Sincerely,

STATE HISTORIC PRESERVATION OFFICE

Claire F. Blackwell
Director and Deputy State
Historic Preservation Officer

CFB:bv

c: Mark Schenkelberg

May 1, 2002

REC'D MAY 0 7 2002

RECEIVED

MAY 15 2002

BUCHER, WILLIS & RATLIFF CORPORATION
KANSAS CITY, MO

Mr. Rick L. Hansen
Field Supervisor
U.S. Department of Interior
U.S. Fish and Wildlife Service
608 East Cherry Street
Columbia, Missouri 65201

Re: Floyd W. Jones - Lebanon Airport Environmental Coordination Letter
BWR Job Number: 2001-349

Dear Mr. Hansen:

An Environmental Review, based on MoDOT – Aviation Section checklist, is being prepared for the City of Lebanon as part of an Airport Master Plan Update for the Floyd W. Jones - Lebanon Airport (located within the city limits of Lebanon, Missouri). To further assess the preferred site alternative and evaluate the proposed airport improvements, environmental coordination is being assembled based on ultimate planned development as depicted by the enclosed airport drawings and most recent USGS map information. The major project development tasks include:

- Acquisition of additional land for airport expansion (approximately 77 Acres)
- Expansion of terminal area (parking apron and hangars).
- Earthwork (fill) of approximately 1,175,360 C.Y.
- Extension of the runway 2,150 feet to the south and increase pavement width from 75 feet to 100 feet for ultimate runway dimension of 6,500' x 100'.
- Construction of new full-parallel taxiway, offset 300 feet to the east.
- Clear trees and brush (14 acres).
- Relocation of a sewage lift station at least 250 feet east from existing site.
- Mitigation of four ponds within the ultimate property boundary of the airport.
- Installation of additional aircraft fuel storage tank (6,000 gal.).
- Re-alignment of Fremont Road, west of Missouri Highway 5.

A reply with an assessment of your position on compliance and permitting requirements would be appreciated within thirty (30) calendar days, or an interim reply stating your *expected* position. All responses and associated documentation will be appreciated, and addressed accordingly.

Should you have any questions, please feel free to call me (816) 363-2696. Thank your for your assistance.

Sincerely,

BUCHER, WILLIS & RATLIFF CORPORATION

Robert W. Crain
Airport Planner

RWC
Enclosures

The U.S. Fish and Wildlife Service has reviewed the subject project proposal and determined that no federally listed species or designated critical habitat occurs within the project area; consequently, this concludes Section 7 consultation and no further review of this project is necessary.

Field Supervisor — Date 5/9/02

STATE OF MISSOURI
Bob Holden, Governor • Stephen M. Mahfood, Director
DEPARTMENT OF NATURAL RESOURCES
www.dnr.state.mo.us

June 18, 2002

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

RE: Lebanon Airport

Dear Mr. Crain:

Thank you for your letter regarding the Lebanon Airport master plan update. From the information received from your office, it appears that a Section 404 permit and its associated Section 401 Water Quality Certification may be required for the proposed activities. A permit and certification will be required if there is to be any fill placed in the three intermittent tributaries that appear in the map entitled "Alternative B option 3." A more detailed review of the project will occur after application for the 401/404 permits if needed. The Kansas City District of the Army Corps of Engineers should be contacted to determine if any jurisdictional waters, including wetlands, would be impacted.

Thank you again for coordinating on this matter. If there are any questions, please contact me at (573) 522-2741, e-mail at nrhamis@dnr.state.mo.us, or send to Mr. Scott Hamilton, Missouri Department of Natural Resources, Water Pollution Control Program, P.O. Box 176, Jefferson City, MO 65102-0176.

Sincerely,

WATER POLLUTION CONTROL PROGRAM

Scott Hamilton
Environmental Specialist III
Planning Section

SH:pc

Integrity and excellence in all we do

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)

JERRY M. CONLEY, Director

June 6, 2002

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

Dear Mr. Crain:

Re: Floyd W. Jones – Lebanon Airport Environmental Coordination Letter
BWR Job Number: 2001-349

Thank you for your letter of May 1, 2002, 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.

Please note that the Lebanon Office of the Missouri Department of Conservation is located on the east side of Highway 5 just across from the airport.

Thank you for the opportunity to review and comment.

Sincerely,

Mary Lyon

MARY LYON
POLICY ANALYST

ML:dcl

LEBANON
MISSOURI
Friendly people. Friendly place.

Stanley H. Allen
Mayor

Scott L. Shumate
City Administrator

May 28, 2002

Mr. Brian C. Weiler, A.A.E.
Administrator of Aviation
Multimodal Operations Division
Missouri Department of Transportation
105 East Capitol Avenue
PO Box 270
Jefferson City MO 65102

RE: LAND USE COMPATIBILITY ASSURANCE LETTER
CITY OF LEBANON, MISSOURI

Dear Mr. Weiler:

The City of Lebanon, Missouri, makes the following statement of compatible land use assurance as required by Section 511(a)(b) of the Airport and Airway Improvement Act of 1982.

The City of Lebanon provides assurance that appropriate action will be taken, to the extent reasonable by State law, to encourage the compatible use of land adjacent to or in the immediate vicinity of the Floyd W. Jones-Lebanon Airport to activities and purposes compatible with normal airport operations, including the landing and departure of aircraft. This action includes the consideration of both existing and planned land uses. In addition, we will encourage and support other jurisdictions in the area in their efforts to do the same.

If the Missouri Department of Transportation (MoDOT) Aviation Section has any further questions regarding this matter, please contact me.

Sincerely,

Joseph W. Knapp
Assistant City Administrator

The foregoing instrument was acknowledged before me on the 29th day of May 2002.

Katherine D. Hilton

KATHERINE D. HILTON
Notary Public - Notary Seal
STATE OF MISSOURI
Laclede County
My Commission Expires Nov. 7, 2005

P.O. Box 111 • Lebanon, Missouri 65536
phone: 417-532-2156 • fax: 417-532-8388 • e-mail: lebanon@llion.org

Missouri Department of Transportation

MoDOT

Dale L Ricks, District Engineer

Springfield Area District
3025 East Kearney Street
M.O. Box 868
Springfield, MO 65801
(417) 895-7600
Fax (417) 895-7610
www.modot.state.mo.us
Toll free 1-888 ASK MoDOT

May 24, 2002

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

Re: Floyd W. Jones – Lebanon Airport Environmental Coordination Letter
BWR Job Number: 2001-349

Dear Mr. Crain:

We have reviewed the proposed improvements to the Lebanon airport and offer the following comments:

1. Realignment of Fremont Road will impact utilities, particularly sanitary sewer. The lift station should not be located on state right-of-way.
2. If airport improvements will result in a significant increase in stormwater drainage onto state right-of-way, MoDOT – District 8 requests the opportunity to review a stormwater drainage report and plans for appropriate stormwater improvements.

We have no other comments at this time. Please contact me if you have any questions.

Sincerely,

Frank Miller

Frank O. Miller, AICP
Senior Transportation Planner

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Copy: Dale Ricks
Christopher Haller
Becky Baltz
Brian Weiler
Bill Ray
Leo Cologna
Gary Bass
Bill Steininger

J:\millerf\Local Miscellaneous\Laclede\Lebanon EA Review Letter 05.24.02.doc

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

(To be completed by Federal Agency)	Date Of Land Evaluation Request 5/28/02
Name Of Project Floyd W. Jones - Lebanon Airport	Federal Agency Involved FAA/MoDOT - Aviation Section
Proposed Land Use Aeronautical Purposes	County And State Laclede County, 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 ☒	No ☐	Acres Irrigated	Average Farm Size

Major Crop(s)	Farmable Land In Govt. Jurisdiction	Amount Of Farmland As Defined in FPPA
PASTURE	Acres: 250289 % 71	Acres: 187690 %53
Name Of Land Evaluation System Used	Name Of Local Site Assessment System	Date Land Evaluation Returned By NRCS
LESA	LACLEDE County	6-6-02

