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CHAPTER ONE
INTRODUCTION

The Oregon Department of Aviation (ODA) is updating the Airport Layout Plan (ALP) Report for Lebanon State Airport (S30). The purpose of the study is to define the current, short-term and long-term needs of the airport. The Airport Layout Plan Report replaces the Lebanon State Airport Master Plan completed in 1994.[1] Prior master plan recommendations will be reviewed and revised as necessary, to reflect current conditions and any changes in activity, utilization, or facility development that may affect future demand for aviation facilities.

Funding for the ALP project is provided through a Federal Aviation Administration (FAA) Airport Improvement Program grant (90 %) and local match (10 %) provided by ODA.

The preparation of this document may have been supported, in part, through the Airport Improvement Program financial assistance from the Federal Aviation Administration as provided under Title 49, United States Code, section 47104. The contents do not necessarily reflect the official views or policy of the FAA. Acceptance of this report by the FAA does not in any way constitute a commitment on the part of the United States to participate in any development depicted therein nor does it indicate that the proposed development is environmentally acceptable with appropriate public laws.

[1] Lebanon State Airport Master Plan 1990-2010 (W&H Pacific, 1994).

OVERVIEW

Lebanon State Airport is located in Linn County and is included in the "Core System of Airports" in the Oregon Aviation Plan (OAP).[2] Core system airports are defined as having "a significant role in the statewide aviation system." The Airport is included in the "Community General Aviation Airport" category based on its current functional role. Community GA airports typically accommodate a wide range of general aviation users and local business activities.

Community GA airports are significant components in the statewide transportation system and often generate both direct (employment, etc.) and indirect economic benefits for the local community or region. Commercial-related aviation service businesses, such as fixed base operators and aircraft maintenance shops create employment and provide vital services and products within a large geographic area. For smaller communities without convenient access to commercial air travel, general aviation airports provide additional options for business and personal travel.

The level of local support provided by airport users has been significant at Lebanon State Airport. A 2002 project to construct the west parallel taxiway extension project was completed in a partnership with the Lebanon Chapter of the Oregon Pilot's Association (OPA), which included a contribution of equipment and labor valued at approximately $50,000.

Local OPA members also regularly contribute their resources to a variety of ongoing maintenance projects including mowing grass, minor field maintenance, servicing the portable chemical toilets, and landscaping. The local OPA chapter estimates that the value of in-kind contributions at the airport between 1999 and 2004 was nearly $66,000.

Lebanon State Airport is included in the National Plan of Integrated Airport Systems (NPIAS), administered by the FAA. NPIAS airports are eligible for federal funding of improvements through FAA programs such as the current Airport Improvement Program (AIP). The FAA requires that all NPIAS airports periodically update their airport plans to maintain effective long-term planning. This project will enable the Airport to meet the FAA's requirement to maintain an up-to-date plan.

[2] Oregon Aviation Plan (Dye Management/Century West), © Oregon Department of Transportation 2000.

The primary objective of the Airport Layout Plan Report is to identify current and future facility needs and the improvements necessary to maintain a safe and efficient airport that is economically, environmentally, and socially sustainable. The Airport Layout Plan Report will:

- *Examine previous recommendations and development alternatives as appropriate to meet the current and projected airport facility needs;*
- *Determine current and future activity and facility requirements;*
- *Update the airport layout plan, airspace plan, and land-use plan for the airport and its surrounding areas; and*
- *Schedule priorities of improvements and estimate development costs for the 20-year planning period.*

PUBLIC INVOLVEMENT

The public involvement element of the planning process provided opportunities for all interested individuals, organizations, or groups to participate in the project. A list of stakeholders was developed for the project, which included airport users, local citizens, businesses, and local, state and federal government agencies, and community leaders. A planning advisory committee (PAC) was formed to assist the Consultant and ODA in developing the updated plan.

At the project kickoff, a Joint Planning Conference (JPC) was held for agencies and organizations with a specific interest or responsibility (land use, environmental, natural resources, transportation, etc.) associated with the airport or its vicinity. The purpose of the JPC was to identify any concerns or issues, which needed to be addressed as part of this airport layout plan update. The JPC provided valuable information used in formulating the plan.

The PAC reviewed and commented on draft work products and provided local knowledge and expertise to the planning process. PAC meetings were held at key points during the study in conjunction with public informational meetings.

Following completion of preliminary work products, the Draft ALP Report was prepared to present the culmination of the entire work effort, reflecting the input provided by all participants in the planning process. Following a period of review, all public and agency comments received were integrated into the Final Airport Layout Plan Report and ALP drawing set through coordination with ODA airport management and planning staff.

AIRPORT LAYOUT PLAN REPORT CONCLUSIONS

1. Lebanon State Airport is owned and operated by the Oregon Department of Aviation and is one of three publicly owned airports in Linn County.

2. The Airport is categorized as a "Community General Aviation Airport" in the 2000 Oregon Aviation Plan and is included in Oregon's core system of airports, which denotes its significance in Oregon's aviation system.

3. The Airport is included in the National Plan of Integrated Airport System (NPIAS), making it eligible for federal funding through the Federal Aviation Administration (FAA).

4. The Airport has a single paved and lighted runway (2,877 by 50 feet), oriented in a north-south direction (16/34). Roads are located at both ends of the runway; the Runway 34 threshold is displaced 387 feet to provide improved obstruction clearance.

5. Runway 16/34 has a full-length parallel taxiway on its east side and a partial-length parallel taxiway on its west side (south end). The airfield facilities are generally designed to meet FAA Airport Design Group (ADG) I standards associated with small fixed wing aircraft.

6. Airfield lighting currently includes medium intensity runway edge lights (MIRL), visual approach slope indicators (VASI) on both runway ends, runway threshold lights and the airport beacon. The taxiways are not lighted, although edge reflectors are installed.

7. Most landside facilities at Lebanon State (aircraft parking apron, fuel, hangars, etc.) are located on the east side of the runway; a single row of conventional hangars is located on the west side of the runway, adjacent to the west parallel taxiway.

8. The most recent air traffic data provided by ODA (Acoustical Counting Program) is for 2000 and 2001, which estimated 10,558 and 6,691 annual operations at the airport, respectively. FAA Terminal Area Forecast data lists 43 based aircraft and 16,689 annual operations at Lebanon State in 2001. An updated count of 57 based aircraft was conducted by the Lebanon Oregon Pilots Association (OPA) Chapter in late 2004.

9. The Airport operates under day and night visual flight rules (VFR) and does not currently have instrument approach capabilities.

10. Aviation fuel (AVGAS) and major aircraft maintenance services are available at the airport.

AIRPORT LAYOUT PLAN REPORT RECOMMENDATIONS

1. A regular schedule of pavement maintenance (vegetation control, crack filling, slurry seals, patching, etc.) should be conducted on airfield pavements to maximize the useful life and optimize life cycle maintenance expenditures through ODA's Pavement Maintenance and Management Program (PMMP).

2. Current and future design standards for Runway 16/34 are based on FAA airport reference code (ARC) B-I (small) for "utility" runways (per FAR Part 77).

3. Acquisition of approximately 23 acres of agricultural use property adjacent to the west side of the airport is recommended to accommodate the airport's long-term development potential. The northern portion of the land was recently annexed into the Lebanon city limits with "ML – Limited Industrial" zoning. Although airport-related development is not specially identified as a permitted use in ML zones, local planning officials have recognized its appropriateness on the airport itself, which is also zone ML. The southern section of the future property acquisition area is currently located outside the Lebanon city limits, but within the city's urban growth boundary (UGB). The area is currently zoned by Linn County for agricultural use, but its future land use is designated "C-Industrial" in the City of Lebanon Comprehensive Plan. Once annexed into the city limits, the area would be rezoned industrial by the City.

4. Short-term development of remaining landside areas within the existing airport boundary is recommended based on market demand, until action on airport property acquisition is determined. As depicted on the updated airport layout plan, the existing airport land base can accommodate expanded aircraft parking apron on the east side and a limited amount of new hangar construction on the east and west sides of the runway.

5. Relocation of the end of Runway 34 is recommended to address the currently deficient runway safety area, object free area, obstacle free zone and primary surface created by the airport boundary fence located approximately 120 feet from the current runway end. Approximately 120 feet of existing runway will be converted to taxiway (final dimension to be determined by survey).

6. A 258-foot extension of Runway 16/34 is recommended at its north end to compensate for the reduction of useable runway at the south end. In order to maintain acceptable

obstruction clearance, it is recommended that the existing threshold location for Runway 16 be retained and that the new section of runway be configured as a displaced threshold. The extended runway will have standard extended runway safety area and object free areas (based on existing fence located on north property line). The future runway length will be 3,015 feet with displaced thresholds at both ends (Runway 16 - 258 feet; Runway 34 – approximately 267 feet).

7. A north extension of the west parallel taxiway (with 150-foot runway separation) is recommended to provide full-length taxiway access to the runway.

8. Development of an aircraft wash pad facility is recommended adjacent to the main apron and fueling area.

9. Extension of city water service lines is recommended to provide fire suppression for hangars located on the west side of the airfield.

10. Development of public restroom facilities is recommended in the existing terminal area (adjacent to the main apron and fueling area); an alternative location adjacent to the future aircraft wash pad is also identified on the ALP.

11. Expansion of the main (east) apron is recommended as needed, based on demand.

12. Phased development of the west landside area is recommended to accommodate future demand for T-hangars, conventional hangars and aircraft parking. The first phase of development includes taxiway/taxilane connections and vehicle access. The second phase of development includes additional lease areas for conventional hangars, a new aircraft tiedown apron, taxiway/taxilane connections, and vehicle access and parking.

13. Electronic (keypad combination) gates should be provided to limit access to existing and new apron and hangar areas.

14. The City of Lebanon and Linn County should ensure that airport overlay zoning reflects the updated boundaries of the FAR Part 77 airspace surfaces defined in this plan and complies fully with Oregon state law (ORS Ch. 836.600-634). The ordinance language and mapping developed and maintained by the land use jurisdictions should be consistent to ensure overall compatibility.

15. The City of Lebanon and Linn County should ensure through their comprehensive planning that development of rural lands in the vicinity of the airport is compatible with airport activities. Maintaining industrial zoning in the areas surrounding the airport provides effective land use compatibility with airport operations. Development of new

residential areas, or increasing the densities of existing rural residential areas within the boundaries of the protected airspace surfaces of the airport should be discouraged to ensure the long-term viability of the airport as an important transportation facility within the region.

16. ODA should require that applicants for all leases or development proposals involving construction of structures on the airport demonstrate compatibility with the airport's protected airspace surfaces. The applicant should be required to provide all documentation necessary for the sponsor to obtain "no objection" finding by FAA resulting from the review of FAA Form 7460-1 – Notice of Proposed Construction or Alteration, prior to approval of ground leases. Any proposal that receives an objection by FAA should not be approved without first addressing FAA concerns.

17. Local (City or County) planning and building officials should require that applicants for all proposed development within the boundaries of the airport overlay zone (as defined by the updated Airport Airspace Plan) demonstrate a finding of "no objection" by FAA resulting from review of proposed development (FAA Form 7460-1) prior to approval of building permits, plats, binding site plans, etc., and coordinated with ODA.

18. It is recommended that any proposed changes in land use or zoning within the boundaries of the airport overlay zone be coordinated with ODA to ensure consistency with Oregon airport land use guidelines.

19. ODA should adopt the Airport Layout Plan Report and drawings in a timely manner to guide airport activities. Linn County and the City of Lebanon should also adopt the Airport Layout Plan Report and drawings for incorporation into local comprehensive and transportation planning.

20. ODA should initiate the recommended improvements and major maintenance items in a timely manner, requesting funding assistance under FAA and other federal or state funding programs for all eligible capital improvements.

CHAPTER TWO
INVENTORY OF EXISTING CONDITIONS

INTRODUCTION

This chapter documents existing conditions and aviation activity at the airport. Existing forecasts of aviation activity will be evaluated, and updated as necessary, to identify in broad terms, anticipated trends that may affect development needs at Lebanon State Airport through the twenty-year planning period and beyond. The existing airfield facilities were also examined during recent on-site inspections. Historical data from a variety of sources are used in this evaluation:

- **Lebanon State Airport Master Plan and Airport Layout Plan** (W&H Pacific 1990; Adopted/Approved in 1994)
- **Lebanon State Airport - Airport Layout Plan (**not submitted to FAA for review & approval) (ODA 2000)
- **Linn County Regional Airport Feasibility Study and Site Investigation** (Bucher Willis & Ratliff, 1996)
- **Lebanon Airport Pavement Evaluation Maintenance-Management Program** (Pavement Consultants, Inc., 2004)
- **Oregon Continuous Aviation System Plan – Volume I: Inventory and Forecasts; Volume III: Recommended Development Plan** (AirTech, 1997)
- **Oregon Aviation Plan** (Dye Management Group, 2000)
- **FAA Airport Master Record Form** (5010-1), **APO Terminal Area Forecasts**.
- **Seattle Sectional Aeronautical Chart; IFR Enroute Low Altitude (L-2) Chart** – US DOT Federal Aviation Administration National Charting Office.
- Other local documents and regional socioeconomic data.

AIRPORT LOCALE

Lebanon State Airport is a public use, publicly owned airport located approximately 1 mile west of downtown Lebanon in Linn County. The airport is owned and operated by the Oregon Department of Aviation (ODA) and serves the community of Lebanon and outlying areas of

western Linn County. The airport site consists of approximately 77 acres held in fee and 93 acres of easements protecting approaches to the runway. A location and site map are shown in **Figure 2-1**, on Page 2-7.

Linn County is in the center of the Willamette Valley, with the Willamette River as its western boundary and the crest of the Cascades as its eastern boundary. Lebanon is located at the edge of the western foothills of the Cascade Mountains. U.S. Highway 20 (Santiam Highway) and Oregon Highway 34 (Tangent Street) connect at Lebanon, approximately 8 miles east of U.S. Interstate 5. Albany, the Linn County seat, is located approximately 12 miles (14 road miles) northwest of Lebanon. From Lebanon, Portland is 80 miles north; Salem is 35 miles north; Sweet Home is 13 miles southeast; and Eugene is 45 miles south.

Lebanon offers a variety of cultural and recreational activities that support a growing tourism industry. Many of the area's numerous covered bridges, some of which date back to the early 1930's, are within a 45-minute drive of Lebanon. Fishing, swimming, canoeing and rafting are popular activities on the South Santiam River that flows through Lebanon. The Cascade Mountains offer year-round recreational opportunities including fishing, hunting, boating, camping, backpacking, hiking and skiing. The Willamette Valley and the Oregon coast are also located nearby, offering a wide variety of activities and attractions.