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	41.0			
B. Total Acres To Be Converted Indirectly	36.0			
C. Total Acres In Site	77.0	0.0	0.0	0.0
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	0			
B. Total Acres Statewide And Local Important Farmland	72			
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted	.001			
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value	87			
PART V *(To be completed by NRCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*	45	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	5			
3. Percent Of Site Being Farmed	20	0			
4. Protection Provided By State And Local Government	20	0			
5. Distance From Urban Builtup Area	0	5			
6. Distance To Urban Support Services	0	0			
7. Size Of Present Farm Unit Compared To Average	10	0			
8. Creation Of Nonfarmable Farmland	25	0			
9. Availability Of Farm Support Services	5	4			
10. On-Farm Investments	20	15			
11. Effects Of Conversion On Farm Support Services	25	0			
12. Compatibility With Existing Agricultural Use	10	6			
TOTAL SITE ASSESSMENT POINTS	160	47	0	0	0
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100	45	0	0	0
Total Site Assessment *(From Part VI above or a local site assessment)*	160	47	0	0	0
TOTAL POINTS *(Total of above 2 lines)*	260	92	0	0	0

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ☐ No ☒

Reason For Selection:

See Instructions on reverse side)

Form AD-1006 (10-83)

This form was electronically produced by National Production Services Staff

APPENDIX F

CATEGORICAL EXCLUSION CHECKLIST

The information you provide below will assist the MoDOT in making its determination as to whether a categorical exclusion is appropriate or an EA is required for your proposed project. Please fill in your airport name, a brief project description, and which categorical exclusion would apply to your project. Then, if appropriate, place a check mark or an "o.k." in each blank next to the numbered items, and any subparagraphs that apply, to indicate that you have properly addressed each issue. If you cannot check "ok" then that may indicate the need to prepare an EA, so you should provide a brief explanation of the circumstances so that we can evaluate the issue further. Please note that items 1, 5, and 10 require consultation with agencies with jurisdiction over those resources.

AIRPORT NAME: Floyd W. Jones - Lebanon Airport

PROJECT DESCRIPTION:

Environmental Review

CONSIDERATION OF EXTRAORDINARY CIRCUMSTANCES

x 1. **NATIONAL HISTORIC PRESERVATION ACT OF 1966 AND ARCHAEOLOGICAL AND HISTORIC PRESERVATION ACT OF 1974** requirements have been met, as evidenced by the following:

_____ a. The project will not destroy or disrupt significant scientific, prehistoric, historic, or archaeologic data; and

_____ b. The project will not impact any property that is listed or eligible for the National Register of Historic Places; and

_____ c. **Correspondence from the State Historic Preservation Officer (attached)** demonstrates that the proposed action is not likely to have an effect on historic or archaeologic resources.

> 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. Therefore, the project area should undergo an archaeological survey prior to the initiation of project-related activities."*

x 2. **SECTION 4(F) OF DOT ACT**: The project will not use Section 4(f) lands.

x 3. **FARMLANDS:** The proposed project will not involve acquisition and conversion of farmland scoring over 160 on Form AD-1006 and protected under the FPPA to nonagricultural use through Federal financial assistance, because:

_____ a. no land acquisition is included in this proposed project, or

✓b. the proposed project involves land acquisition, and

a **Farmland Conversion Impact Rating** was submitted to the **United States Department of Agriculture, Natural Resources Conservation Service** to determine the impact rating for the proposed airport alternative. Calculations of the *Relative Value of Farmland to be Converted* totaled **45** out of **100**, and *Total Site Assessment* totaled **47** out of **160**. The cumulative value of the **Farmland Conversion Impact Rating** was **92** out of **260**.

x 4. **ENVIRONMENTAL CONTROVERSY:** The proposed project is not highly controversial on environmental grounds. Opposition on environmental grounds has not been received from Federal, state or local governmental agencies, or by a substantial number of persons affected by the proposed action.

x 5. **NATURAL ENVIRONMENT:** The proposed project will not have a significant impact on natural, ecological, cultural or scenic resources of national, state, or local significance.

Correspondence from the **U.S. Fish and Wildlife Service** indicated that *"no federally listed species or designated critical habitat occurs within the project area...and no further review of this project is necessary."* A letter 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...referenced site. 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."* The use of wetland and soil maps as well as an on-site inspection should be considered to insure there are no unnecessary impacts to sensitive species or communities.

x 6. **RELOCATION HOUSING:** The proposed project is not highly controversial with respect to the availability of adequate relocation housing, because:

✓ a. the proposed project will not require relocations; or

_____ b. the proposed project will require relocations, but adequate relocation housing is available.

x 7. **COMMUNITY DISRUPTION:** The project will not: (1) cause substantial division or disruption of an established community; (2) disrupt orderly, planned development; or (3) cause a significant increase in surface traffic congestion.

The City of Lebanon has submitted a Letter of Assurance (attached in Appendix) as required by Section 511(s)(5) of the *Airport and Airway Improvement Act of 1982*, to emphasize their commitment towards encouraging the continuation of compatible land use in the area around the airport.

x 8. **NOISE:** The proposed project will not have a significant impact on noise levels of noise sensitive areas.

x 9. **AIR QUALITY:** The project will not have a significant impact on air quality or violate the local, state, or Federal standards for air quality.

The threshold that prompts an air analysis is 180,000 annual operations, as outlined in FAA Order 5050.4A. Since the forecast of expected activity at the Lebanon Airport is only 38,500 operations by the end of the 20-year planning period, an air quality analysis is not required.

____ 10. **WATER QUALITY** requirements have been met, as the proposed project will not have a significant impact on water quality or contaminate a public water supply system. **Correspondence from the Corps of Engineers (attached)** indicates that the proposed action will not be in or affect any wetlands, or require a Section 404 Permit under the Clean Water Act.

A response has not yet been received by the Corps of Engineers within the 30-day window; therefore, it is anticipated that the project does not affect *Section 404 of the Clean Water Act.*

x 11. **CONSISTENCY:** The proposed project will not be inconsistent with any Federal, state, or local law or administrative determination relating to the environment. The project will not be inconsistent with community plans.

x 12. **CUMULATIVE IMPACTS CONSIDERATIONS:** The overall cumulative impact of the proposed action and the consequences of subsequent related actions have been considered, and are not considered to be collectively significant.

I certify, to the best of my knowledge, that the information provided above demonstrates that the proposed project is not covered by any of the items in paragraphs 24 or 26 of FAA Order 5050.4A, and that there is no information that indicates the need to prepare an environmental assessment for the proposed actions which are otherwise excluded.

Signature: Robert W. Crain Date: 10/14/03

Robert W. Crain, Airport Planner
Typed Name and Title

APPENDIX G

FLOYD W. JONES - LEBANON AIRPORT
0-5 YEAR DEVELOPMENT (PHASE I)
ESTIMATED PROJECT COSTS AND FUNDING SOURCES

Project Description	Unit	Quantity	Unit Cost	Local Cost	MoDOT/FAA Cost	Total Cost (100%)
PHASE I - LAND ACQUISITION						
None						
Subtotal Project Cost				$0	$0	$0
Engineering, Administrative & Legal Costs (25%)				$0	$0	$0
TOTAL PHASE I - LAND ACQUISITION				**$0**	**$0**	**$0**
PHASE I - RUNWAY AND TAXIWAY						
Convert Closed Runway 9-27 to Taxiway "C" (1,970' x 35'; 12,500 lbs DWG)						
Pavement Removal / Base Course	S.Y.	14,370	$2.50	$3,593	$32,333	$35,926
Pavement Edge Saw Cut (Full Depth)	L.F.	60	$3.50	$21	$189	$210
Pavement Marking	L.F.	1,970	$1.00	$197	$1,773	$1,970
Seeding and Miscellaneous	L.S.	1	$2,500	$250	$2,250	$2,500
						$40,606
Construct Full-Parallel Taxiway System (4,352' x 35'; 54,000 lbs DWG) and Connectors (Total 21,830 S.Y.)						
Mobilization	L.S.	1	$30,000	$3,000	$27,000	$30,000
Temporary Markings, Barricades and Lighting	L.S.	1	$5,000	$500	$4,500	$5,000
Earthwork / Excavation	C.Y.	15,900	$4.00	$6,360	$57,240	$63,600
Pavement Removal / Base Course	S.Y.	12,340	$4.00	$4,936	$44,424	$49,360
Pavement Edge Saw Cut (Full Depth)	L.F.	1,000	$3.50	$350	$3,150	$3,500
Lime Treated Subgrade (9")	S.Y.	21,830	$2.25	$4,912	$44,206	$49,118
Crushed Aggregate Base Course (10")	S.Y.	21,830	$7.00	$15,281	$137,529	$152,810
Bituminous Prime Coat	Gallons	12,440	$1.25	$1,555	$13,995	$15,550
Bituminous Tack Coat	Gallons	3,740	$1.25	$468	$4,208	$4,675
Bituminous Surface Course (8")	Tons	8,680	$35.00	$30,380	$273,420	$303,800
Pavement Marking	L.F.	6,700	$1.25	$838	$7,538	$8,375
Install Taxiway / Runway Signs	Each	8	$2,800	$2,240	$20,160	$22,400
Install Taxiway Reflectors	Each	70	$18.00	$126	$1,134	$1,260
MITL Installation on Taxiway Radius						
Trench & cable	L.F.	200	$3.25	$65	$585	$650
MITL Fixtures - Taxiway Radius	Each	16	$400	$640	$5,760	$6,400
Vault and Regulator Work	L.S.	1	$3,000	$300	$2,700	$3,000
Seeding and Miscellaneous	L.S.	1	$5,000	$500	$4,500	$5,000
						$724,498
Grade / Pave Connector Taxiway to Private Hangar (1,197 S.Y.; 30,000 SWG)						
Mobilization	L.S.	1	$20,000	$2,000	$18,000	$20,000
Temporary Markings, Barricades and Lighting	L.S.	1	$5,000	$500	$4,500	$5,000
Pavement Edge Saw Cut (Full Depth)	L.F.	120	$3.50	$42	$378	$420
Earthwork / Excavation	C.Y.	765	$4.00	$306	$2,754	$3,060
Lime Treated Subgrade (9")	S.Y.	1,197	$2.25	$269	$2,424	$2,693
Crushed Aggregate Base Course (10")	S.Y.	1,197	$7.00	$838	$7,541	$8,379
Bituminous Prime Coat	Gallons	600	$1.25	$75	$675	$750
Bituminous Tack Coat	Gallons	180	$1.25	$23	$203	$225
Bituminous Surface Course (6")	Tons	420	$35.00	$1,470	$13,230	$14,700
Pavement Marking	L.F.	160	$1.00	$16	$144	$160
Seeding and Miscellaneous	L.S.	1	$1,500	$150	$1,350	$1,500
						$56,887
Install "Deer-Proof" Fencing (8 Foot) Along Airport Perimeter Including Access Gates						
Install "Deer Proof" Fencing - (8')	L.F.	16,589	$9.00	$14,930	$134,371	$149,301
Install Hangar Access Security Gates	Each	2	$10,000	$2,000	$18,000	$20,000
Install Airside (Aircraft) Access Security Gate	Each	1	$15,000	$1,500	$13,500	$15,000
						$184,301
Install Taxiway Hold Position and Directional Identification Signs for Runway 18-36						
Directional / Guidance Signs	Each	10	$3,500	$3,500	$31,500	$35,000
Trench / Wiring / Cable Duct	L.F.	5,700	$3.00	$1,710	$15,390	$17,100
Vault Work	Each	1	$2,500	$250	$2,250	$2,500
						$54,600
Subtotal Project Cost				$106,089	$954,803	$1,060,892
Contingency Engineering, Legal, & Administrative Costs (25%)				$53,045	$477,401	$265,223
TOTAL PHASE I - RUNWAY AND TAXIWAY				**$159,134**	**$1,432,204**	**$1,326,115**

PHASE I - TERMINAL AREA

Install Aircraft Parking Apron Security Lighting						
Install Aircraft Parking Apron Lights	L.S.	6	$2,000	$1,200	$10,800	$12,000
						$12,000
Grade / Pave Aircraft Parking Apron and Hangar Taxilane (13,775 S.Y.) - 12,500 lbs DWG						
Mobilization	L.S.	1	$10,000	$1,000	$9,000	$10,000
Earthwork / Excavation	C.Y.	8,800	$4.00	$3,520	$31,680	$35,200
Lime Treated Subgrade (9")	S.Y.	13,775	$2.25	$3,099	$27,894	$30,994
Crushed Aggregate Base Course (10")	S.Y.	13,775	$7.00	$9,643	$86,783	$96,425
Bituminous Prime Coat	Gallons	6,890	$1.25	$861	$7,751	$8,613
Bituminous Tack Coat	Gallons	2,070	$1.25	$259	$2,329	$2,588
Bituminous Surface Course (4")	Tons	3,200	$35.00	$11,200	$100,800	$112,000
Pavement Marking	L.F.	1,000	$1.25	$125	$1,125	$1,250
Seeding and Miscellaneous	L.S.	1	$5,000	$500	$4,500	$5,000
						$302,069
Construct 8-Unit Nested T-Hangar (12,150 S.F.) and Hangar Pad (1,350 S.Y.)						
Earthwork / Excavation	C.Y.	338	$4.00	$1,352	$0	$1,352
Lime Treated Subgrade (9")	S.Y.	1,350	$2.25	$3,038	$0	$3,038
Crushed Aggregate Base Course (5")	S.Y.	1,350	$5.50	$7,425	$0	$7,425
Construct Concrete Hangar Pad (4")	S.Y.	1,350	$42.00	$56,700	$0	$56,700
Construct 8-Unit T-Hangar	S.F.	12,150	$18.00	$218,700	$0	$218,700
Utility Hookup / Activation	L.S.	1	$1,200	$1,200	$0	$1,200
						$288,415

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

Construct 10-Unit Nested T-Hangar (14,850 S.F.) and Hangar Pad (1,650 S.Y.)						
Earthwork / Excavation	C.Y.	413	$4.00	$1,652	$0	$1,652
Lime Treated Subgrade (9")	S.Y.	1,650	$2.25	$3,713	$0	$3,713
Crushed Aggregate Base Course (5")	S.Y.	1,650	$5.50	$9,075	$0	$9,075
Construct Concrete Hangar Pad (4")	S.Y.	1,650	$42.00	$69,300	$0	$69,300
Construct 8-Unit T-Hangar	S.F.	14,850	$18.00	$267,300	$0	$267,300
Utility Hookup / Activation	L.S.	1	$1,200	$1,200	$0	$1,200
						$352,240

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

Grade / Pave Auto Access and Parking (2,030 S.Y.)						
Earthwork / Excavation	C.Y.	565	$4.00	$2,260	$0	$2,260
Lime Treated Subgrade (9")	S.Y.	2,030	$2.25	$4,568	$0	$4,568
Crushed aggregate base course (6")	S.Y.	2,030	$5.50	$11,165	$0	$11,165
Bituminous Prime Coat	Gallons	1,020	$1.25	$1,275	$0	$1,275
Bituminous Tack Coat	Gallons	300	$1.25	$375	$0	$375
Bituminous Surface Course (4")	Tons	472	$35.00	$16,520	$0	$16,520
Install Auto Lighting	Each	3	$2,500	$7,500	$0	$7,500
Pavement Marking	L.F.	200	$1.00	$200	$0	$200
Seeding and Miscellaneous	L.S.	1	$1,500	$1,500	$0	$1,500
						$45,363

Note: Auto access and parking financing assumed through conventional methods using local funds.