CLIMATE

Linn County is characterized by a temperate climate. Summers are fairly warm, but hot days are rare. Winters are cool, but snow and freezing temperatures are not common except at higher elevations. Rainfall is extremely light summer, so crops growing actively during this period need irrigation. In most winters, one or two storms over the whole area bring strong and sometimes damaging winds, and in some years the accompanying heavy rains cause serious flooding.

The climate in the Lebanon area is characterized by warm, dry summers and mild, wet winters. The average maximum temperature is 81.5 degrees Fahrenheit (July) and the average minimum temperature is 32.8 degrees (January). Lebanon averages 53.01 inches of precipitation (6.28 in January and 0.46 in July).

GEOLOGY AND TERRAIN

Lebanon State Airport is located about one mile from Lebanon. Soil survey information for Linn County indicates that the Lebanon is located within the Malabon-Coburg-Conser soil association.

These areas are characterized by "deep, well drained to poorly drained, nearly level silty clay loams that formed in old alluvial deposits."

Lebanon State Airport elevation is 344 feet above mean sea level (MSL). The terrain surrounding the airport is relatively level with terrain rising to the south and southwest near the runway, and the rising Cascade foothills to the east. Peterson Butte is located about one to two miles southwest of the runway, rising to an elevation of approximately 1,431 feet MSL, which is nearly 1,100 feet above the airport.

SOCIOECONOMIC CONDITIONS

Population

According to data compiled by the U.S. Census, Center for Population and Census, and Portland State University, the population of Linn County in 2001 was 103,500; the population of Lebanon in 2001 was 13,190. Between 1980 and 2001, the population of Lebanon has increased by 27 percent while the Linn County population increased by 16 percent. The percentage of Linn County residents living in Lebanon has remained basically unchanged over the past decade. Approximately 7.9 percent of the county resides within the City of Lebanon.

Economy

The climate and soil conditions provide one of Oregon's most diversified agriculture areas, allowing a wide variety of specialty crops and leading the nation in the production of common and perennial ryegrass. Linn County is also home to major producers of rare and primary metals, processed food, manufactured homes and motor homes as well as the traditional logging and wood products industries. Linn County's economy relies heavily on the lumber and wood products industry; and in 1990, this industry accounted for 40% of the county's manufacturing jobs.

The five largest employers in Linn County, as of January 2003, were Lebanon Community Hospital, Weyerhaeuser, Entek Manufacturing, Georgia Pacific, and Willamette Valley Rehabilitation Center.[3] According to Oregon Employment Department data, the unemployment

[3] Oregon Economic and Community Development Department (2003)

rate in Linn County in 2001 was approximately 8.3 percent, which was above the statewide average.

Manufacturing in Linn County is highly diversified with concentration in rare metals production, two paper mills, small but growing electronics and plastic sectors, and machinery and food processing. The average annual wage in Linn County, after adjustment for inflation, has been dropping steadily for a decade. The average annual wage in 2000 was approximately $28,446 while the average annual wage in Oregon was $32,776.

A Lowe's distribution center is planned for Lebanon on a 204-acre site, west of the airport. According to the project summary provided on the City of Lebanon's website, the facility is expected to open by 2007, creating an estimated 400 to 750 family wage jobs.

Airport History

The existing airport site was purchased by the State of Oregon from private owners in 1970, with partial local funding assistance. According to information contained in the 1990 master plan, improvements to the runway were made in 1973-1974 in addition to the acquisition of avigation easements. A partial-length parallel taxiway and aircraft parking apron were constructed on the east side of the runway in 1974; another section of parallel taxiway and apron was constructed in 1980.

The 1990 Airport Master Plan and Airport Layout Plan (ALP) drawings were finalized in 1994, with major recommended changes in airport configuration, including runway reorientation/extension, realignment of Airport Road, and substantial areas of property acquisition along the west side of the airport.

In 1996, the Linn County Regional Airport Feasibility and Site Investigation study was completed. The study evaluated the options associated with continued operation of the Lebanon and Albany airports in addition to development of a new regional airport, which could replace the two existing airports. The study noted the development constraints associated with Lebanon State Airport that were identified in the previous master plan, but concluded that further efforts would be required to determine its development potential. It is noted that since the regional airport study was completed in 1996, the long-term future of Albany Municipal Airport became more certain with the completion of a new airport master plan[4] and substantial new investment in

[4] Albany Municipal Airport Master Plan (Century West Engineering, 2002)

the airport. As a result, it appears that development of a new regional general aviation airport appears unlikely within the current planning period and improvements to the existing airports in Albany and Lebanon will be needed to address current and future aviation demands.

In April 2003, the Lebanon State Airport ALP was revised by ODA by eliminating the previously recommended runway reconfiguration/extension. Although the revised ALP was not submitted for formal FAA review and approval, the internal revision reflected a significant change in ODA's preferred development direction for the airport. The 2003 ALP represents the baseline (existing conditions) for use in this planning project.

Recent improvements at Lebanon State include installation of a new aboveground aviation fuel tank and cardlock system, extension of the west parallel taxiway to the midfield exit; paving airport access entrance roads; fencing; and private hangar construction. The 1993 existing facilities drawing (Sheet 2 of the ALP set) depicted 32 airport buildings, including 31 conventional aircraft hangars and the FBO building. During a site visit conducted in late 2003, there were 42 airport buildings, including 41 conventional hangars and the FBO building. A census of hangars conducted by the Lebanon OPA Chapter in late 2004 indicated a total of 45 hangars.

As noted earlier, the Lebanon OPA Chapter has been a local significant resource for ODA through its member's contribution of equipment, labor and funds for a wide range of maintenance and improvement projects at the airport. The value of OPA in-kind contributions made from 1999 through 2004 is estimated at $65,800.

Airport Environment

Lebanon State Airport is located approximately one mile west of the city center and is surrounded by a variety of land uses. The airport consists of a single north-south runway with landside developments located on both sides of the runway. The paved and lighted runway utilizes a standard left traffic pattern.

The airport has a relatively small and narrow land base which has largely limited hangar development to single rows of small conventional hangars facing the parallel taxiways. The airport is bordered on three sides by local roads: Airport Road to the south; Airway Road to the east; and Oak Street to the north. The western side of the airport borders agricultural land.

The Airport Property Plan (Exhibit "A," dated 2/23/73) provided by ODA, lists total airport acreage at 76.5 acres owned in fee and an additional 92.74 acres under easement. The easements are located in portions of the runway approach and approach-transitional surfaces at both ends of

the runway. Airport property extends to the south side of Airport Road and includes approximately 18.1 acres for the Runway 34 protection zone (RPZ) and a portion of the runway approach surface.

An Exhibit "B" property drawing (dated 3/8/78) depicts future property acquisition along the eastern edge of the airport, between the existing airport property line and Airway Road. The drawing identified numerous parcels totaling 9.99 acres to be acquired by the state as part of future projects, although it appears that none of the planned property acquisition has occurred.

AIRFIELD FACILITIES

Historically, Lebanon State has served a variety of general aviation users, including business related aviation. **Figure 2-2** depicts a detail of existing terminal area facilities at the airport, located at the east end of the airport. **Table 2-1** summarizes airport data.

TABLE 2-1
AIRPORT DATA

Airport Name/Designation	Lebanon State Airport (S30)
Airport Owner	Oregon Department of Aviation
Date Established	1970
Airport Category	National Plan of Integrated Airport Systems (NPIAS) General Aviation. FAA Airport Reference Code: B-I
Oregon Aviation System Designation	Community General Aviation Airport (Category 4)
Airport Acreage	Approximately 76.5 Acres (fee simple)
Airport Reference Point	N 44º31.79' W 122º 55.77'
Airport Elevation	344 feet Mean Sea Level (MSL)
Airport Traffic Pattern Configuration/Altitude	Left Traffic – 1,344 feet MSL (1,000 feet above ground level)

FIGURE 2-1: EXISTING CONDITIONS AND SITE MAP

FIGURE 2-2: TERMINAL AREA FACILITIES

Runways and Taxiways

Lebanon State Airport has one paved, lighted runway (16/34), oriented in a north-south direction. Runway 16/34 is 2,877 feet long and 50 feet wide. The threshold for Runway 34 is displaced 387 feet to reduce obstructions created by trees and Airport Road, which is located approximately 135 feet from the runway end. The runway has basic runway markings (runway numbers, centerline stripe, displaced threshold markings and taxiway lead-in striping), which are consistent with visual flight rules (VFR) use. The markings are generally in fair to good condition, although local pilots report that some markings require repainting.

The 1993 airport layout plan included a wind rose created for the runway based on estimated wind data from Albany Municipal Airport in 1959. The data estimated that Runway 16/34 has approximately 95 percent coverage at 15 miles per hour. Local pilots indicate that the prevailing winds generally follow a northerly-southerly direction, with seasonal shifts. **Table 2-2** summarizes existing runway facilities.

TABLE 2-2
RUNWAY DATA

Dimensions	2,877 x 50 feet; Runway 34 threshold displaced 387 feet.
Effective Gradient	0.07%
Surface	Asphalt
Weight Bearing Capacity	Not Published.[1] 12,500 pounds – Single Wheel Landing Gear (1994 ALP)
Marking	Basic (rwy numbers, centerline stripe; displaced threshold; yellow lead-in lines on exit taxiways)
Lighting	Medium Intensity Runway Edge Lighting (MIRL); threshold lights; Visual Approach Slope Indicators (VASI) - Runways 16 & 34
Wind Coverage	95 percent (All Weather) with a 15 mph crosswind. Data: 1994 ALP

1. No runway pavement strength data published in U.S. Airport/Facility Directory

The runway is served by parallel taxiways on both sides, serving all of the airport's landside development areas. The 1990 Airport Master Plan recommended alpha-numeric taxiway designators for the east parallel (Taxiway A) and the west parallel (Taxiway B). The exit taxiways were designated A1-A4 and B1. **Table 2-3** summarizes existing taxiway facilities.

TABLE 2-3
TAXIWAY DATA

Taxiway A - East Parallel (North Section)	
Dimensions	1,200 x 30 feet with (2) 90-degree exit taxiways and (1) 45-degree exit (turnaround loop) at Rwy 16 end
Surface	Asphalt (very good condition)
Marking	Centerline stripe; hold lines 125' from Rwy centerline on exit taxiways
Lighting/Reflectors	Reflectors
Runway-Parallel Taxiway Separation	150 feet
Taxiway A - East Parallel (South Section)	
Dimensions	1,600 x 20 feet with (2) 90-degree exit taxiways
Surface	Asphalt (good condition)
Marking	Centerline stripe; hold lines 125' from Rwy centerline on exit taxiways
Lighting/Reflectors	Reflectors
Runway-Parallel Taxiway Separation	Varies: 215 to 235 feet
Taxiway B - West Parallel	
Dimensions	1,600 x 20 feet with (2) 90-degree exit taxiways
Surface	Bituminous Surface Treatment (BST) (excellent condition)
Marking	Centerline stripe; hold lines 125' from Rwy centerline on exit taxiways
Lighting/Reflectors	None
Runway-Parallel Taxiway Separation	220 feet

The east side parallel (Taxiway A) is a full-length taxiway, consisting of two sections with different runway separations. The north section is 30 feet wide, extends approximately 1,200 feet from the end of Runway 16 to the mid-field exit taxiway and is located 150 feet from runway centerline. The north end of Taxiway A connects with the original runway turnaround loop and an aircraft holding area is located at the north end of the parallel taxiway.

The west parallel (Taxiway B) serves aircraft hangars located along the southwest corner of the airport. Taxiway B extends 1,700 feet from the end of Runway 34 to the midfield exit taxiway. Taxiway B is 20 feet wide with a runway separation of 220 feet.

The south section of Taxiway B is 20 feet wide and extends approximately 1,600 feet from the end of Runway 34 to the mid-field exit taxiway. The taxiway has two sections joined by an "S-curve" with runway separations of 215 feet and 235 feet. The southern-most 700 feet of

pavement widens up to 65 feet wide, with 12 light aircraft tiedowns located immediately adjacent to the west edge of the taxiway.

Aircraft hold lines are located 125 feet from runway centerline on all exit taxiways that connect to the runway. Most taxiways on the airport have edge reflectors.

Aircraft Apron

The airport's main apron accommodates aircraft parking, fueling, and fixed base operator (FBO) facilities. The fueling area and FBO building are located at the south end of the apron. The apron currently has 18 light aircraft tiedowns, configured in two single rows (tail-in) located along the eastern and western edges of the apron, with a center taxilane. The taxilane extends the length of the apron and has two connections to Taxiway A (east parallel taxiway). The markings (tiedown positions and taxilane stripes) on the apron are in good condition. The aircraft fueling area is located near the southern edge of apron, adjacent to Taxiway A2. The fueling area is configured with a single aboveground tank and card lock dispensing system to accommodate aircraft on the east side of the storage tank. The grass area located behind the main apron is also appears to be used occasionally for aircraft storage.

A small aircraft tiedown apron is located along the western edge of Taxiway A, near the south end of the runway. The area accommodates up to 12 aircraft tiedowns, although it is noted that these parking positions are located within the taxiway object free area and should be removed/relocated. **Table 2-4** summarizes existing apron facilities at the airport.

TABLE 2-4
AIRCRAFT APRON DATA

Main Apron	Approximately 632 x 120 ' (8,426 square yards) 18 Light Aircraft Tiedowns, Aircraft Fueling Asphalt Concrete
South Tiedown Apron *(located along the western edge of the east parallel taxiway)*	Approximately 500 x 45' (2,222 square yards) 12 Light aircraft tiedowns Asphalt Concrete

Agricultural Aircraft Facilities

Lebanon State Airport does not currently have any designated agricultural (AG) aircraft loading areas or associated facilities.

Rotorcraft Facilities

Lebanon State Airport does not currently have any designated rotorcraft parking areas or associated facilities. There are no locally based rotorcraft; the occasional itinerant rotorcraft park on the main apron or in the grass area behind the apron.

Airfield Pavement Condition

As part of the **Oregon Aviation System Plan**, the Oregon Department of Aviation manages a program of pavement evaluation and maintenance for Oregon's general aviation airports. This evaluation provides standardized pavement condition index (PCI) ratings, pavement features and current conditions. Through the use of MicroPAVER computer software, current pavement condition ratings are entered into the system with the specifics of each pavement section. The program is able to predict the future condition of the pavements if no action is taken (i.e. rate of deterioration) while also identifying the recommended measures needed to extend the useful life of the pavement section.