Grade / Pave Aircraft Taxilane andTaxiway Access Connector (7,953 S.Y.) - 54,000 lbs DWG						
Mobilization	L.S.	1	$10,000	$1,000	$9,000	$10,000
Earthwork / Excavation	C.Y.	9,000	$4.00	$3,600	$32,400	$36,000
Lime Treated Subgrade (9")	S.Y.	7,953	$2.25	$1,789	$16,105	$17,894
Crushed Aggregate Base Course (10")	S.Y.	7,953	$7.00	$5,567	$50,104	$55,671
Bituminous Prime Coat	Gallons	3,980	$1.25	$498	$4,478	$4,975
Bituminous Tack Coat	Gallons	1,200	$1.25	$150	$1,350	$1,500
Bituminous Surface Course (6")	Tons	2,774	$35.00	$9,709	$87,381	$97,090
Pavement Marking	L.F.	1,400	$1.25	$175	$1,575	$1,750
Seeding and Miscellaneous	L.S.	1	$1,500	$150	$1,350	$1,500
						$226,380
Rehabilitate Common Hangar Access Taxiways and Approaches (4,797 S.Y.) - 54,000 lbs DWG						
Mobilization	L.S.	1	$10,000	$2,000	$8,000	$10,000
Crack seal	S.Y.	650	$1.25	$163	$650	$813
Bituminous Tack Coat	Gallons	720	$1.25	$180	$720	$900
Bituminous Surface Course (2")	Tons	560	$35.00	$3,920	$15,680	$19,600
Pavement Marking	L.F.	1,350	$1.50	$405	$1,620	$2,025
Seeding and Miscellaneous	L.S.	1	$1,500	$300	$1,200	$1,500
						$34,838

Note: Taxiway rehabilitation project eligible for State Maintenance Program using 80% State / 20% local funding.

Construct Common Hangar (10,000 S.F.) and Hangar Pad (1,111 S.Y.)						
Mobilization	L.S.	1	$20,000	$20,000	$0	$20,000
Demolish and remove 4-unit T-hangar	L.S.	1	$10,000	$10,000	$0	$10,000
Earthwork / Excavation	C.Y.	493	$4.00	$1,972	$0	$1,972
Lime Treated Subgrade (9")	S.Y.	1,111	$2.25	$2,500	$0	$2,500
Crushed Aggregate Base Course (5")	S.Y.	1,111	$5.50	$6,111	$0	$6,111
P.C.C. (4")	S.Y.	1,111	$42.00	$46,662	$0	$46,662
Construct Common Hangar	S.F.	10,000	$25.00	$250,000	$0	$250,000
Utility Hookup / Activation	L.S.	1	$1,200.0	$1,200	$0	$1,200
						$338,444

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

Construct Common Hangar (10,000 S.F.) and Hangar Pad (1,111 S.Y.)						
Mobilization	L.S.	1	$20,000	$20,000	$0	$20,000
Demolish and remove 4-unit T-hangar	L.S.	1	$10,000	$10,000	$0	$10,000
Earthwork / Excavation	C.Y.	493	$4.00	$1,972	$0	$1,972
Lime Treated Subgrade (9")	S.Y.	1,111	$2.25	$2,500	$0	$2,500
Crushed Aggregate Base Course (5")	S.Y.	1,111	$5.50	$6,111	$0	$6,111
P.C.C. (4")	S.Y.	1,111	$42.00	$46,662	$0	$46,662
Construct Common Hangar	S.F.	10,000	$22.00	$220,000	$0	$220,000
Utility Hookup / Activation	L.S.	1	$1,200.0	$1,200	$0	$1,200
						$308,444

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

Grade / Pave Common Hangar and Aircraft Parking Apron (3,280 S.Y.)						
Mobilization	L.S.	1	$10,000	$1,000	$9,000	$10,000
Earthwork / Excavation	C.Y.	2,277	$4.00	$911	$8,197	$9,108
Lime Treated Subgrade (9")	S.Y.	3,280	$2.25	$738	$6,642	$7,380
Crushed Aggregate Base Course (8")	S.Y.	3,280	$5.50	$1,804	$16,236	$18,040
P.C.C. (4")	S.Y.	3,280	$42.00	$13,776	$123,984	$137,760
Pavement Marking	L.F.	300.00	$1.00	$30	$270	$300
Install tie-downs	Each	3	$150	$45	$405	$450
Seeding and Miscellaneous	L.S.	1	$1,500	$150	$1,350	$1,500
						$184,538

Subtotal Project Cost	$1,412,371	$680,358	$2,092,730
Engineering, Administrative & Legal Costs (25%)	$353,093	$170,090	$523,182
TOTAL PHASE I - TERMINAL AREA	**$1,765,464**	**$850,448**	**$2,615,912**

PHASE I - OTHER PROJECTS

Install 12,000 Gallon Above-Ground Jet-A Fuel Tank						
Install 12,000 Gallon Above-Ground Jet-A Fuel Tar	L.S.	1	$53,000	$53,000	$0	$53,000
Fencing	L.F.	80	$5.00	$400	$0	$400
						$53,400
Install Segmented Circle and Lighted Wind Cone						
Install Segmented Circle and Lighted Wind Cone	L.S.	1	$5,000	$500	$4,500	$5,000
						$5,000
Conduct Environmental Assessment for Future Runway and Taxiway Extension (Phase II)						
Study	L.S.	1	$40,000	$4,000	$36,000	$40,000
						$40,000

PHASE I - OTHER NON-CAPITAL PROJECTS

Adopt "Airport Height and Hazard Zoning" Based on Most Recent FAR Part 77 Airspace Drawing
Implement Fuel Spill Prevention Plan with Appropriate Local and State Agencies

Subtotal Project Cost	$57,900	$40,500	$98,400
Engineering, Administrative & Legal Costs (25%)	$14,475	$10,125	$24,600
TOTAL PHASE I - OTHER	**$72,375**	**$50,625**	**$123,000**

Subtotal Project Cost	$1,576,360	$1,675,661	$3,252,021
Engineering, Administrative & Legal Costs (25%)	$394,090	$418,915	$813,005
TOTAL PHASE I DEVELOPMENT	**$1,970,450**	**$2,094,576**	**$4,065,027**