Table 2-5 summarizes airfield pavement conditions for Lebanon State Airport based on the most recent inspection conducted in October 2004. In 2004, the ratings for the pavements ranged from "excellent" to "failed." The northern 381-foot section of Runway 16/34 was rated "very good" and the remainder of the runway was rated "excellent." The majority of east parallel taxiway was rated "very good," although a section of the taxiway near the south end of the runway was rated "failed." The majority of the west parallel taxiway was rated "excellent," although the northern section (547 feet), the midfield connecting taxiway, and the southern connecting taxiway were rated "good," "fair," and "poor" respectively. The east aircraft apron was rated "very good." The average PCI for all airfield pavements at the airport in 2004 was 78, which corresponds to a "very good" pavement condition rating. The majority of airfield pavements at Lebanon State Airport were slurry sealed and crack sealed in 2000; a limited amount of sealing (taxiways) was also completed in 2004.

TABLE 2-5
SUMMARY OF AIRFIELD PAVEMENT CONDITION
(OCTOBER 2004)

Pavement	Section Design/Age	PCI Rating[1]	Condition
Runway 16/34 *(northern section)*	2" AC (1974); 6.5" Aggregate Base (1974)	96	Excellent
Runway 16/34 *(southern section)*	1.5" AC (1974); 2" AC (unknown); 6" Aggregate Base (unknown)	82 (south 381') 86 (to mid-field taxiway)	Very Good Excellent
East Parallel Taxiway *(north section)*	1.5" AC (1979); Unknown BST; Unknown Base	75 (parallel) 89 (angled exit)	Very Good Excellent
East Parallel Taxiway *(north holding area)*	Unknown AC; Unknown Base (1987)	75	Very Good
East Parallel Taxiway *(midfield-south section)*	1.5" AC (1996); Triple BST (1987); Gravel Base (1987)	76	Very Good
East Parallel Taxiway (*south 800-foot section)*	Unknown AC; Unknown Base (1974)	10	Failed
SE Hangar Taxiway Stub	Unknown AC; Unknown Base	100	Excellent
West Parallel Taxiway *(south 1,150-foot section)*	2" AC (1979); 8" Aggregate Base (1979)	98	Excellent
West Parallel Taxiway *(north 547-foot section)*	2" AC (1979); 8" Aggregate Base (1979)	61	Good
West Parallel Taxiway Connectors	Mid-Runway: 2" AC (1979); 8" Aggregate Base (1979) South: 2" AC (1974); 6.5" Aggregate Base (1974)	91 (midfield fillet) 42 (midfield exit) 26 (south exit)	Excellent Fair Poor
Main Apron	2" AC (1979); 8" Aggregate Base (1979)	79	Very Good

1. The Pavement Condition Index (PCI) scale ranges from 0 to 100, with seven general condition categories ranging from "failed" to "excellent." For additional details, see *Oregon Aviation System Plan Pavement Evaluation/Maintenance Management Program* for Lebanon State Airport (2004).

During site visits associated with this project, the airfield pavements were observed to be generally consistent with the most recent formal pavement evaluations. The runway and parallel taxiways have considerable cracking, although it appears that crack filling has been performed on

a regular basis. As noted in the PCI data, the southern section of Taxiway A has deteriorated considerably, with visible cracking, depressions and overall weathering observed. The aircraft parking apron appeared to be in good or fair condition, with minor cracking, rutting and oil spillage visible.

LANDSIDE FACILITIES

Hangars and Airport Buildings

In early 2005, the airport had 45 conventional hangars and the FBO building. The majority of aircraft hangars are used primarily for aircraft storage. Existing airport buildings are summarized in **Table 2-6**.

TABLE 2-6
AIRPORT BUILDINGS

Area of Airport	Existing Use
East Side (Main Apron)	
FBO Building	FBO Operations
Conventional Hangar (1)	Aircraft Storage
East Side (South Section)	
Conventional Hangars (26)	Aircraft Storage
West Side	
Conventional Hangars (18)	Aircraft Storage

Airport Lighting

Lebanon State Airport accommodates day and night operations in visual flight rules (VFR) conditions. Runway 16/34 is equipped with medium intensity runway edge lighting (MIRL) and threshold lights. The runway lights are in good condition and are set on a dusk-to-dawn automatic (photocell) switch. The taxiways on the airport do not have any lighting, although most taxiways have edge reflectors; major exit taxiways are marked with blue light fixtures as part of the runway edge lighting. Both runway ends are equipped with visual approach slope indicators (VASI).

The airport rotating beacon is mounted on a platform southeast of the terminal apron. The beacon is also set on an automatic dusk-dawn switch. The airport has two wind cones located on

the west side of the runway; a lighted wind cone is located south of the midfield exit taxiway and an unlighted wind cone is located near the end of Runway 16. **Table 2-7** summarizes existing airport lighting at Lebanon State Airport.

Overhead flood lighting is mounted on most hangars around the airport. Additional overhead lighting is located near the FBO building on the main apron.

TABLE 2-7
AIRPORT LIGHTING

Component	Type	Condition
Runway Lighting	Medium Intensity Runway Edge Lighting (MIRL)	Good
Runway Approach Lighting	None	N/A
Visual Guidance Indicators	Visual Approach Slope Indicators (VASI) Rwy 16&34	Good
Taxiway Lighting or Reflectors	Reflectors	Good
Lighted Airfield Signage	None	N/A
Airport Lighting	Airport Rotating Beacon	Good

AIRSPACE AND NAVIGATIONAL AIDS

Lebanon State Airport operates under visual flight rules (VFR) conditions and does not have any ground-based electronic navigational aids. The previous airport master plan recommended development of non-precision instrument approach capabilities at the airport. This recommendation will be reexamined in the facility requirements analysis. **Table 2-8** summarizes existing navigational aids and related items.

TABLE 2-8
NAVIGATIONAL AIDS AND RELATED ITEMS

Type	Facilities
Electronic Navigational Aids	None on site. Nearest Locations: Corvallis VOR/DME (15.7 nm WSW) 115.4 MHz Lewisburg NDB (15.7 nm WSW) 225 KHz Eugene VOR (27.6 nm SW) 112.9 MHz
Instrument Approaches	None
Weather Observation	None
Communication	Common Traffic Advisory Frequency (CTAF) - 122.8 MHz

The area surrounding the airport includes a variety of uses including residential, commercial, industrial and agricultural. Airport Road crosses through the runway protection zone (RPZ) for Runway 34 and Oak Street travels through the RPZ for Runway 16. The threshold for Runway 34 is displaced 387 feet to increase obstruction clearance for vehicles and trees located within the approach. The Runway 16 approach appears to be unobstructed.

Local airport traffic pattern altitude is 1,344 feet above mean sea level (MSL), which is approximately 1,000 feet above ground level (AGL) with standard left traffic.

Tables 2-9 and 2-10 summarize notable obstructions, special airspace designations and IFR routes in the vicinity of Lebanon State Airport, as identified on the Seattle Sectional Aeronautical Chart. Local airport operations and flight activity is not affected by the noted airspace or obstructions located in the vicinity of the airport.

TABLE 2-9
LOCAL AIRSPACE OBSTRUCTIONS/FEATURES
(10 NAUTICAL MILE RADIUS)

Type of Obstruction	Distance From Airport
Tower	1.5 miles southwest of airport (on Peterson Butte); 1,621' MSL
Tower	1.0 miles north of airport; 570' MSL

TABLE 2-10
AIRSPACE/INSTRUMENT ROUTES

Airspace Item	Description	**Location**
Low Altitude Enroute Airway	Victor 448 – 4,000 feet mean sea level minimum enroute altitude (MEA)	1.5 nautical miles east. Extends from Eugene VORTAC on the 010-degree radial.
Low Altitude Enroute Airway	Victor 536 – 4,000/6,000 feet mean sea level minimum enroute altitude (MEA)	4 nautical miles south. Connects Corvallis and Deschutes VORTACs on a 081-261 degree course.
Low Altitude Enroute Airway	Victor 23 – 3,000 feet mean sea level minimum enroute altitude (MEA)	5.5 nautical miles west. Connects Eugene and Newberg VORTACs on a 355-175 degree course.
Class E Airspace	Associated with terminal instrument procedure (700 feet above ground level)	2 miles northwest; associated with Albany Airport

AIRPORT SUPPORT FACILITIES/SERVICES

Aircraft Fuel

Aviation gasoline (AVGAS) is available for sale at the airport. The airport has one double wall aboveground fuel storage tank for 100LL AVGAS, located near the south end of the main apron, opposite the FBO building. The fuel storage tank is equipped with a cardlock system. Jet fuel is not available for sale at the airport.

Surface Access and Vehicle Parking

Vehicle access to the FBO, main apron and eastside hangar areas is provided by two airport access roads that extend from Airway Road. A paved vehicle parking area (27 spaces) is located adjacent to the FBO building and main apron. A paved access road extends from Airport Road, near the south end of the runway to serve the hangars located on the west side of the runway.

Fencing

A project was completed in 2003 that extended chain link fencing around the main section of the airport perimeter with electronic vehicle gates installed at main access points. The new fencing sections (eastern, southern and western property sections) were connected to existing fencing on

the northern and eastern sections of the airport. The fencing project did not include the area of airport-owned property located south of Airport Road, which has limited wire fencing.

Utilities

Lebanon State Airport is located within city limits and the east side of the airport has water, electric, sanitary sewer and telephone service through lines that run along Airway Road. It is noted that the eastern section of the airport directly abuts Airway Road at only two points (at the FBO and at the SE airport access road). This limits access to the adjacent utility lines to these two points; providing any additional utility connections along the east side of the airport would require easements or acquisition of adjacent privately owned parcels.

The local fire district has indicated that the lack of water service to the west side hangar area limits fire response capabilities. Extending fire hydrants to the west side of the airport is recommended to provide adequate fire protection for existing and any future hangars.

LAND USE PLANNING AND ZONING

Lebanon State Airport is located at the western edge of the City of Lebanon in the City's Limited Industrial (ML) Zone. The airport is juxtaposed between Airport Road to the south and Oak Street to the north, and also borders narrow properties fronting on Airway Road, immediately east of the runway. The ML Zone does not include airports and/or aviation activities as either conditionally or outright permitted uses. Recommendations for changes in existing zoning to conform to Oregon land use guidelines for airports will be addressed in the land use evaluation conducted as part of the environmental review. East of the airport (across Airway Road), some areas are zoned City of Lebanon, Mixed Use (MU), which allows a wide range of activities, subject to approval by the Planning Commission. Land uses abutting Lebanon State Airport are predominantly a mix of agricultural and limited industrial activities. A large area of residential land use is located north of the airport, within one-half mile on the extended centerline of the runway. The City of Lebanon annexed a large area of land located immediately west of the airport in late 2004. Future development of this area may include airport expansion and industrial development. Additional areas located near the southwest corner of the airport, and further south of the airport are currently located outside the city limits, but within the City's urban growth boundary. These areas have future industrial land use designations in the City's comprehensive plan.

AIRPORT SERVICE AREA

The airport service area refers to the area surrounding an airport that is directly affected by the activities at that airport. Normally a 30 or 60-minute surface travel time is used to approximate the boundaries of a service area. The nearest public-use airports in the vicinity of Lebanon are located in Albany and Corvallis with surface travel times ranging from 20 to 30 minutes. In addition, there are more than a dozen privately owned airports located within a 20-mile radius of Lebanon State Airport.

Lebanon State Airport serves a variety of general aviation users within the community and in outlying areas. The close proximity of airports in Albany and Corvallis creates some competition between the airports due to overlapping service areas. However, it appears that each of the airports play an important role in serving general aviation users, providing access to air transportation and supporting local economies. When multiple airports are located within an airport's local service area, competition to attract aircraft and tenants can fluctuate based on facility and market related elements. The availability and price of hangar space, fuel and aircraft services tend to be key market factors in activity within an airport's service area. Airfield facility capabilities such as runway length or instrumentation are primary factors in determining the typical user base for an airport. Establishing an instrument approach at Lebanon State Airport has been identified as a needed improvement in the City of Lebanon's Master Transportation Plan. The issues associated with developing an instrument approach at the airport are discussed in detail in Chapter Four (Facility Requirements). **Table 2-12** lists the public airports in the vicinity of Lebanon State Airport.

TABLE 2-12
PUBLIC USE AIRPORTS IN VICINITY
(WITHIN 15 NAUTICAL MILES)

Airport	Location	Runway Dimension (feet)	Surface	Lighted Runway ?	Fuel Available ?
Albany Municipal	8 NM northwest	3,004 x 75	Asphalt	Yes	Yes
Corvallis Municipal	15 NM west	5,900 x 150 (primary rwy)	Asphalt	Yes	Yes

CHAPTER THREE
AVIATION ACTIVITY FORECASTS

INTRODUCTION

The purpose of this chapter is to prepare updated forecasts of aviation activity for the twenty-year planning period addressed in the Airport Layout Plan Update (2004-2024). The updated forecasts will provide the basis for estimating future facility needs at Lebanon State Airport. The scope of work for this project suggests use of the most recent Oregon Aviation System Plan (OASP)[5] forecasts (1994-2018), with revision as required, to reflect current conditions. FAA-approved airport master plan[6] forecasts (1990-2010) are relatively recent and will also be reviewed. These forecasts, combined with the Federal Aviation Administration (FAA) Terminal Area Forecasts (TAF) will be compared with recent activity data to determine how closely the projections track with actual events. Once the relevance of existing forecasts is determined, a judgment can then be made regarding their use in developing updated projections for the current twenty-year planning period.

Economy

The economy of Lebanon and Linn County has traditionally been heavily dependent on natural resources with wood and paper product industries being major local employers. Other leading employment segments include manufacturing, agriculture, retail trade, services and government. The Oregon Employment Department 2002-2012 employment projections for the region that includes Linn, Benton and Lincoln Counties, indicates a slight increase (1.4 percent) in goods producing employment and a 12.7 percent increase in service producing employment. These projections suggest that the economy will continue its transition with most new jobs being in service-related sectors. A Lowe's distribution center planned for Lebanon on a 204-acre site, west of the airport. According to the project summary provided on the City of Lebanon's

[5] Oregon Continuous Aviation System Plan, Volume I Inventory and Forecasts (1997, AirTech).

[6] Lebanon State Airport Master Plan 1990-2010 (W&H Pacific, July, 1994)

website, the facility is expected to open by 2007, creating an estimated 400 to 750 family wage jobs. Economic incentives totaling approximately $12 million are being provided to Lowe's by the State of Oregon Lottery Fund, City of Lebanon and Linn County, with the local government investment to be paid back through collection of property taxes.

In recent years, unemployment rates within Linn County have been consistently higher than the statewide average, with rates ranging from 6 percent to a peak of 15 percent in 1982. In 2003, Linn County's unemployment rate peaked at 10.9 percent; the July 2004 unemployment rate was 8.9 percent, which illustrates a seasonal component in the employment levels.[7]

The use of private aircraft for personal and business transportation is an important element in Lebanon's economy, particularly as new businesses are attracted to the community. With the nearest commercial air service available in Eugene or Portland, Lebanon State Airport accommodates general aviation aircraft used by local residents, businesses and visitors. The airports located in Corvallis and Salem provide the facilities and services required to accommodate larger business aviation activity. In its role as a community general aviation airport, Lebanon State provides a convenient transportation option for general aviation and business users operating light single-engine and multi-engine aircraft.

Population

Population growth within Lebanon and Linn County has been moderate in recent years and that trend is expected to continue in the future. Lebanon's population in 2003 was estimated at 13,140, while Linn County's population was estimated at 104,900.[8]

Between the 1990 and 2000 census, the population of Lebanon increased by 18.3 percent, which equals an average annual increase of 1.69 percent. During the same period, Linn County population increased by 13 percent, which equals an average annual increase of 1.23 percent. Population estimates for July 2003 indicate that recent growth has slowed considerably compared to the previous ten-year period. During the three years between 2000 and 2003 Lebanon's average annual growth rate slowed to 0.49 percent; Linn County's population growth slowed to 0.59 percent per year during the same period.

[7] Oregon Employment Department Workforce Analysis (2004)

[8] Portland State University Center for Population Studies (July 1, 2003)

Long-term population forecasts for Linn County continue to reflect modest growth. The Oregon Office of Economic Analysis projects Linn County population will increase 20 percent by 2025 and 39 percent by 2040. These long-term forecasts equate to average annual growth rates of approximately 0.90 percent.

The modest forecasts of population growth for the community and region suggest that future aviation demand at Lebanon State Airport can be expected to be generally consistent with community growth trends. However, for many smaller airports, the ability to attract new tenants and promote growth in air traffic is often a reflection of the ability of airport management to maintain and improve facilities, and effectively compete for market share.

Airport Site and Local Market Factors

Lebanon State Airport is configured with very limited depth of developable lands on either side of the runway-taxiway system. This narrow configuration has strongly influenced the development of predominantly of small and medium individual box (conventional) hangars, rather than the combination of T-hangars and conventional hangars commonly found at other general aviation airports. The continued development of small conventional hangars on the west side of the runway has been facilitated by the 2003 taxiway extension project, noted earlier.

While the development of individual conventional hangars does not appear to have been constrained significantly by the airfield configuration, the absence of space capable of accommodating T-hangar development has likely contributed to a shortage of "rental" hangar space available to prospective aircraft owners. The availability of competitively priced hangar rental space is often a key factor in an airport's ability to attract and retain based aircraft.

In a related development, Albany Municipal Airport has added more than 50 new T-hangar spaces since 2000, after many years without any increase in hangar capacity. Armed with renewed local political support and the airport's first master plan update[9] in twenty years, the amount of public and private investment at Albany Municipal has dramatically increased in the last few years, which has coincided with a significant increase in based aircraft. To some degree, activities at Albany Municipal Airport directly affect market demand at Lebanon State. As a result, Albany's recent hangar construction would be expected to affect demand for hangar space at all airports within a 30- to 60-minute drive time, including Lebanon State.

[9] Albany Municipal Airport Master Plan Update (David Miller, Century West Engineering; Aron Faegre & Associates, 2002)

However, based on the strength of the regional market, it is reasonable to expect demand to periodically exceed available capacity, which would prompt new waves of hangar construction activity. Each of the airports within the local service area has unique competitive advantages. The ability of the individual airports to respond to market demand will largely determine which airports have more success in attracting new aircraft. Another factor that suggests favorable long-term market potential for Lebanon State is the failure to develop a regional airport in Linn County as a replacement for Albany and Lebanon. In the absence of a new regional airport, local air service area demand will gravitate to the existing airports best able to compete for the business.

Although any number of changes in local market conditions could stimulate based aircraft numbers well beyond recent historic trends at Lebanon State, the airport's existing site constraints are expected to continue being a primary factor in the airport's ability to expand facilities and accommodate demand. Extensive planning efforts have been undertaken in the past to improve and expand Lebanon State Airport, most of which involved recommendations to acquire property and make major changes to the airfield and existing surface roadways. Most of the recommendations of the 1990 Airport Master Plan[10] were ultimately discarded by ODA when it became apparent that the plan, which reflected major airfield expansion, was not consistent with local community and surface transportation plans. Considering these historical events, it does not appear reasonable to base future demand scenarios and airport facility planning on major expansion of the airport.

Therefore, for purposes of this forecasting exercise, it is assumed that future aviation demand will be related to the capabilities/constraints of the existing site, rather than being dependent on an expanded site. In the event that property acquisition is accomplished that could materially affect the airport's ability to accommodate a large increase in based aircraft, such as a multiple T-hangar development, it would then be appropriate to update the aviation activity forecasts to reflect actual events.

[10] Lebanon State Airport Master Plan 1990-2010 (W&H Pacific, Finalized 1994)

Recent Historic Activity

Based Aircraft

The current number of based aircraft at Lebanon State Airport is estimated at 57,[11] up from 42 cited for 1990 in the Airport Master Plan. **Table 3-1** summarizes recent based aircraft totals at Lebanon State Airport.

TABLE 3-1
2004 BASED AIRCRAFT
LEBANON STATE AIRPORT

Aircraft Type	2004 (Estimate)
Single Engine Piston	54
Multi-Engine Piston/Turbine	3
Helicopters, Other	0
Total	**57**

Source: OPA Based Aircraft Census (11/04)

Aircraft Operations

Aircraft operations estimates for Lebanon State Airport are available for seven separate years between 1981 and 2001, through the Oregon Department of Aviation's automated acoustical (RENS) activity counting program. In the absence of air traffic control tower records, RENS counts generally provide the most reliable estimates of activity for uncontrolled airports. The RENS program uses a counting device that is triggered by specific noise level (aircraft engine noise) normally associated with an aircraft takeoff. Four seasonal on-site data samples are normally collected over a twelve-month period (October to October) for use in creating statistically derived estimates of operations.

Table 3-2 summarizes the RENS activity counts conducted for Lebanon State since 1981. In the period since the last master plan was completed, five separate RENS counts have been conducted. Four of the five counts were significantly lower (29 to 55 percent) than the 1990 base

[11] November 2004 Aircraft Census (Lebanon OPA Chapter)

year air traffic estimate of 14,800 operations. Only one count (1995) was higher (11 percent) than the 1990 estimate.

TABLE 3-2
SUMMARY OF ODA ACTIVITY COUNTS
LEBANON STATE AIRPORT

	1981	1987	1994	1995	1997	2000	2001
Annual Operations	11,662	14,026	8,887	16,444	9,855	10,558	6,691
Net Increase or Decrease Over Prior Count	--	+20.3%	-36.6%	+85.0%	-40.1%	+7.1%	-36.6%

Source: Oregon Department of Aviation, RENS acoustical counts.

The most recent count (2001-2002) was the lowest count recorded by ODA over the last twenty years. Although the unusually low count may have been affected by unique local conditions or some counting irregularities, it is known to have coincided with a sharp decline in national general aviation activity that was strongly influenced by the lingering effects of the "9/11" terrorist attacks and a lagging economy. There is no indication the number of based aircraft at Lebanon declined significantly during this period, which suggests that aircraft utilization during the period was well below normal. As a result, the ODA 2001 count is not considered to be representative of current activity or long-established historic aircraft utilization levels at Lebanon State.

Figure 3-1 depicts the range of RENS counts since at Lebanon State since 1981. Although there is considerable fluctuation between individual counts, a modest downward trend is visible within the range of counts. **Figure 3-2** depicts the RENS counts in relation to historic operations estimates from FAA TAF. It appears that the recent TAF operations estimates generally run higher than recent RENS counts, which may warrant an adjustment of future TAF projections.

Table 3-3 compares previous master plan estimates, FAA based aircraft data and ODA RENS operations data, which yield an activity ratio, which is useful in gauging trends. A review of activity ratios generated between 1987 and 2001 indicates an average of 260 operations per based aircraft; another calculation that removes the high and low counts within the sample results in an average ratio of 248 operations per based aircraft. These ratios are significantly lower than those used to project operations forecasts in the 1990 Airport Master Plan (352 to 430 operations per based aircraft). Although it appears that the airport has occasionally generated this level of activity (as evidenced in the 1995 count), it has not been sustained and may have even declined in recent years.

For the purposes of estimating current air traffic activity, a historic aircraft utilization level of 250 operations per based aircraft was applied to the current estimate of 57 based aircraft, resulting in 14,250 aircraft operations. This operations level is higher than the most recent ODA activity count, but is comparable to the airport's historic aircraft utilization levels over the last twenty years. An updated RENS count is recommended in the near future to gauge current activity.

TABLE 3-3
SUMMARY OF HISTORICAL AVIATION ACTIVITY
LEBANON STATE AIRPORT

Year	Aircraft Operations	Based Aircraft	Operations Per Based Aircraft	Data Source
1981	11,662	41	284	1,2
1987	14,026	55	255	1,2
1990	14,800	42	352	3
1994	8,887	42	212	1,2
1995	16,444	40	411	1,2
1997	9,855	40	246	1,2
2000	10,558	40	264	1,2
2001	6,691	43	156	1,2
2004	--	57	--	4
Mean*	*11,160*	*45*	*261*	-

Data Sources/Notes:

1. ODA RENS Aircraft Activity Counter Program
2. FAA TAF Data (BASED AIRCRAFT)
3. 1990 Airport Master Plan Base Year Data (estimates)
4. OPA Lebanon Chapter Airport Survey

* Mean calculation for aircraft operations does not include 1990 data, where operations were estimated; the mean calculation for based aircraft does not include 1990, but does include the 2004 estimate.

FIGURE 3-1
SUMMARY ODA ACTIVITY COUNTS
LEBANON STATE AIRPORT

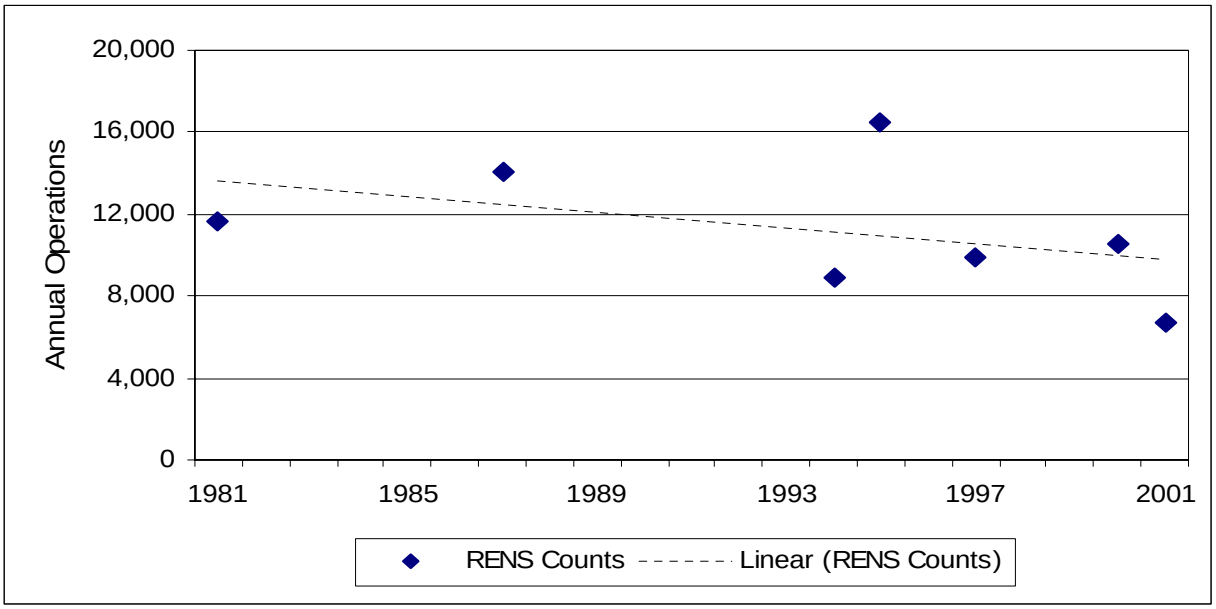
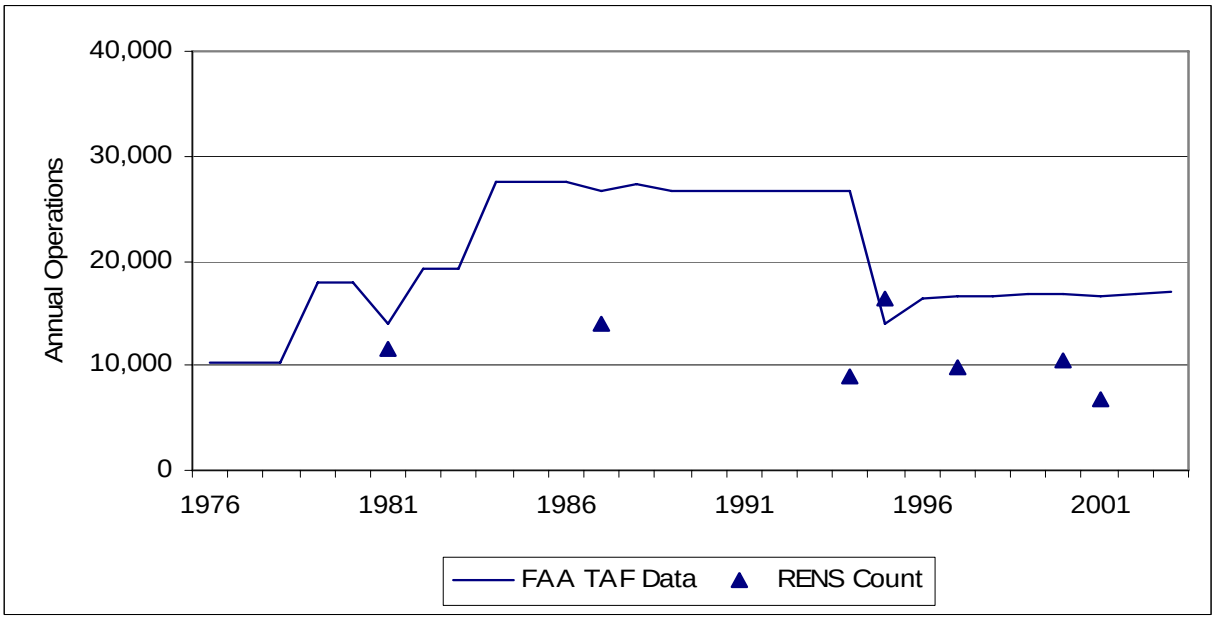


FIGURE 3-2
SUMMARY OF ODA ACTIVITY COUNTS & TAF DATA
LEBANON STATE AIRPORT



REVIEW OF EXISTING FORECASTS

Existing aviation forecasts for Lebanon State Airport are summarized below and in **Table 3-4**.