FLOYD W. JONES - LEBANON 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 A - (fee simple)	Acres	4	$4,000	$1,680	$15,120	$16,800
Tract C - (fee simple)	Acres	12	$4,000	$4,960	$44,640	$49,600
Tract D - (fee simple)	Acres	6	$4,000	$2,560	$23,040	$25,600
Tract E - (fee simple)	Acres	6	$4,000	$2,480	$22,320	$24,800
Tract F - (fee simple)	Acres	3	$4,000	$1,280	$11,520	$12,800
Tract G - (fee simple)	Acres	3	$4,000	$1,240	$11,160	$12,400
Tract H - (fee simple)	Acres	13	$4,000	$5,080	$45,720	$50,800
Tract I - (fee simple)	Acres	4	$4,000	$1,520	$13,680	$15,200
Tract J - (fee simple)	Acres	4	$4,000	$1,560	$14,040	$15,600
Tract K - (fee simple)	Acres	3	$4,000	$1,320	$11,880	$13,200
Tract L - (avigation easement)	Acres	1	$800	$104	$936	$1,040
Tract O - (avigation easement)	Acres	1	$800	$40	$360	$400
Tract N1 - (avigation easement)	Acres	2	$800	$176	$1,584	$1,760
Tract N2 - (avigation easement)	Acres	3	$800	$200	$1,800	$2,000
Subtotal Project Cost				$24,200	$217,800	$242,000
Engineering, Administrative & Legal Costs (25%)				$6,050	$54,450	$60,500
TOTAL PHASE II - LAND ACQUISITION				**$30,250**	**$272,250**	**$302,500**
PHASE II - RUNWAY AND TAXIWAY						
RUNWAY 18-36 IMPROVEMENTS:						
Earthwork / Excavation						
Earthwork / Excavation	C.Y.	1,011,070	$4.00	$404,428	$3,639,852	$4,044,280
Note: Earthwork calculation includes runway and taxiway						
Widen Runway 18-36 to 100 Feet						
Mobilization	L.S.	1	$50,000	$5,000	$45,000	$50,000
Temporary Markings, Barricades and Lighting	L.S.	1	$10,000	$1,000	$9,000	$10,000
Clearing and Grubbing	Acre	10	$1,500	$1,500	$13,500	$15,000
Remove Fencing	L.F.	5,000	$1.50	$750	$6,750	$7,500
Pavement Edge Saw Cut (Full Depth)	L.F.	8,780	$3.50	$3,073	$27,657	$30,730
Lime Treated Subgrade (9")	S.Y.	4,835	$2.25	$1,088	$9,791	$10,879
Crushed Aggregate Base Course (10")	S.Y.	4,835	$7.00	$3,385	$30,461	$33,845
Bituminous Prime Coat	Gallons	2,420	$1.25	$303	$2,723	$3,025
Bituminous Tack Coat	Gallons	725	$1.25	$91	$816	$906
Bituminous Surface Course (4")	Tons	1,124	$35.00	$3,934	$35,406	$39,340
Extend Runway 18-36 to 5,500' x 100'						
Pavement Edge Saw Cut (Full Depth)	L.F.	100	$3.50	$35	$315	$350
Lime Treated Subgrade (9")	S.Y.	12,825	$2.25	$2,886	$25,971	$28,856
Crushed Aggregate Base Course (10")	S.Y.	12,825	$7.00	$8,978	$80,798	$89,775
Bituminous Prime Coat	Gallons	6,410	$1.25	$801	$7,211	$8,013
Bituminous Tack Coat	Gallons	1,925	$1.25	$241	$2,166	$2,406
Bituminous Surface Course (4")	Tons	2,980	$35.00	$10,430	$93,870	$104,300
Overlay Runway 18-36 (5,500' x 100'; 54,000 lbs DWG)						
Clean and Seal Cracks & Joints.	L.F.	15,000	$4.00	$6,000	$54,000	$60,000
Pavement Marking Removal	L.F.		$0.50	$0	$0	$0
Bituminous Tack Coat	Gallons	9,180	$1.25	$1,148	$10,328	$11,475
Bituminous Surface Course (2")	Tons	7,115	$35.00	$24,903	$224,123	$249,025
Pavement Marking	L.F.	5,500	$1.75	$963	$8,663	$9,625
Remove Old Runway and Taxiway Pavement from North Side						
Pavement Removal	S.Y.	8,312	$45.00	$37,404	$336,636	$374,040
Seeding and Miscellaneous	L.S.	1	$1,500	$150	$1,350	$1,500
Extend Parallel Taxiway to 5,500' x 35'; 54,000 lbs DWG)						
Sawcut Pavement - Full Length, Each Side	L.F.	35	$3.50	$12	$110	$123
Lime Treated Subgrade (9")	S.Y.	5,585	$2.25	$1,257	$11,310	$12,566
Crushed Aggregate Base Course (10")	S.Y.	5,585	$7.00	$3,910	$35,186	$39,095
Bituminous Prime Coat	Gallons	2,800	$1.25	$350	$3,150	$3,500
Bituminous Tack Coat	Gallons	840	$1.25	$105	$945	$1,050
Bituminous Surface Course (6")	Tons	1,950	$35.00	$6,825	$61,425	$68,250
Pavement Marking	L.F.	1,150	$1.25	$144	$1,294	$1,438
Install Taxiway Reflectors	Each	23	$18.00	$41	$373	$414
Directional / Guidance Signs	Each	2	$3,500	$700	$6,300	$7,000
Trench / Wiring / Cable Duct	L.F.	1,100	$3.00	$330	$2,970	$3,300
Seeding and Miscellaneous	L.S.	1	$1,500	$150	$1,350	$1,500
						$5,323,105

Re-Locate Sewage Lift Station						
Re-Locate Sewage Lift Station	L.S.	1	$40,000	$4,000	$36,000	$40,000
						$40,000
Encase Sewage Collection System (2,000 L.F.)						
Sewer Pipe	L.F.	2,000	$85.00	$17,000	$153,000	$170,000
						$170,000
Reroute 6" and 12" Water Distribution System (1,000 L.F.)						
Water Pipe - 6"	L.F.	1,000	$80.00	$8,000	$72,000	$80,000
Water Pipe - 12"	L.F.	1,000	$85.00	$8,500	$76,500	$85,000
						$165,000
Reroute Two City-Owned, Underground Power Distribution Lines (6,600 L.F.)						
Powerline - Above Ground	L.F.	5,600	$10.00	$5,600	$50,400	$56,000
Powerline - Under Ground	L.F.	1,000	$15.00	$1,500	$13,500	$15,000
						$71,000
Bury City-Owned Overhead Powerline (1,000 ft)						
Powerline - Under Ground	L.F.	1,000	$15.00	$1,500	$13,500	$15,000
						$15,000
Re-route County-Owned Overhead / Underground Powerline (6,600 ft)						
Powerline - Above Ground	L.F.	5,600	$10.00	$5,600	$50,400	$56,000
Powerline - Under Ground	L.F.	1,000	$15.00	$1,500	$13,500	$15,000
						$71,000
Close / Re-route Fremont Road (3,950 L.F.)						
Close / Barrier / Sign Fremont Road	L.S.	1	$3,500	$350	$3,150	$3,500
Re-Route Fremont Road	L.F.	3,950	$100	$39,500	$355,500	$395,000
						$398,500
Remove 17 Various Structures Within the Ultimate BRL/RPZ						
Removal of Structures Within the Ultimate BRL / R	Each	17	$500	$850	$7,650	$8,500
						$8,500
Install MITL on Parallel Taxiway (Runway 18-36 Taxiway Radius)						
Trench & Cable	L.F.	2,600	$3.25	$845	$7,605	$8,450
MITL Fixtures - Taxiway Radius	Each	6	$400	$240	$2,160	$2,400
Junction / Regulator / Vault work	L.S.	1	$3,000	$300	$2,700	$3,000
				$1,385	$12,465	**$13,850**
Install Runway MIRL And Threshold Lighting (Pilot Controlled)						
Install / Replace MIRL Edge Lighting Fixtures	Each	56	$550	$3,080	$27,720	$30,800
Install / Replace Threshold Lighting Fixtures	Each	16	$325	$520	$4,680	$5,200
Trench & Cable	L.F.	12,000	$3.25	$3,900	$35,100	$39,000
Bare Counterpoise & Trench	L.F.	12,000	$1.25	$1,500	$13,500	$15,000
Junction / Regulator / Vault work	L.S.	1	$15,000	$1,500	$13,500	$15,000
						$105,000
Install Runway End Identifier Lights (REIL) - Runway 18 and 36 End						
Install REIL's	Each	2	$6,500	$1,300	$11,700	$13,000
Vault work	L.S.	1	$3,000	$300	$2,700	$3,000
						$16,000
Install Precision Approach Path Indicators (PAPI-4L) Runway 18 & 36						
Install Precision Approach Path Indicator (PAPI-4L	Each	2	$28,000	$5,600	$50,400	$56,000
Trench & Cable	L.F.	5,000	$2.00	$1,000	$9,000	$10,000
Underground Cable	L.F.	9,500	$1.25	$1,188	$10,688	$11,875
Junction / Regulator / Vault work	L.S.	1	$5,000	$500	$4,500	$5,000
						$82,875
Subtotal Project Cost				$649,368	$5,844,312	$6,493,680
Engineering, Administrative & Legal Costs (25%)				$162,342	$1,461,078	$1,623,420
TOTAL PHASE II - RUNWAY AND TAXIWAY				**$811,710**	**$7,305,390**	**$8,117,100**

PHASE II - TERMINAL AREA

Construct 4-Unit Span Hangar (10,416 S.F.) and Hangar Pad (1,160 S.Y.)						
Mobilization	L.S.	1	$5,000	$5,000	$0	$5,000
Earthwork / Excavation	C.Y.	870	$4.00	$3,480	$0	$3,480
Lime Treated Subgrade (9")	S.Y.	1,160	$2.25	$2,610	$0	$2,610
Crushed Aggregate Base Course (5")	S.Y.	1,160	$6.00	$6,960	$0	$6,960
P.C.C. (4")	S.Y.	1,160	$42.00	$48,720	$0	$48,720
4-unit hangar	S.F.	10,416	$20.00	$208,320	$0	$208,320
Seeding and Miscellaneous	L.S.	1	$1,500	$1,500	$0	$1,500
						$276,590

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

Grade / Pave Span Hangar Access Taxilane (1,672 S.Y.) - 12,500 lbs SWG						
Mobilization	L.S.	1	$5,000	$500	$4,500	$5,000
Earthwork / Excavation	C.Y.	1,255	$4.00	$502	$4,518	$5,020
Lime treated subgrade (9")	S.Y.	1,672	$2.25	$376	$3,386	$3,762
Crushed Aggregate Base Course (10")	S.Y.	1,672	$7.00	$1,170	$10,534	$11,704
Bituminous Prime Coat	Gallons	840	$1.25	$105	$945	$1,050
Bituminous Tack Coat	Gallons	500	$1.25	$63	$563	$625
Bituminous Surface Course (4")	Tons	4,670	$35.00	$16,345	$147,105	$163,450
Seeding and Miscellaneous	L.S.	1	$1,500	$150	$1,350	$1,500
						$192,111

Overlay / Mark Main Terminal Entrance Road and Parking (3,482 S.Y.)						
Mobilization	L.S.	1	$5,000	$5,000	$0	$5,000
Crack Seal	S.Y.	348	$1.40	$487	$0	$487
Bituminous Tack Coat	Gallons	1,045	$1.25	$1,306	$0	$1,306
Bituminous Surface Course (2")	Tons	9,715	$35.00	$340,025	$0	$340,025
Pavement Marking	L.F.	200	$0.90	$180	$0	$180
Seeding and Miscellaneous	L.S.	1	$1,500	$1,500	$0	$1,500
						$348,498

Note: Auto access and parking financing assumed through conventional methods using local funds.