1990 Airport Master Plan

The 1990 master plan forecasts assumed annual population growth within Linn County to be approximately 0.49 percent (1987-2008).[12] Current population forecasts also reflect modest growth, which indicates that the broad underlying assumptions related to population growth used in the 1990 forecasts have not changed significantly in recent years.

The 1990 master plan forecasts projected based aircraft to increase from 42 to 50 (+19%) by 2010, which equals an annual average growth of **0.88 percent**. The current (2004) estimate of 43 based aircraft is 5 aircraft below the master plan forecast for 2005, which reflects a net increase of only approximately 2.4 percent over the 14-year period.

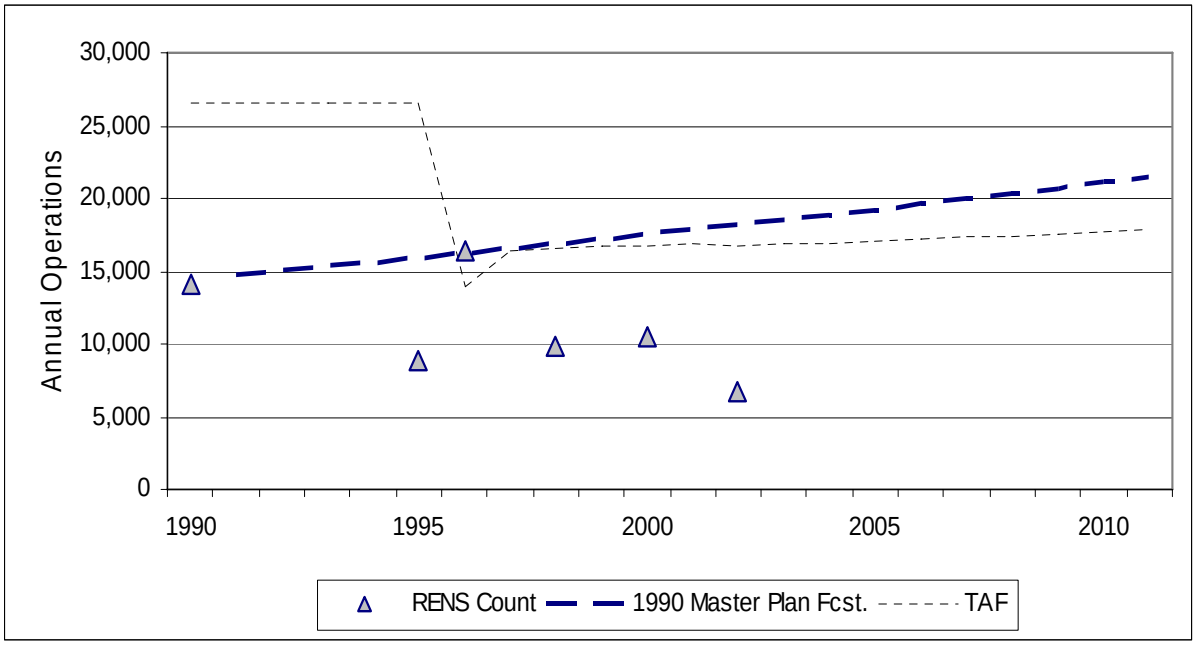
Aircraft operations were projected to increase by 45 percent, from 14,800 in 1990 to 21,500 in 2010. This equals an annual average growth of **1.88 percent**. The higher rate of growth for aircraft operations (compared to based aircraft) reflected gradually increasing (352 to 430) aircraft utilization ratios. The 1990 base year operations level was comparable to the most recent ODA count (1987: 14,026 operations). However, as indicated in **Figure 3-3**, most subsequent RENS counts at Lebanon State have fallen well below the 1990 master plan operations forecasts. The current estimate of aircraft operations noted above (10,750) is 27 percent below the 1990 base year operations estimate and 45 percent below the 2005 forecast.

As a result, while the master plan forecast of based aircraft remains within a reasonable margin, the operations forecast deviates significantly from actual activity and is no longer considered valid for use in projecting long-term activity.

[12] Bonneville Power Authority Forecasts

FIGURE 3-3

REFERENCE: ODA RENS COUNTS, TAF & 1990 MASTER PLAN FORECAST
LEBANON STATE AIRPORT



Oregon Aviation System Plan (OASP)

The 1997 OASP forecasts reflect growth in based aircraft and aircraft operations that are relatively consistent with the 1990 master plan forecasts. Overall, based aircraft and operations at Lebanon State Airport were both forecast to increase by 25 percent between 1994 and 2014, which equals an annual average growth of **1.15 percent**. Between 1994 and 2014, based aircraft were projected to increase from 39 to 49 and aircraft operations were projected to increase from 14,720 to 18,400. The 2000 Oregon Aviation Plan updated the 1997 forecasts by extrapolating previously defined growth rates out to 2018. For 2018, based aircraft were projected to increase to 52, with aircraft operations increasing to 19,357.

A recent surge in based aircraft has resulted in current totals exceeding the long-term OASP forecasts of based aircraft. In general, the OASP operations forecasts have run consistently higher than most subsequent activity counts conducted by ODA. The OASP forecasts also reflect higher aircraft utilization levels (376-382 operations per based aircraft) than are evident in the historic activity counts conducted at the airport in recent years.

As a result, while the forecast of based aircraft provides a broad trend that can be extended into the future, the operations forecast does not reflect current activity trends. However, the forecast could provide a reasonable "high" growth scenario to help gauge the sizing for potential facility development reserves.

FAA Terminal Area Forecasts (TAF)

The Federal Aviation Administration (FAA) maintains forecasts for Lebanon State Airport in the TAF. The TAF projects an increase in based aircraft from 43 (2002 base year estimate) to 48 in 2020. This reflects an overall increase of 12 percent, which translates into an average annual growth rate of **0.65 percent**. The TAF projects aircraft operations to increase from 16,814 (2002) to 19,076 in 2020. The increase of about 13.5 percent translates into an average annual growth rate of **0.70 percent**. The slightly faster growth projected for aircraft operations compared to based aircraft is reflected in gradually increasing aircraft utilization ratios. It appears that the TAF accurately reflects current based aircraft levels, although as with the other existing forecasts, operations projections are considerably higher than recent historic activity levels. However, the TAF provides a reasonable projection of future activity for comparison with updated forecasts.

The FAA's long-term forecasts project a very conservative increase the number of aircraft in the U.S. general aviation fleet. The FAA 2001-2015 TAF projects that total airport operations within the Northwest Mountain Region will increase 17.5 percent by 2015, which is an annual average increase of approximately 1.08 percent.

TABLE 3-4
EXISTING AVIATION FORECASTS

Source	1994/95	1999/00	2004/05	2009/10	2014/15	2018	2020
Based Aircraft ***2004 Estimate: 57***							
1990 Airport Master Plan *(0.88% AAR)*	44	46	48	50	--	--	--
1997 / 2000 OASP *(1.15% AAR)*	39	40	43	46	49	52	--
TAF *(0.65% AAR: 2003-2020)*		40	43	44	46	47	48
Aircraft Operations ***2004 Estimate: 14,250****							
1990 Airport Master Plan *(2.34% AAR)*	16,200	17,800	19,600	21,500	--	--	--
1997 / 2000 OASP *(1.15% AAR)*	14,720	15,280	16,210	--	18,400	19,357	--
TAF *(0.70 AAR: 2003-2020)*	26,600	16,778	17,065	17,693	18,321	18,823	19,076

- Note: Adjacent forecast years (i.e., 1994 OASP and 1995 airport master plan) have combined in this table for convenient comparison; TAF data presented for earliest year of each grouping.
- * Estimate of 2004 aircraft operations prepared by David Miller, AICP.

Updated Forecasts

Based on the review of existing forecasts, an updated forecast of based aircraft and aircraft operations was developed to reflect airport development potential and the long-term growth expectations for the community and region. The updated forecasts are summarized in **Table 3-5**. The FAA TAF and OASP forecasts are listed in **Table 3-4** and are also included in the updated forecasts graphs (**Figures 3-4 and 3-5)**.

The updated (ALP 2004) forecast of based aircraft ranges from the current 57 aircraft to 69 in 2024. The net increase of 12 aircraft (+21.1%) equates to an average annual growth rate of **0.96 percent**. A significant factor in the modest based aircraft forecasts is site development constraints described above and the historic changes in based aircraft levels at the airport over the last twenty years. As noted earlier, any significant changes in the historic development trends at the airport could result in significantly higher growth. However, based on the uncertainty associated with these conditions, it is recommended that adequate development reserves be

identified on the airport or through future property acquisition, capable of accommodating at least a 100 to 150 percent increase of the 20-year based aircraft forecast.

The 2004 estimate of 14,250 operations and 57 based aircraft results in a ratio of 250 operations per based aircraft. An updated forecast of aircraft operations was developed by initially applying this level of aircraft utilization, gradually increasing to 260 operations per based aircraft by the end of the 20-year planning period. As indicated in the historic data, aircraft utilization ratios at Lebanon have fluctuated widely in recent years. However, for the purposes of projecting future demand, this ratio appears to represent a level of activity that can be sustained through the current planning period as the airport develops its limited land base.

The gradually increasing ratio reflects a balance between current and recent utilization levels and also reflects the airport's ability to maintain a strong user base through the planning period. Aircraft operations are forecast to increase from 14,250 to 17,940 operations (+25.9%) by 2024, which equals an average annual increase of **1.16 percent** above current levels.

Air Traffic Distribution/Design Aircraft

Both the 1990 master plan and 1997 OASP forecasts assumed that local operations accounted for 60 to 62 percent of total airport activity, with itinerant operations (GA, air taxi, etc.) accounting for 38 to 40 percent of total operations. Local operations include flights that begin and end at the airport (i.e., aircraft within the traffic pattern (touch and go), aircraft operating near the airport, etc.). In the absence of significant volumes of flight training activity, local operations typically account for relatively low percentage of overall activity.

The FAA TAF forecasts for Lebanon State project a lower level of local aircraft operations (37%). For the purposes of updating the forecasts, the TAF split of 37/63% for local/itinerant operations appears to more closely reflect typical activity trends for most small general aviation airports and will be used in the preparing the updated forecasts.

The 1990 master plan identified a light twin-engine aircraft (Beechcraft Baron) as representative of the current design aircraft. The Beechcraft Baron is included in Airplane Design Group I and Approach Category B (B-I). The B-I category also includes many light twin-engine piston aircraft. By FAA definition, the "design aircraft" must have a minimum of 500 itinerant annual operations, which at Lebanon State, is met by a combination of locally based and itinerant aircraft.

The 1990 master plan's future design aircraft was assumed to be a twin-engine turboprop aircraft, such as the Beechcraft King Air, included in Airplane Design Group II and Approach Category B

(B-II). However, as noted earlier, the airport's ability to upgrade to airport reference code (ARC) B-II was entirely dependent on a major facility expansion and reconfiguration of the runway-taxiway system recommended in the master plan. Since the updated forecasts of aviation activity are based on the capabilities of the existing airport site, an upgrade to ARC B-II is not feasible under current planning assumptions. In addition, based on the available length of the runway and other elements, virtually all aircraft activity is generated by aircraft weighing less than 12,500 pounds. Therefore, within Airplane Design Group I, it is appropriate to base airfield planning on the subcategory designed for "runways serving small aircraft exclusively." Small aircraft are defined as those weighing less than 12,500 pounds.

TABLE 3-5
UPDATED FORECASTS
LEBANON STATE AIRPORT

	Base Year 2004	**2009**	**2014**	**2019**	**2024**
2004 ALP Forecast (Preferred)					
Based Aircraft					
Single Engine	54	57	60	63	65
Multi Engine Piston/Turbine	3	3	3	3	4
Total	**57**	**60**	**63**	**66**	**69**
Aircraft Operations					
Local (37%)	5,270	5,550	5,940	6,230	6,640
Itinerant (63%)	8,980	9,450	10,125	10,600	11,300
Total	**14,250**	**15,000**	**16,065**	**16,830**	**17,940**
Average Operations per Based Aircraft	*250*	*250*	*255*	*255*	*260*
Operations by Critical Aircraft B-I (piston twin – 4%)	*570*	*600*	*643*	*673*	*718*

FIGURE 3-4
UPDATED BASED AIRCRAFT FORECAST
LEBANON STATE AIRPORT

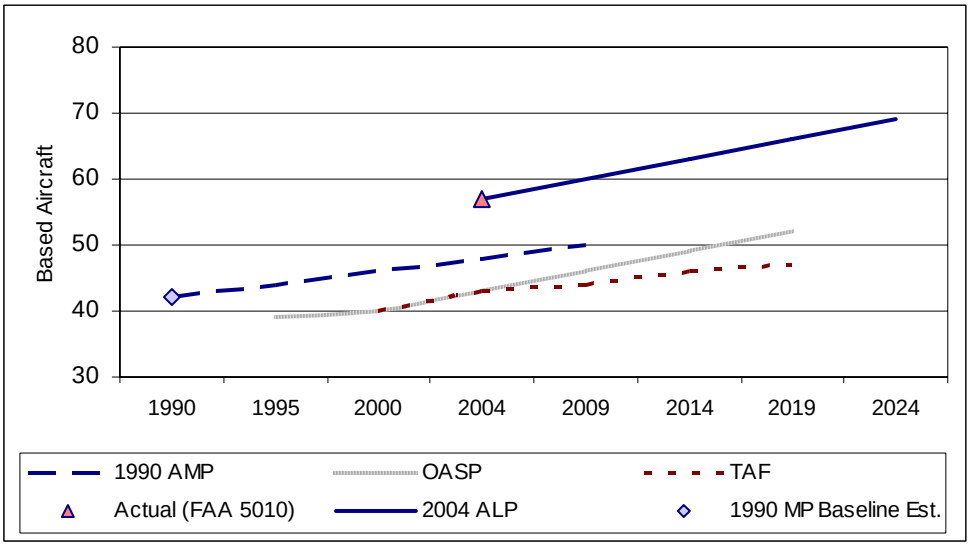
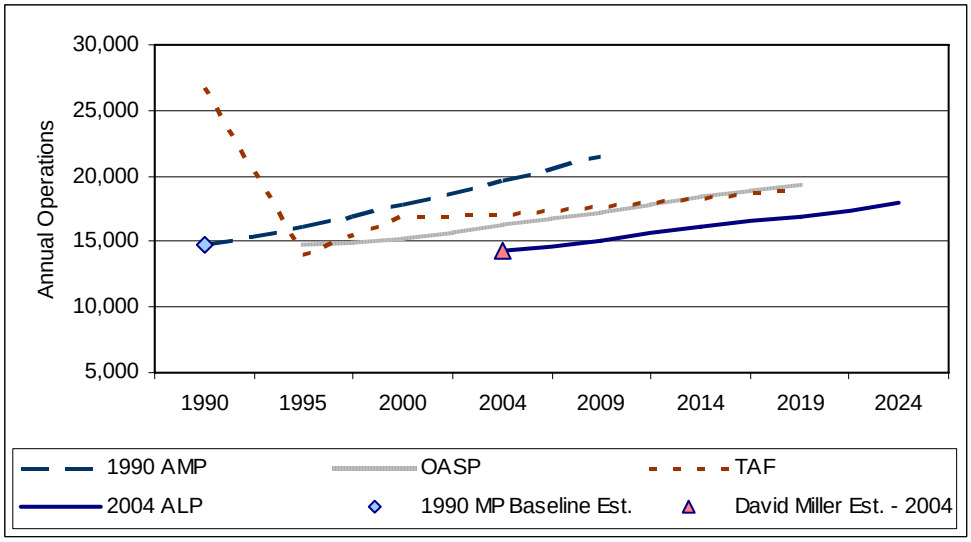


FIGURE 3-5
UPDATED AIRCRAFT OPERATIONS FORECAST
LEBANON STATE AIRPORT



CHAPTER FOUR
AIRPORT FACILITY REQUIREMENTS

INTRODUCTION

This chapter uses the results of the inventory and forecast conducted in **Chapters Two** and **Three**, as well as established planning criteria, to determine the airside and landside facility requirements through the current twenty-year planning period. Airside facilities include runways, taxiways, navigational aids and lighting systems. Landside facilities include hangars, fixed base operator (FBO) facilities, aircraft parking, aircraft fueling and automobile parking.

The facility requirements evaluation is used to identify the adequacy or inadequacy of existing airport facilities and identify what new facilities may be needed during the planning period based on forecast demand. Options for providing these facilities will be evaluated in **Chapter Five** to determine the most cost effective and efficient means for implementation.

1990-2010 Airport Master Plan Overview

The 1990-2010 Airport Master Plan[13] is the most recent comprehensive planning conducted for Lebanon State Airport. After a lengthy planning process, the FAA-approved airport layout plan (ALP) drawing was completed in July 1994 (referred to as "1994 ALP" in this chapter). As noted in Chapter Three, many of the recommendations contained in the master plan reflected a strategy to significantly expand airport facilities to accommodate larger aircraft. The major recommendations included the following items:

- *Realign the section of Airport Road located near the south end of Runway 16/34 to allow runway extension;*

[13] Lebanon State Airport Master Plan 1990-2010 (W&H Pacific, Finalized 1994)

- *Re-orient the runway approximately 10 degrees to a northwest-southeast alignment; (15/33);*
- *Expand runway to 4,170 feet long by 75 feet wide;*
- *Upgrade the airport to accommodate business turboprop aircraft (airplane design group II) by increasing separations between the runway, parallel taxiways, aircraft parking and aircraft hangars;*
- *Remove/relocate all existing hangars on the west side of the runway to accommodate redevelopment;*
- *Locate all future landside facilities (hangars, aircraft parking, etc.) on the east side of the runway; and*
- *Acquire approximately 65 acres of property along the west side of the airport and including additional parcels located north of Oak Street and south of Airport Road to accommodate the reconfigured and lengthened runway and provide adequate space for landside facility development on the east side of the runway.*

However, because the master plan lacked consistency with local community planning, it was not locally adopted or incorporated into local transportation and land use planning. Local governmental acceptance of the master plan was a critical (missing) step required to move forward and address a variety of surface transportation and land use issues affecting the proposed airport development. Although the master plan took four years to complete, it was not ultimately effective in providing an implementable development program.

In part due to site limitations documented at both the Lebanon and Albany airports, a study was conducted in 1995-96 to evaluate the feasibility of developing a new regional general aviation airport in Linn County as a replacement for the two community airports.[14] The study included thirteen recommended follow-up actions, many of which were focused on the need to develop a consensus among local stakeholders how to define and implement an effective strategy for general aviation in Linn County. However, an absence of consensus among local community and regional governments regarding how sponsorship of a new public airport would be accomplished resulted in the project eventually being dropped from further consideration.

[14] Linn County Regional Airport Feasibility Study and Site Investigation (Bucher, Willis & Ratliff Corporation, July 1996)

By the late 1990's, it became evident to the Oregon Department of Transportation – Aeronautics Division (now ODA) that the 1994 master plan had become largely obsolete and could not reasonably be implemented. In April 2003, most of the major expansion items depicted on the 1994 Airport Layout Plan were removed by ODA, and a new "existing conditions" ALP drawing was generated. The revised ALP drawing was not formally coordinated with the FAA. As a result, the 1994 ALP continues to be recognized as the "officially-approved" ALP by FAA (until completion of this ALP update). However, on an informal basis, the experience of the last master plan has led the FAA to conclude that the 1994 ALP no longer provides a realistic development program for Lebanon State Airport. This Airport Layout Plan study will evaluate the prior master plan recommendations and provide new direction in planning based on the capabilities of the existing site and established FAA airport planning and development guidelines.

The recommended facility improvements contained in the 1990 Airport Master Plan are summarized in **Table 4-1.** Although many of these recommendations are no longer valid, some items that have not been implemented may still be valid. These items will be revalidated, modified or eliminated based on the updated facility needs assessment and FAA guidelines. In recent years, the primary focus has shifted to making minor improvements to the existing airfield and accommodating privately funded hangar construction.

Lebanon State Airport has significant site constraints that limit future development within its existing land base. Options for expanding the airport site, particularly to accommodate landside developments (hangars, etc.) should be pursued where feasible and utilization of existing airport land should be optimized.

TABLE 4-1: SUMMARY OF 1990-2010 AIRPORT MASTER PLAN RECOMMENDED PROJECTS AND CURRENT STATUS

Completed Yes/No	Projects
Yes	East Side Hangar Area Site Preparation (earthwork)
No	Taxiway A Reconstruction
Yes	Southwest Taxiway to Midfield Connection
Yes	Security Fencing – Phase I
No	Runway Relocation Study/Environmental Assessment
No	Construct Agricultural Operations Area
No	Land Acquisition for New Runway (Apprx. 64 Acres)
No	Relocate Power Company (*building adjacent to Oak Road*)
Yes	Security Fencing – Phase II
No	Relocate Airport Road
No	Relocate 16 Southwest Hangars
No	Construct Relocated Runway & Construct Partial Taxiway C *(north and south sections of the new east parallel taxiway)*
No	Construct Remainder of Taxiway C *(center section of the new east parallel taxiway)*
	Other Items Completed (*Not Included in 1990-2010 Master Plan CIP*)
Yes	New aboveground AVGAS fuel tank with cardlock
Yes	Hangar Construction (private)
Yes	Improved SE vehicle access lanes (paving)

AIRPORT PLANNING OVERVIEW

A review of the 1994 Airport Layout Plan (ALP) improvements and current FAA design standards identifies several changes affecting the planning criteria previously used at Lebanon State Airport. The 1994 ALP recommended future design standards based on Airplane Design Group (ADG) II and Aircraft Approach Category B (Airport Reference Code: B-II). The future design aircraft was identified as Beechcraft King Air, which represented a typical business turboprop weighing less than 12,500 pounds. The future runway (15/33) was planned as a utility runway with non-precision instrument approaches to Runway 15. However, as noted earlier, the option of realigning and significantly expanding the runway is not considered to be feasible for the purposes of this ALP update.

Based on the existing site configuration, it is not feasible to protect the airspace needed to accommodate straight-in non-precision instrument approaches on Runway 16/34. The location of existing hangars and aircraft tiedowns (200 to 250 feet from runway centerline) prevents meeting the more stringent clearing standards required under FAR Part 77 for non-precision instrument runways. Therefore, for airspace planning purposes, visual approach capabilities for utility runways are recommended. This airspace configuration would also support development of a non-precision instrument circling approaches with visual final approach segments.

At a length of 2,877 feet, Runway 16/34 is able to accommodate slightly more than three-quarters of the small aircraft fleet under typical conditions, as defined by the FAA's runway length model (see Airside Requirements section for detailed discussion regarding runway length requirements). Considering the airport's physical site limitations and the anticipated use of the runway predominantly by light single- and twin-engine aircraft, the use of ADG I (small) design standards is appropriate. ADG I (small) differs from ADG I in a few areas including object free area, aircraft parking line, and parallel taxiway separation dimensions.

The option of upgrading facilities to accommodate a wider range of business aircraft is something that most small airports consider during the master planning process. Many turboprops and business jet aircraft are included in ADG II. The dimensional standards associated with ADG II are generally larger than the corresponding ADG I and ADG I (small) standards. For purposes of comparison, a review of design standards for ADG I (small); ADG I; and ADG II reveals the most significant design limitations associated with the site. **Figures 4-1, 4-2 and 4-3** illustrate the geometric footprint associated with the most critical design standards (presented in reverse order from the most demanding to the least demanding).

The feasibility of major facility expansion at Lebanon State Airport is limited by physical site characteristics created by public roadways bordering the airport and developable acreage. The most significant design standard limitations are related to runway-parallel taxiway separation; runway safety area clearances; runway object free area clearances; and aircraft parking and building setback distances from the runway and parallel taxiways.

As noted earlier, the length of the runway cannot be significantly increased without relocating Airport Road. However, even if the roadway issue is resolved, the close proximity of existing hangars and aircraft parking to the runway-taxiway system prevents the lateral expansion (increased parallel taxiway separations, etc.) required to upgrade beyond ADG I (small) without significant relocation of existing tenants. A comparison of the existing airport site's ability to meet specific ADG I (small), ADG I and ADG II design standards is also provided in **Table 4-5**, later in the chapter.

FIGURE 4-1: ADG B-II

FIGURE 4-2: ADG B-I

FIGURE 4-3: ADG B-I (SMALL)

Land Utilization

The current Exhibit "A" Property Plan[15] indicates that the airport land area consists of approximately 76.5 acres owned in fee simple. The acreage includes the airside area (runway-taxiway system protected areas, etc.), the east landside area (aircraft storage and support facilities), a narrow west landside development area, and land located south of the Airport Road. **Table 4-2** summarizes airport land uses based on the existing airfield configuration.

TABLE 4-2:
AIRPORT LAND USE CONFIGURATION
LEBANON STATE AIRPORT

Existing Land Use	Acreage	Percentage of Total Airport Property
Airside *(Developed or Undeveloped)* Runway, Parallel Taxiways, Runway Protection Zones, Object Free Area, Runway Safety Area, Obstacle Free Zone, Primary Surface.	38	50%
East Landside *(Developed or Undeveloped)* Aircraft Apron, Hangars, Vehicle Parking, Access Roads, Undeveloped Land.	12	16%
West Landside*(Developed or Undeveloped)* Aircraft hangars and open space along west property line.	8	10%
South Parcel *(area south of Airport Road)* Runway Protection Zone (Rwy 34); Open Space reserved for future aviation-related development.	18	24%
Total	**76**[1]	**100%**

1. Rounded from 76.50 acres, Exhibit "A" drawing (signed 4/73)

The airside area of the airport accounts for half of the airport's total land base (65% of the eveloped airfield area) and is limited both lengthwise (by public roads) and laterally (by adjacent landside development and the east and west boundaries of the airport). The southern parcel of airport land located south of Airport Road represents one-quarter of the airport land base, but is physically disconnected from the main portion of the airfield by the roadway. Although not currently accessible for aircraft-related development, the southern parcel provides valuable protection for the Runway 34 approach and the RPZ for Runway 34. The east landside area accommodates the majority of hangar, parking and aircraft support functions. This area has a

[15] Exhibit "A" Property Plan – Oregon State Aeronautics Division (approved 4/73)

small amount of developable land located along the east parallel taxiway and behind the aircraft apron. The west landside area is a narrow strip of land that accommodates small conventional hangars; the northern portion of this area is currently undeveloped.

In its current configuration, the runway and most required clear areas associated with the airside facilities are contained within airport property. The runway protection zone (RPZ) for Runway 34 is crossed by Airport Road, but is otherwise contained within airport property boundaries; the RPZ for Runway 16 extends beyond airport property and is crossed by Oak Street. The Exhibit "A" drawing depicts avigation easements for both ends of the runway that are intended to protect the approach surfaces and approach transitional surfaces. Airport management should periodically review all avigation easements to ensure that they remain in force.

Although the undeveloped landside areas at Lebanon State Airport are largely limited to the west side of the runway, the airport appears to have adequate land capacity to accommodate the modest forecast demand for hangars, aircraft parking and associated facilities contained in Chapter Three.

However, if construction of hangars accelerates significantly beyond historic trends and 20-year forecast demand, the landside area will quickly reach capacity. In addition, the narrow configuration of the airport limits the size or type of hangars that can be constructed within the existing landside areas. With local community support, it may be possible to pursue future property acquisition to expand landside capacity. However, without additional development area, it is evident that Lebanon State Airport will eventually exhaust its landside capacity.

It is noted that existing developable land around the airport is quickly being developed in a variety of uses. Therefore, the opportunity to acquire undeveloped adjacent lands to protect for future airport use could be preempted by near-term competition from non-aviation development interests. For this reason, property acquisition should be considered among the highest investment priorities for the airport.

Airspace

The airspace surfaces depicted on the 1994 Airspace Plan[16] were based on utility runways and non-precision approaches for the new runway (15/33). As noted earlier, the previously

[16] Lebanon State Airport – Airport Airspace Plan, W&H Pacific (7/94)

recommended runway configuration was removed from an ODA internal update of the airport layout plan in 2003.

Based on the limitations of the airport site and the activity forecasts prepared in Chapter Three, it is recommended that airspace planning for Runway 16/34 be based on standards for utility runways with visual approaches. Visual approaches could also accommodate daytime non-precision instrument approaches with circling minima.

A large area of terrain penetration was depicted on the 1994 plan in the conical surface southwest of the runway (Peterson Butte). Terrain penetration and other close-in obstructions will be reevaluated during the update of the airspace plan drawing.

The airspace features described in Chapter Two (IFR airways, military training routes, etc.) do not affect local airport operation. The airspace structure surrounding Lebanon State Airport is uncomplicated and is not expected to constrain future airport development or operation.