Construct Maintenance Hangar (20,000 S.F.) with Hangar Pad (2,222 S.Y.)						
Mobilization	L.S.	1	$10,000	$10,000	$0	$10,000
Earthwork / Excavation	C.Y.	1,850	$4.00	$7,400	$0	$7,400
Lime treated subgrade (9")	S.Y.	2,222	$2.25	$5,000	$0	$5,000
Crushed Aggregate Base Course (8")	S.Y.	2,222	$5.50	$12,221	$0	$12,221
P.C.C. (6")	S.Y.	2,222	$45.00	$99,990	$0	$99,990
Maintenance hangar	S.F.	20,000	$22.00	$440,000	$0	$440,000
Utility Hookup / Activation	L.S.	1	$1,200	$1,200	$0	$1,200
Seeding and Miscellaneous	L.S.	1	$1,500	$1,500	$0	$1,500
						$577,311

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

Construct Maintenance Hangar Parking Apron (4,309 S.Y.) – 54,000 lbs DWG						
Mobilization	L.S.	1	$10,000	$1,000	$9,000	$10,000
Earthwork / Excavation	C.Y.	3,200	$4.00	$1,280	$11,520	$12,800
Lime treated subgrade (9")	S.Y.	4,309	$2.25	$970	$8,726	$9,695
Crushed Aggregate Base Course (8")	S.Y.	4,309	$5.50	$2,370	$21,330	$23,700
P.C.C. (6")	S.Y.	4,309	$45.00	$19,391	$174,515	$193,905
Install tie-downs	Each	5	$150	$75	$675	$750
Seeding and Miscellaneous	L.S.	1	$1,500	$150	$1,350	$1,500
						$252,350

Subtotal Project Cost	$1,246,845	$400,015	$1,646,860
Engineering, Administrative & Legal Costs (25%)	$311,711	$100,004	$411,715
TOTAL PHASE II - TERMINAL AREA	**$1,558,556**	**$500,018**	**$2,058,575**

Subtotal Project Cost	$1,920,413	$6,462,127	$8,382,540
Engineering, Administrative & Legal Costs (25%)	$480,103	$1,615,532	$2,095,635
TOTAL PHASE II DEVELOPMENT	**$2,400,516**	**$8,077,659**	**$10,478,175**

FLOYD W. JONES - LEBANON 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						
Tract P (fee simple)	Acres	2	$4,000	$600	$5,400	$6,000
Subtotal Project Cost				$600	$5,400	$6,000
Engineering, Administrative & Legal Costs (25%)				$150	$1,350	$1,500
TOTAL PHASE III - LAND ACQUISITION				**$750**	**$6,750**	**$7,500**
PHASE III - RUNWAY AND TAXIWAY						
RUNWAY 18-36 IMPROVEMENTS:						
Earthwork / Excavation						
Earthwork / Excavation	C.Y.	164,290	$4.00	$65,716	$591,444	$657,160
Note: Earthwork calculation includes runway and taxiway						
Extend Runway 18-36 to 6,500' x 100'						
Mobilization	L.S.	1	$50,000	$5,000	$45,000	$50,000
Temporary Markings, Barricades and Lighting	L.S.	1	$10,000	$1,000	$9,000	$10,000
Clearing and Grubbing	Acre	4	$1,500	$600	$5,400	$6,000
Pavement Edge Saw Cut (Full Depth)	L.F.	100	$3.50	$35	$315	$350
Lime Treated Subgrade (9")	S.Y.	11,183	$2.25	$2,516	$22,646	$25,162
Crushed Aggregate Base Course (10")	S.Y.	11,183	$7.00	$7,828	$70,453	$78,281
Bituminous Prime Coat	Gallons	5,590	$1.25	$699	$6,289	$6,988
Bituminous Tack Coat	Gallons	1,680	$1.25	$210	$1,890	$2,100
Bituminous Surface Course (6")	Tons	3,900	$35.00	$13,650	$122,850	$136,500
Overlay Runway 18-36 (6,500' x 100'; 60,000 lbs DWG)						
Joint and Crack Repair	S.Y.	3,600	$2.25	$810	$7,290	$8,100
Pavement marking removal	L.F.	5,500	$0.50	$275	$2,475	$2,750
Bituminous Tack Coat	Gallons	10,890	$1.25	$1,361	$12,251	$13,613
Bituminous Surface Course (2")	Tons	8,415	$35.00	$29,453	$265,073	$294,525
Pavement Marking	L.F.	6,500	$1.75	$1,138	$10,238	$11,375
Extend Parallel Taxiway 1,000' x 35'						
Sawcut pavement - full length, each side	L.F.	35	$3.50	$12	$110	$123
Lime Treated Subgrade (9")	S.Y.	5,010	$2.25	$1,127	$10,145	$11,273
Crushed Aggregate Base Course (10")	S.Y.	5,010	$7.00	$3,507	$31,563	$35,070
Bituminous Prime Coat	Gallons	2,500	$1.25	$313	$2,813	$3,125
Bituminous Tack Coat	Gallons	750	$1.25	$94	$844	$938
Bituminous Surface Course (6")	Tons	1,750	$35.00	$6,125	$55,125	$61,250
Pavement Marking	L.F.	1,000	$1.25	$125	$1,125	$1,250
Install Taxiway Reflectors	Each	20	$18.00	$36	$324	$360
Directional/guidance signs	Each	2	$3,500	$700	$6,300	$7,000
Trench / Wiring / Cable Duct	L.F.	1,000	$3.00	$300	$2,700	$3,000
Overlay Taxiway and Connectors (6,900' x 35'; 60,000 lbs DWG)						
Joint and Crack Repair	S.Y.	200	$2.25	$45	$405	$450
Pavement Marking Removal	L.F.	4,750	$0.50	$238	$2,138	$2,375
2" Fiber Reinforced Bonded P.C.C. Overlay	S.Y.	3,060	$20.00	$6,120	$55,080	$61,200
Bituminous Tack Coat	Gallons	540	$1.25	$68	$608	$675
Bituminous Surface Course (2")	Tons	420	$35.00	$1,470	$13,230	$14,700
Pavement Marking	L.F.	5,750	$1.75	$1,006	$9,056	$10,063
Seeding and Miscellaneous	L.S.	1	$1,500	$150	$1,350	$1,500
						$1,517,253

1 M To 5,900 LF @ 500,000 = 625,000

Crack seal / Overlay Taxiway "C" (1,970' x 35'; 60,000 lbs SWG)						
Mobilization	L.S.	1	$5,000	$500	$4,500	$5,000
Minor Crack / Joint Repair	S.Y.	7,661	$1.25	$958	$8,619	$9,576
Bituminous Tack Coat	Gallons	1,150	$1.25	$144	$1,294	$1,438
Bituminous Surface Course (4")	Tons	1,780	$35.00	$6,230	$56,070	$62,300
Pavement Marking	L.F.	1,970	$1.25	$246	$2,216	$2,463
Seeding and Miscellaneous	L.S.	1	$1,500	$150	$1,350	$1,500
						$82,276
Install medium intensity approach lights with sequenced flashers (MALSF)						
Install MALSF	Each	1	$100,000	$10,000	$90,000	$100,000
Vault and Regulator Work	L.S.	1	$2,500	$250	$2,250	$2,500
						$102,500
Subtotal Project Cost				$170,203	$1,531,826	$1,702,029
Engineering, Administrative & Legal Costs (25%)				$42,551	$382,957	$425,507
TOTAL PHASE III - RUNWAY AND TAXIWAY				**$212,754**	**$1,914,783**	**$2,127,536**