Instrument Approach Capabilities

Lebanon State Airport does not currently have a published instrument approach procedure (IAP). Recent changes in FAA standards for establishing instrument approaches at small (utility) airports now require that straight-in approach procedures be developed in order to obtain authorization for nighttime use. With the existing "utility-visual" airspace surfaces, a daytime-only non-precision instrument approach (circling procedure) could be developed at Lebanon State.

Upgrading the airspace to accommodate a straight-in approach to Runway 16/34 would require significant changes in the airfield development configuration and airspace. These changes would include a requirement to double the width of the runway primary surface (clear area surrounding the runway) to 500 feet. The primary surface must be kept free of obstructions (including parked aircraft). At Lebanon, a portion of the aircraft parking area is located within 200 feet of runway centerline. In order to accommodate a wider primary surface, no aircraft parking would be permitted within at least 250 feet of the runway centerline. In addition to the wider primary surface, the need to maintain an unobstructed 7:1 transitional surface slope that extends from the (relocated) outer edge of the primary surface would also affect potential locations for building heights and aircraft parking.

Similar to the earlier discussion evaluating the feasibility of upgrading beyond ADG I (small) design standards, an upgrade to non-precision instrument capabilities would significantly impact existing facilities on the airfield. The existing building restriction lines (BRL) vary from

approximately 225 to 260 feet from runway centerline. Based on the existing utility-visual airspace surface dimensions, a building height of approximately 14 feet (above runway elevation) can be accommodated *at the 225-foot BRL* without penetrating the transitional surface; the clearance height increases to approximately 19 feet at the 260-foot BRL. If the airspace surfaces were upgraded to non-precision instrument, future building heights would be severely limited to avoid penetrating the transitional surface that extends outward from the runway. Existing structures penetrating protected airspace would be required to install obstruction lighting, or in extreme cases, be removed or relocated.

Aircraft parking positions would also need to be relocated to avoid penetrating the expanded airspace surfaces. With an average tail height of 8 feet, the aircraft parking line (APL) would be located approximately 306 feet from runway centerline. However, the majority of the main apron is located too close to the runway to meet that setback. It would be necessary to develop new apron areas with increased runway separation in order to comply with a 306-foot APL.

Summary:

Based on the potential impacts on existing landside development areas and overall airport land utilization, it is recommended that Runway 16/34 and the associated airspace surfaces continue to be planned based on visual approaches. Development of a daytime-only non-precision instrument approach can be accommodated with in the existing airfield development and airspace configuration. A detailed airspace (TERPS) assessment would need to be conducted by the FAA to determine the overall feasibility of establishing an approach and the approach and visibility minimums that could be obtained.

Airport Design Standards

The selection of the appropriate design standards for the development of airfield facilities is based primarily upon the characteristics of the aircraft that are expected to use the airport. The most critical characteristics are the approach speed and wingspan of the design aircraft anticipated for the airport. The **design aircraft** is defined as the most demanding aircraft type operating at the airport with a minimum of 500 annual itinerant operations (takeoffs and landings).

Federal Aviation Administration (FAA) **Advisory Circular (AC) 150/5300-13, Airport Design**, serves as the primary reference in planning airfield facilities. **FAR Part 77, Objects Affecting Navigable Airspace**, defines airport imaginary surfaces, which are established to protect the airspace immediately surrounding a runway. The airspace and ground areas surrounding a

runway should be free of obstructions (i.e., structures, parked aircraft, terrain, trees, etc.) to the greatest extent possible.

FAA **Advisory Circular 150/5300-13** groups aircraft into five categories based upon their approach speed. Categories A and B include small propeller aircraft, some smaller business jet aircraft, and some larger aircraft with approach speeds of less than 121 knots. Categories C, D, and E consist of the remaining business jets as well as larger jet and propeller aircraft generally associated with commercial and military use; these aircraft have approach speeds of 121 knots or more. The advisory circular also establishes six aircraft design groups, based on the physical size (wingspan) of the aircraft. The categories range from Airplane Design Group (ADG) I, for aircraft with wingspans of less than 49 feet, to ADG VI for the largest commercial and military aircraft. ADG I is further divided into two subcategories: runways serving "small airplanes exclusively" and runways serving aircraft weighing more than 12,500 pounds. Aircraft with a maximum gross takeoff weight of less than 12,500 pounds are classified as "small aircraft" by the Federal Aviation Administration. As noted earlier, aircraft activity at Lebanon State Airport consists predominantly of small aircraft. A summary of typical aircraft and their respective design categories is presented in **Table 4-3.**

TABLE 4-3:
TYPICAL AIRCRAFT & DESIGN CATEGORIES

Aircraft	Airplane Design Group	Aircraft Approach Category	Maximum Gross Takeoff Weight (Lbs)
Piper PA-28/32 Cherokee	A	I	2,550
Cessna 182	A	I	2,950
Lancair Columbia 300	A	I	3,400
Cessna 206	A	I	3,600
Beechcraft Bonanza A36	A	I	3,650
Cessna 210	A	I	3,850
Beechcraft Baron 55	A	I	5,300
Socata/Aerospatiale TBM 700	A	I	6,579
Piper Aerostar 602P	B	I	6,000
Cessna P337 Skymaster	B	I	4,630
Cessna 402	B	I	6,300
Cessna 421	B	I	7,450
Cessna Citation CJ1 (CE525)	B	I	10,600
Beechcraft 99 Airliner	B	I	11,300
Beechcraft Super King Air 200	B	II	12,500
Piper Malibu	A	II	4,300
Cessna Caravan 1	A	II	8,000
Pilatus PC-12	A	II	9,920
Cessna Citation CJ2 (CE525A)	B	II	12,375
Cessna Citation Bravo (CE550)	B	II	14,800
Dassault Falcon 20	B	II	28,660
Learjet 60	C	I	23,100
Canadair Challenger	C	II	45,100
Gulfstream III	C	II	69,700

Source: FAA Advisory Circular (AC) 150/5300-13 (change 7); Jane's Aircraft Guide; aircraft manufacturer data.

The airport currently accommodates predominately Approach Category A or B and Airplane Design Group I aircraft weighing less than 12,500 pounds. The 1990 Airport Master Plan[17] recommendation that facilities at Lebanon State Airport be planned based on Aircraft Approach Category B and Airplane Design Group II (B-II) is not considered feasible due to several site-specific conditions.

[17] 1990-2010 Airport Master Plan Report for Lebanon State Airport (W&H Pacific, July 1994).

Based on a review of air traffic, site considerations and the outcome of prior planning recommendations, it is recommended that the current airport reference code (ARC) B-I (small aircraft exclusively) be maintained as the appropriate long-term planning criteria for Lebanon State Airport. The use of design standards based on **Aircraft Approach Category B and Airplane Design Group I (small aircraft exclusively) is recommended for Runway 16/34 (*Airport Reference Code - ARC B-I (small)*).** Under FAR Part 77, "utility" airspace surfaces are consistent for runways designed to accommodate with ADG I aircraft.

Airfield design standards for ADG I (small) are summarized in **Table 4-4**; ADG I and ADG II design standards are also summarized for comparison. A summary of Lebanon State Airport's current and potential compliance with the various levels of design standards is presented in **Table 4-5**. As indicated in the table, most existing facilities meet ADG I (small) design standards, but do not meet ADG I or ADG II standards for Approach Category A and B aircraft.

TABLE 4-4: AIRPORT DESIGN STANDARDS SUMMARY

(DIMENSIONS IN FEET)

Standard	Runway 16/34 *Existing Conditions*	ADG I[1] (small aircraft exclusively)	ADG I[2] A&B Aircraft	ADG II[3] A&B Aircraft
Runway Length	2,877	3,060/3,650[4]	3,060/3,650[4]	3,650/5,330[5]
Runway Width	50	60	60	75
Runway Shoulder Width	10	10	10	10
Runway Safety Area Width	120	120	120	150
Runway Safety Area Length (Beyond Rwy End)	< 120 S/240 N[6]	240	240	300
Obstacle-Free Zone Width	250	250	400	400
Object Free Area Width	250	250	400	500
Object Free Area Length (Beyond Rwy End)	< 120 S/240 N[6]	240	240	300
Primary Surface Width	250	250	500	500
Primary Surface Length (Beyond Rwy End)	< 120 S /200 N[6]	200	200	200
Runway Protection Zone Length	1,000	1,000	1,000	1,000
Runway Protection Zone Inner Width	250	250	500	500
Runway Protection Zone Outer Width	450	450	700	700
Runway Centerline to:				
Parallel Taxiway/Taxilane Centerline	150-220	150	225	240
Aircraft Parking Area[7]	195	125	200	250
Aircraft Parking Area[8]	195	194.5	320	320
Building Restriction Line[9]	225-260	251	376	376
Taxiway Width	20-30	25	25	35
Taxiway Shoulder Width	10	10	10	10
Taxiway Safety Area Width	49	49	49	79
Taxiway Object Free Area Width	89	89	89	131
Taxiway Centerline to Fixed/Movable Object	44.5+	44.5	44.5	65.5
Taxilane Object Free Area Width	79+	79	79	115
Taxilane Centerline to Fixed/Movable Object	39.5+	39.5	39.5	39.5

1. Utility (visual) runways (Per FAR Part 77); all other dimensions reflect visual runways and runways with not lower than 3/4-statute mile approach visibility minimums (per AC 150/5300-13, Change 7). RPZ dimensions based on visual and not lower than 1-mile approach visibility minimums.
2. Utility (nonprecision) runways (Per FAR Part 77); all other dimensions reflect visual runways and runways with not lower than 3/4-statute mile approach visibility minimums (per AC 150/5300-13, Change 7). RPZ dimensions based on visual and not lower than 1-mile approach visibility minimums.
3. Larger than Utility (nonprecision instrument) runways (Per FAR Part 77); all other dimensions reflect visual runways and runways with not lower than 3/4-statute mile approach visibility minimums (per AC 150/5300-13, Change 7). RPZ dimensions based on visual and not lower than 1-mile approach visibility minimums.
4. Runway length required to accommodate 95 and 100 percent of General Aviation Fleet 12,500 pounds or less. 81 degrees F, 3-foot change in runway centerline elevation.
5. Runway length required to accommodate 100 percent of General Aviation Fleet 12,500 pounds or less and 75 percent large airplane fleet (60,000 pounds or less) at 60 percent useful load. 81 degrees F, 3-foot change in runway centerline elevation.
6. Nonstandard dimension at south end of the runway (Airport Road, fence)

7. FAA minimum standard with no parallel taxiway.
8. Distance required for standard parallel taxiway OFA clearance and distance required to clear 10-foot aircraft tail height in transitional surface.
9. Distance to protect standard parallel taxiway object free area and accommodate an 18-foot structure (at the BRL) without penetrating the 7:1 Transitional Surface.

TABLE 4-5: RUNWAY 16/34 CONFORMANCE WITH FAA DESIGN STANDARDS

Item	*Airplane Design Group I (Small Aircraft Exclusively)*	*Airplane Design Group I A & B Aircraft*	*Airplane Design Group II A & B Aircraft*
Runway Safety Area	No[1]	No[1]	No[1]
Runway Object Free Area	No[1]	No[1]	No[1]
Runway Obstacle Free Zone	No[1]	No[1]	No[1]
Taxiway Safety Area	Yes	No[2]	No[2]
Taxiway Object Free Area	No[10]	No[2]	No[2]
Building Restriction Line – East	Yes	No[3]	No[3]
Building Restriction Line – West	Yes	No[3]	No[3]
Aircraft Parking Line – East	Yes	No[3]	No[3]
Runway Protection Zones	No[4]	No[4]	No[4]
Runway-Parallel Taxiway Separation	Yes	No	No
Runway Width	No	No	No
Runway Length	No[5]	No[6]	No[7]
Taxiway Width (Parallel)	No[8]	No[8]	No[9]

Notes:

1. Airport Road and fence (Rwy 34 end)
2. Inadequate space to meet standard runway-parallel taxiway clearances and parallel taxiway-building clearances.
3. Inadequate space to meet standard parallel taxiway clearances and protect nonprecision instrument airspace surfaces.
4. Roads located in Runway 16 and 34 protection zones.
5. Per FAA Runway Length Model: Existing runway length is than the FAA-recommended length required to accommodate 95% of small aircraft fleet.
6. Per FAA Runway Length Model: Existing runway length is less than the FAA-recommended length required to accommodate 100% of small aircraft fleet.
7. Per FAA Runway Length Model: Existing runway length is less than the FAA-recommended length required to accommodate 75% of large aircraft weighing less than 60,000# at 60% useful load.
8. Taxiway widths vary from 20 to 30 feet.
9. All taxiway widths less than ADG II standard (35 feet).
10. Light aircraft tiedowns located on west edge of east parallel taxiway (south section) located within Taxiway OFA

Airport Design Standards Note:

The airport planning criteria recommended for Runway 16/34 at Lebanon State Airport are based on the following assumptions:

Visual runways and runways with not lower than ¾ statute mile visibility minimums. Runway protection zones (RPZ) are based on a visibility standard of "visual and not lower than 1-mile" for runways expected to serve small aircraft exclusively. All references to the "standards" are based on these approach visibility assumptions, unless otherwise noted. (Per FAA Advisory Circular 150/5300-13, change 9). Airport Design Standards are based on Airport Reference Code (ARC) B-I (small). The ultimate FAR Part 77 airspace planning criteria is based on "utility" runways with visual approaches.

Runway Safety Area (RSA)

The FAA defines runway safety area (RSA) as "A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway." Runway safety areas are most commonly used by aircraft that inadvertently leave (or miss) the runway environment during landing or takeoff.

By FAA design standard, the RSA *"shall be:*

(1) cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations;

(2) drained by grading or storm sewers to prevent water accumulation;

(3) capable, under dry conditions, of supporting snow removal equipment, aircraft rescue and firefighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft; and

(4) free of objects, except for objects that need to be located in the runway safety area because of their function. Objects higher than 3 inches above grade should be constructed on low impact resistant supports (frangible mounted structures) of the lowest practical height with the frangible point no higher than 3 inches. Other objects such as manholes, should be constructed at grade. In no case should their height exceed 3 inches."

The recommended transverse grade for the lateral RSA ranges between 1½ and 5 percent from runway shoulder edges. The recommended longitudinal grade for the first 200 feet of extended RSA beyond the runway end is 0 to 3 percent. The remainder of the RSA must remain below the runway approach surface slope. The maximum negative grade is 5 percent. Limits on longitudinal grade changes are plus or minus 2 percent per 100 feet within the RSA. The airport sponsor should regularly clear the RSA of brush or other debris and periodically grade and compact the RSA to maintain FAA standards.