PHASE III - TERMINAL AREA

REHABILITATE / EXPAND MAIN AIRCRAFT PARKING APRON

Rehabilitate Main Aircraft Parking Apron (19,428 S.Y.) - 60,000 lbs DWG						
Mobilization	L.S.	1	$10,000	$2,000	$8,000	$10,000
Temporary Markings, Barricades and Lighting	L.S.	1	$8,000	$1,600	$6,400	$8,000
Cold Milling (2")	S.Y.	19,428	$4.00	$15,542	$62,170	$77,712
Clean and Seal Cracks & Joints	L.F.	4,000	$4.00	$3,200	$12,800	$16,000
4" Fiber Reinforced Bonded P.C.C. Overlay	S.Y.	19,428	$24.00	$93,254	$373,018	$466,272
Expand Main Aircraft Parking Apron (6,153 S.Y.)						
Earthwork / Excavation	C.Y.	4,275	$4.00	$3,420	$13,680	$17,100
Saw Cut	L.F.	800	$9.00	$1,440	$5,760	$7,200
Lime Treated Subgrade (9")	S.Y.	6,153	$2.25	$2,769	$11,075	$13,844
Crushed Aggregate Base Course (8")	S.Y.	6,153	$6.00	$7,384	$29,534	$36,918
P.C.C. (8")	S.Y.	6,153	$32.00	$39,379	$157,517	$196,896
Pavement Marking	L.F.	2,500	$1.25	$625	$2,500	$3,125
Install Aircraft Tiedown Anchors	Each	26	$150	$780	$3,120	$3,900
Seeding and Miscellaneous	L.S.	1	$2,000	$400	$1,600	$2,000
						$858,967
Overlay Maintenance Hangar Parking Apron (4,309 S.Y.) – 60,000 lbs DWG						
Mobilization	L.S.	1	$5,000	$500	$4,500	$5,000
Cold Milling (1")	S.Y.	4,309	$3.00	$1,293	$11,634	$12,927
2" Fiber Reinforced Bonded P.C.C. Overlay	S.Y.	4,309	$24.00	$10,342	$93,074	$103,416
Seeding and Miscellaneous	L.S.	1	$1,500	$150	$1,350	$1,500
						$122,843
Grade / Pave Auto Access and Parking (2,944 S.Y.)						
Mobilization	L.S.	1	$5,000	$5,000	$0	$5,000
Earthwork / Excavation	C.Y.	1,300	$4.00	$5,200	$0	$5,200
Lime Treated Subgrade (9")	S.Y.	2,944	$2.25	$6,624	$0	$6,624
Crushed Aggregate Base Course (5")	S.Y.	2,944	$3.75	$11,040	$0	$11,040
Bituminous Prime Coat	Gallons	1,480	$1.25	$1,850	$0	$1,850
Bituminous Tack Coat	Gallons	450	$1.25	$563	$0	$563
Bituminous surface course (4")	Tons	685	$35.00	$23,975	$0	$23,975
Install auto lighting	Each	2	$1,500	$3,000	$0	$3,000
Pavement Marking	L.F.	200	$1.50	$300	$0	$300
Seeding and Miscellaneous	L.S.	1	$1,500	$1,500	$0	$1,500
						$59,052

Note: Auto access and parking financing assumed through conventional methods using local funds.

Construct 10-Unit T-Hangar (14,648 S.F.) with Hangar Pad (1,628 S.Y.)						
Earthwork / Excavation	C.Y.	800	$4.00	$3,200	$0	$3,200
Lime Treated Subgrade (9")	S.Y.	1,628	$2.25	$3,663	$0	$3,663
Crushed Aggregate Base Course (5")	S.Y.	1,628	$3.75	$6,105	$0	$6,105
P.C.C. (4")	S.Y.	1,628	$42.00	$68,376	$0	$68,376
10-Unit T-Hangar	S.F.	14,648	$18.00	$263,664	$0	$263,664
Utility Hookup / Activation	L.S.	1	$1,200	$1,200	$0	$1,200
						$346,208

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

Construct 10-Unit T-Hangar (14,648 S.F.) with Hangar Pad (1,628 S.Y.)						
Earthwork / Excavation	C.Y.	800	$4.00	$3,200	$0	$3,200
Lime Treated Subgrade (9")	S.Y.	1,628	$2.25	$3,663	$0	$3,663
Crushed Aggregate Base Course (5")	S.Y.	1,628	$3.75	$6,105	$0	$6,105
P.C.C. (4")	S.Y.	1,628	$42.00	$68,376	$0	$68,376
10-Unit T-Hangar	S.F.	14,648	$18.00	$263,664	$0	$263,664
Utility Hookup / Activation	L.S.	1	$1,200	$1,200	$0	$1,200
						$346,208

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

Construct 10-Unit T-Hangar (14,648 S.F.) with Hangar Pad (1,628 S.Y.)						
Earthwork / Excavation	C.Y.	800	$4.00	$3,200	$0	$3,200
Lime Treated Subgrade (9")	S.Y.	1,628	$2.25	$3,663	$0	$3,663
Crushed Aggregate Base Course (5")	S.Y.	1,628	$3.75	$6,105	$0	$6,105
P.C.C. (4")	S.Y.	1,628	$42.00	$68,376	$0	$68,376
10-Unit T-Hangar	S.F.	14,648	$18.00	$263,664	$0	$263,664
Utility Hookup / Activation	L.S.	1	$1,200	$1,200	$0	$1,200
						$346,208

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

Construct 10-Unit T-Hangar (14,648 S.F.) with Hangar Pad (1,628 S.Y.)						
Earthwork / Excavation	C.Y.	800	$4.00	$3,200	$0	$3,200
Lime Treated Subgrade (9")	S.Y.	1,628	$2.25	$3,663	$0	$3,663
Crushed Aggregate Base Course (5")	S.Y.	1,628	$3.75	$6,105	$0	$6,105
P.C.C. (4")	S.Y.	1,628	$42.00	$68,376	$0	$68,376
10-Unit T-Hangar	S.F.	14,648	$18.00	$263,664	$0	$263,664
Utility Hookup / Activation	L.S.	1	$1,200	$120	$0	$1,200
						$346,208

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

Grade / Pave T-Hangar Taxilane (34,816 S.Y.) - 12,500 lbs S						
Mobilization	L.S.	1	$5,000	$500	$4,500	$5,000
Earthwork / Excavation	C.Y.	17,408	$4.00	$6,963	$62,669	$69,632
Lime Treated Subgrade (9")	S.Y.	34,816	$2.25	$7,834	$70,502	$78,336
Crushed Aggregate Base Course (6")	S.Y.	34,816	$4.50	$15,667	$141,005	$156,672
Bituminous Prime Coat	Gallons	17,400	$1.25	$2,175	$19,575	$21,750
Bituminous Tack Coat	Gallons	5,200	$1.25	$650	$5,850	$6,500
Bituminous Surface Course (4")	Tons	8,095	$35.00	$28,333	$254,993	$283,325
Seeding and Miscellaneous	L.S.	1	$1,500	$150	$1,350	$1,500
						$622,715

Grade / Pave T-Hangar Access and Parking (2,864 S.Y.)						
Earthwork / Excavation	C.Y.	1,275	$4.00	$5,100	$0	$5,100
Lime Treated Subgrade (9")	S.Y.	2,864	$2.25	$6,444	$0	$6,444
Crushed Aggregate Base Course (5")	S.Y.	2,864	$3.75	$10,740	$0	$10,740
Bituminous surface course (2")	Tons	8,000	$35.00	$280,000	$0	$280,000
Install Auto Lighting	Each	4	$1,500	$6,000	$0	$6,000
Pavement Marking	L.F.	200	$1.50	$300	$0	$300
Seeding and Miscellaneous	L.S.	1	$1,500	$150	$1,350	$1,500
						$310,084

Note: Auto access and parking financing assumed through conventional methods using local funds.

Construct Common Hangar (3,600 S.F.) and Hangar Pad (400 S.Y.)						
Earthwork / Excavation	C.Y.	300	$4.00	$1,200	$0	$1,200
Lime Treated Subgrade (9")	S.Y.	400	$2.25	$900	$0	$900
Crushed Aggregate Base Course (10")	S.Y.	400	$7.00	$2,800	$0	$2,800
P.C.C. (6")	S.Y.	400	$32.00	$12,800	$0	$12,800
Common Hangar	S.F.	3,600	$22.00	$79,200	$0	$79,200
Utility Hookup / Activation	L.S.	1	$5,000	$5,000	$0	$5,000
						$101,900

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

Construct Common Hangar (3,600 S.F.) and Hangar Pad (400 S.Y.)						
Earthwork / Excavation	C.Y.	300	$4.00	$1,200	$0	$1,200
Lime Treated Subgrade (9")	S.Y.	400	$2.25	$900	$0	$900
Crushed Aggregate Base Course (10")	S.Y.	400	$7.00	$2,800	$0	$2,800
P.C.C. (6")	S.Y.	400	$32.00	$12,800	$0	$12,800
Common Hangar	S.F.	3,600	$22.00	$79,200	$0	$79,200
Utility Hookup / Activation	L.S.	1	$5,000	$5,000	$0	$5,000
						$101,900

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

Construct Common Hangar (3,600 S.F.) and Hangar Pad (400 S.Y.)						
Earthwork / Excavation	C.Y.	300	$4.00	$1,200	$0	$1,200
Lime Treated Subgrade (9")	S.Y.	400	$2.25	$900	$0	$900
Crushed Aggregate Base Course (10")	S.Y.	400	$7.00	$2,800	$0	$2,800
P.C.C. (6")	S.Y.	400	$32.00	$12,800	$0	$12,800
Common Hangar	S.F.	3,600	$22.00	$79,200	$0	$79,200
Utility Hookup / Activation	L.S.	1	$5,000	$5,000	$0	$5,000
						$101,900

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

Construct Common Hangar (3,600 S.F.) and Hangar Pad (400 S.Y.)						
Earthwork / Excavation	C.Y.	300	$4.00	$1,200	$0	$1,200
Lime Treated Subgrade (9")	S.Y.	400	$2.25	$900	$0	$900
Crushed Aggregate Base Course (10")	S.Y.	400	$7.00	$2,800	$0	$2,800
P.C.C. (6")	S.Y.	400	$32.00	$12,800	$0	$12,800
Common Hangar	S.F.	3,600	$22.00	$79,200	$0	$79,200
Utility Hookup / Activation	L.S.	1	$5,000	$5,000	$0	$5,000
						$101,900
Note: Hangar financing assumed through conventional methods using local (airport) funds or private investment options.						
Construct Common Hangar Approach Taxilanes (900 S.Y.) - 4 Each						
Mobilization	L.S.	1	$10,000	$1,000	$9,000	$10,000
Earthwork / Excavation	C.Y.	750	$4.00	$300	$2,700	$3,000
Lime Treated Subgrade (9")	S.Y.	900	$2.25	$203	$1,823	$2,025
Crushed Aggregate Base Course (10")	S.Y.	900	$7.00	$630	$5,670	$6,300
Bituminous Prime Coat	Gallons	450	$1.25	$56	$506	$563
Bituminous Tack Coat	Gallons	135	$1.25	$17	$152	$169
Bituminous Surface Course (8")	Tons	420	$35.00	$1,470	$13,230	$14,700
Seeding and Miscellaneous	L.S.	1	$1,500	$150	$1,350	$1,500
						$38,256
Construct Common Hangar (6,400 S.F.)and Hangar Pad (711 S.Y.)						
Earthwork / Excavation	C.Y.	530	$4.00	$2,120	$0	$2,120
Lime Treated Subgrade (9")	S.Y.	400	$2.25	$900	$0	$900
Crushed Aggregate Base Course (8")	S.Y.	400	$6.00	$2,400	$0	$2,400
P.C.C. (8")	S.Y.	400	$32.00	$12,800	$0	$12,800
Common Hangar	S.F.	6,400	$22.00	$140,800	$0	$140,800
Utility Hookup / Activation	L.S.	1	$5,000	$5,000	$0	$5,000
						$164,020
Note: Hangar financing assumed through conventional methods using local (airport) funds or private investment options.						
Construct Common Hangar (6,400 S.F.)and Hangar Pad (711 S.Y.)						
Earthwork / Excavation	C.Y.	530	$4.00	$2,120	$0	$2,120
Lime Treated Subgrade (9")	S.Y.	400	$2.25	$900	$0	$900
Crushed Aggregate Base Course (8")	S.Y.	400	$6.00	$2,400	$0	$2,400
P.C.C. (8")	S.Y.	400	$32.00	$12,800	$0	$12,800
Common Hangar	S.F.	6,400	$22.00	$140,800	$0	$140,800
Utility Hookup / Activation	L.S.	1	$5,000	$5,000	$0	$5,000
						$164,020
Note: Hangar financing assumed through conventional methods using local (airport) funds or private investment options.						
Construct Common Hangar Approach Taxilanes (600 S.Y.) - 2 Each						
Mobilization	L.S.	1	$10,000	$1,000	$9,000	$10,000
Earthwork / Excavation	C.Y.	500	$4.00	$200	$1,800	$2,000
Lime Treated Subgrade (9")	S.Y.	600	$2.25	$135	$1,215	$1,350
Crushed Aggregate Base Course (6")	S.Y.	600	$4.50	$270	$2,430	$2,700
Bituminous Prime Coat	Gallons	300	$1.25	$38	$338	$375
Bituminous Tack Coat	Gallons	180	$1.25	$23	$203	$225
Bituminous Surface Course (4")	Tons	1,700	$35.00	$5,950	$53,550	$59,500
Seeding and Miscellaneous	L.S.	1	$1,500	$150	$1,350	$1,500
						$77,650
Construct Common Hangar Access and Parking (3,008 S.Y.)						
Earthwork / Excavation	C.Y.	1,340	$4.00	$5,360	$0	$5,360
Lime Treated Subgrade (9")	S.Y.	3,008	$2.25	$6,768	$0	$6,768
Crushed Aggregate Base Course (5")	S.Y.	3,008	$3.75	$11,280	$0	$11,280
Bituminous Surface Course (4")	Tons	700	$35.00	$24,500	$0	$24,500
Install Auto Lighting	Each	6	$1,500	$9,000	$0	$9,000
Pavement Marking	L.F.	800	$1.50	$1,200	$0	$1,200
Seeding and Miscellaneous	L.S.	1	$1,500	$1,500	$0	$1,500
						$59,608
Note: Auto access and parking financing assumed through conventional methods using local funds.						
Subtotal Project Cost				$2,804,725	$1,463,842	$4,268,567
Engineering, Administrative & Legal Costs (25%)				$701,181	$365,960	$1,067,142
TOTAL PHASE III - TERMINAL AREA				**$3,505,907**	**$1,829,802**	**$5,335,709**
PHASE III - OTHER PROJECTS						
Refurbish Airport Beacon						
Refurbish Airport Beacon	L.S.	1	$1,200	$120	$1,080	$1,200
Note: Airport beacon eligible for State Maintenance Program using 80% state / 20% local funding.						
Subtotal Project Cost				$120	$1,080	$1,200
Engineering, Administrative & Legal Costs (25%)				$30	$270	$300
TOTAL PHASE III - OTHER				**$150**	**$1,350**	**$1,500**
Subtotal Project Cost				$2,975,648	$3,002,148	$5,977,796
Engineering, Administrative & Legal Costs (25%)				$743,912	$750,537	$1,494,449
TOTAL PHASE III DEVELOPMENT				**$3,719,560**	**$3,752,685**	**$7,472,245**
Subtotal All Projects				$6,472,422	$11,139,936	$17,612,357
Engineering, Administrative & Legal Costs (25%)				$1,618,105	$2,784,984	$4,403,089
TOTAL DEVELOPMENT COST				**$8,090,527**	**$13,924,919**	**$22,015,447**