The RSA along the sides and beyond the ends of Runway 16/34 appears to be cleared, graded and free of physical obstructions. Open drainage ditches within the RSA have been identified as non-standard and will be covered, piped, or modified to meet RSA standards. The safety area located beyond the end of Runway 34 (south end of the runway) extends approximately 120 feet before reaching a fence that is adjacent to the north side of Airport Road (located approximately 130 feet from the runway end), well short of the ADG I standard of 240 feet of RSA beyond the runway end. The threshold for Runway 34 has been displaced 387 feet to improve obstruction clearance for landing aircraft.

However, FAA design standards do not consider threshold *displacement* to be an adequate measure to address deficient RSA beyond runway ends. Although a displaced threshold provides additional clear area in front of the "runway" for an aircraft that may land short, it does not address the RSA deficiency for aircraft departing from the opposite end of runway, since the entire length of pavement is available for "takeoff." A *relocated* threshold establishes the end of useable runway at a point where standard RSA is provided beyond the runway end(s).

To meet the ADG I standard for RSA, the south end of Runway 16/34 would need to be relocated approximately 120 feet; the existing displaced threshold would not be affected. The southern 120 feet of runway pavement would be converted to taxiway with appropriate taxiway markings and lighting. The pavement between the current runway end and the relocated end would not be available for aircraft operations, which reduces the useable runway length. Options for adding a limited amount of runway length at the north end may be feasible to compensate for the loss of useable runway and should be considered in the alternatives analysis. Improving the area within the RSA boundaries is recommended whenever possible to preserve existing runway lengths. However, when RSA improvements are planned beyond the current year, the FAA typically requires airport sponsors to relocate the thresholds/runway end until the deficiency is corrected.

Any future lighting (such as PAPI) located within the RSA will also need to meet the FAA frangibility standard.

Runway Object Free Area (OFA)

Runway object free areas (OFA) are two dimensional surfaces intended to be clear of ground objects that protrude above the runway safety area edge elevation. Obstructions within the OFA may interfere with aircraft flight in the immediate vicinity of the runway. The FAA defines the OFA clearing standard:

"The OFA clearing standard requires clearing the OFA of above ground objects protruding above the runway safety area edge elevation. Except where precluded by other clearing standards, it is acceptable to place objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes and to taxi and hold aircraft in the OFA. Objects non-essential for air navigation or aircraft ground maneuvering purposes are not to be placed in the OFA. This includes parked airplanes and agricultural operations."

The OFA along the sides and beyond the ends of Runway 16/34 appears to be free of obstructions, with the exception of the south end, which is limited by the airport fence and Airport Road. The measures described to address runway safety area deficiencies will also allow the ADG I OFA standard to be met.

All aircraft parking positions are located outside the runway OFA, although the row of light aircraft tiedowns located along the west edge of the east parallel taxiway (south end) are located within the taxiway OFA. Airport management should periodically inspect the OFA and remove any objects that protrude into the OFA, particularly brush or trees.

Obstacle Free Zone (OFZ)

The OFZ is a plane of clear airspace extending upward to a height of 150 feet above runway elevation, which coincides with the FAR Part 77 horizontal surface elevation. The FAA defines the following clearing standard for the OFZ:

"The OFZ clearing standard precludes taxiing and parked airplanes and object penetrations, except for frangible visual NAVAIDs that need to located in the OFZ because of their function."

The OFZ may include the Runway OFZ, the Inner-approach OFZ (for runways with approach lighting systems), and the Inner-transitional OFZ (for runways with lower than ¾-statute mile approach visibility minimums. For Lebanon State Airport, only the Runway OFZ is required based on runway configuration and planned approach capabilities. The FAA defines the Runway OFZ as:

"The runway OFZ is a defined volume of airspace centered above the runway centerline. The runway OFZ is the airspace above a surface whose elevation at any point is the same as the elevation of the nearest point on the runway centerline. The runway OFZ extends 200 feet beyond each end of the runway."

The standard OFZ for runways serving small aircraft is 250 feet wide. This dimension corresponds with the visual approaches for the existing runway and would accommodate non-precision instrument approaches (not lower than ¾ mile approach visibility minimums).

The OFZ for Runway 16/34 appears to be free of physical obstructions and meets the small aircraft dimensional standards, with the exception of the south end, which is limited by the airport fence and Airport Road. The measures described to address runway safety area deficiencies will also allow the OFZ standard to be met. The exit taxiways connecting to the runway have aircraft hold lines located 125 feet from runway centerline, which marks the outer edge of the existing OFZ boundary. The holding areas located at the ends of the runway (on the east parallel taxiway) have adequate space to allow aircraft to remain clear of the OFZ.

Taxiway/Taxilane Safety Area

The taxiways at Lebanon State Airport include a full-length parallel taxiway (east side), a partial-length parallel taxiway (west side) and several access taxiways. The taxiways and taxilanes vary in width (20 to 30 feet) but appear to meet the dimensional standard for ADG I safety areas. Airport management should regularly inspect safety areas to ensure that they are maintained to FAA standards. Safety areas should be regularly cleared of brush or other debris and periodically graded and compacted.

Taxiway/Taxilane Object Free Area

The ADG I taxiway OFA width is 89 feet. The existing building restriction lines ensure that a clear taxiway OFA is maintained to avoid conflicts with buildings. The main apron parking and fueling areas are also located outside taxiway OFA.

As noted earlier, a row of 12 light aircraft tiedowns located along the west edge of the east parallel taxiway (south end) is located within the taxiway OFA. The 1994 ALP identified these tiedowns "to be removed." It appears that these tiedowns are not regularly used. In the event that airport management wished to maintain the tiedowns for occasional use (overflow parking at events, etc.), the south section of parallel taxiway would need to be temporally closed to

accommodate aircraft parking during those periods in order to meet FAA taxiway clearance standards. Airport management should periodically inspect the taxiway OFA and remove any objects that protrude into the OFA, particularly brush or trees, and above-ground tiedown anchors such as old tires.

Based on the recommended ADG I (small) standards, parked aircraft located along existing/planned taxiways should have a minimum setback (aircraft parking line) of at least 44.5 feet, which corresponds to the outer edge of the ADG I taxiway OFA (39.5 feet for the taxilane OFA).

Building Restriction Line (BRL)

The 1994 Airport Layout Plan (ALP) depicts a 260-foot east BRL that extends from the south end of the aircraft apron to end of the parallel taxiway. The northern section of the east BRL extends from the north end of the aircraft apron to the end north airport boundary and is located 230 feet from runway centerline. The west BRL also varies in location (265 feet for the south section and 230 feet for the north section).

The nearest BRL (230 feet) will accommodate a 15-foot high building without penetrating the utility/visual runway transitional surface and is clear of the ADG I (small) taxiway object free area. A 265-foot BRL will accommodate a 20-foot high building. The existing BRL locations reflect the limited depth of landside development areas on the airport and provide reasonable protection of airfield operations; future BRL locations will be determined based on the types of structures being planned and the need to avoid airspace penetrations and conflicts with taxiing aircraft.

Runway Protection Zones (RPZ)

The FAA provides the following definition for runway protection zones (RPZ):

"The RPZ's function is to enhance the protection of people and property on the ground. This is achieved through airport owner control over RPZs. Such control includes clearing RPZ areas (and maintaining them clear) of incompatible objects and activities. Control is preferably exercised through the acquisition of property interest in the RPZ. The RPZ is trapezoidal in shape and centered about the extended runway centerline. The RPZ begins 200 feet beyond the end of the area useable for takeoff or landing."

According to FAA planning guidelines "the RPZ dimension for a particular runway end is a function of the type of aircraft and approach visibility minimum associated with that runway end."

The RPZ dimensions recommended for Runways 16 and 34 are based on "small aircraft exclusively" with approach visibility minimums "visual and not lower than 1-mile." Under the FAA's airport planning guidelines a "small airplane" is defined as "an airplane of 12,500 pounds or less maximum certificated takeoff weight." Under FAR Part 77, utility runways are "constructed for and intended to be used by propeller driven aircraft of 12,500 pounds maximum gross weight and less." As noted above, RPZs with buildings, roadways, or other items do not fully comply with FAA standards.

A review of recent aerial photography for Lebanon State Airport identified roadways within both RPZs for Runway 16/34. Runway 34 has a 387-foot displaced threshold to improve obstruction clearance for landing aircraft over vehicles traveling on Airport Road. A runway end with a displaced threshold requires both an arrival RPZ (corresponding to the displaced threshold) and a departure RPZ (beginning 200 feet beyond the runway end).

As noted earlier, the nonstandard runway safety area provided beyond the end of Runway 34 will require a change in runway configuration (or relocation of the road) to meet FAA standards. It appears that the most feasible option available to airport management to meet the FAA standards will be to relocate the runway end approximately 120 feet to compensate for deficient safety area. Based on this runway reconfiguration, the future departure RPZ for Runway 34 will be relocated to correspond with the relocated runway end (end of useable pavement).

Oak Street crosses through the RPZ for Runway 16, although since the vehicles traveling on the roadway do not penetrate the approach surface, no displaced threshold is required.

It is recognized that realigning major surface roads routes located within the RPZs may not be highly feasible but should be strongly considered. However, where possible, the City/County should discourage development within the RPZs (particularly structures) that is inconsistent with FAA standards.

Aircraft Parking Line (APL)

The outer row of aircraft parking positions on the main tiedown apron is located approximately 195 feet from runway centerline, which corresponds to the edge of the taxiway object free area for that section of parallel taxiway. Parking locations for larger aircraft should be adjusted accordingly from the APL based on the typical tail height. For example an aircraft with a 15-foot

tail height would need to be parked approximately 230 feet from the runway centerline to avoid penetrating the transitional surface. As noted earlier, the tiedown positions located on the west side of the east parallel taxiway (south section) are located within the taxiway object free area and should be removed.

Runway-Parallel Taxiway Separation

Runway 16/34 is served by east and west parallel taxiways with separations varying from 150 feet (east taxiway-north section) to 220 feet (west taxiway). All existing parallel taxiway sections meet the ADG I (small aircraft exclusively) runway separation standard of 150 feet.

FAR PART 77 SURFACES

Airspace planning for U.S. airports is defined by Federal Air Regulations (FAR) Part 77 – Objects Affecting Navigable Airspace. FAR Part 77 defines imaginary surfaces (airspace) to be protected surrounding airports. **Figure 4-4** on the following page illustrates plan and isometric views of the Part 77 surfaces. **Table 4-6** summarizes FAR Part 77 standards with the corresponding runway type and approach capability.

TABLE 4-6: FAR PART 77 AIRSPACE SURFACES
LEBANON STATE AIRPORT

Item	Utility (visual)[1]
Width of Primary Surface	250 feet
Radius of Horizontal Surface	5,000 feet
Approach Surface Width at End	1,250 feet
Approach Surface Length	5,000 feet
Approach Slope	20:1

Notes: 1. Utility runways are designed for aircraft weighing 12,500 pounds or less.

FIGURE 4-4: FAR PART 77 DIAGRAM

The 1994 Airport Airspace Plan[18] depicted airspace surfaces that were consistent with non-precision instrument approach capabilities and utility runways based on the ultimate runway length/reconfiguration. However, it is noted that in order to accomplish this recommendation, the entire runway was to be reoriented and all hangars located on the west side of the runway were to be removed/relocated. As noted earlier, based on the limitations of the existing airfield site and the inability to implement the previous airfield reconfiguration/expansion scheme, it is recommended that airspace planning be based on visual approaches (including circling non-precision instrument approach procedures) for the existing runway, which is compatible with the existing airside-landside configuration. Based on current FAA airspace planning standards, upgrading the airport to accommodate a straight-in day/night non-precision instrument approach on Runway 16/34 would require major relocation of existing aircraft parking and fueling facilities and a large number of existing aircraft hangars (any structures located within 250 feet of runway centerline).

Approach Surfaces

Runway approach surfaces extend outward and upward from each end of the primary surface, along the extended runway centerline. As noted earlier, the dimensions and slope of approach surfaces are determined by the type of aircraft intended to use the runway and most demanding approach planned for the runway.

The standard FAR Part 77 20:1 approach surface for Runway 34 is obstructed by vehicles traveling on Airport Road and the airport fence located on the north side of the road. The 387-foot displaced threshold established for Runway 34 appears to provide adequate obstruction clearance for landing aircraft. Oak Street is located approximately 520 feet from the end of Runway 16; vehicles traveling the roadway remain below the standard 20:1 visual approach surface. No terrain penetrations appear to exist within the runway approach surfaces. The status of obstructions will be reviewed as part of the airspace drawing update.

Primary Surface

The primary surface is a rectangular plane of airspace, which rests on the runway (at centerline elevation) and extends 200 feet beyond the runway end. The primary surface should be free of

[18] Lebanon State Airport Master Plan; Airport Airspace Plan (Drawing 2), W&H Pacific (July, 1994)

any penetrations, except items with locations fixed by function (i.e., VASI, runway or taxiway edge lights, etc.). The primary surface end connects to the inner portion of the runway approach surface.

The recommended primary surface for Runway 16/34 is based on utility/visual runway standards (250 feet wide). It appears that the primary surface is generally free of obstructions, with the exception the southern end, which is limited by the airport fence and Airport Road. The relocation of the runway end to meet runway safety area standards will also allow a standard primary surface that extends 200 feet beyond the runway end.

Transitional Surface

The transitional surface is located at the outer edge of the primary surface, represented by a plane of airspace that rises perpendicularly at a slope of 7 to 1, until reaching an elevation 150 feet above runway elevation. This surface should be free of obstructions (i.e., parked aircraft, structures, trees, etc.).

The setbacks established for aircraft parking and hangar development are generally consistent with protecting the utility/visual airspace surfaces. Airport management should ensure that all proposed construction on the airport should be reviewed by FAA with a completed FAA Form 7460 submitted. Airport management is also responsible for periodically verifying that all nearby trees do not penetrate the protected airspace surfaces. Off-airport development proposals should be reviewed by local land use authorities to avoid conflicts with protected airspace. Any existing structures found to penetrate FAR Part 77 airspace surfaces should be marked with obstruction lighting.

Horizontal Surface

The horizontal surface is a flat plane of airspace located 150 feet above runway elevation. Based on the “utility” runway designation, the outer boundary of the Runway 16/34 horizontal surface is defined by two 5,000-foot radii, which extend from the runway ends (the intersection point of the extended runway centerline, the outer edge of primary surface, and the inner edge of the approach surface). The outer points of the radii for each runway are connected to form an oval, which is defined as the horizontal surface. Te elevation of the horizontal surface is based on the published elevation of the airport (344 feet MSL), plus 150 feet (494 feet).

The 1994 Airspace Plan depicted areas of terrain penetration (southwest of the runway) within a horizontal surface associated with the realigned and extended runway. The status of obstructions within the horizontal surface will be reviewed as part of the airspace drawing update.

Conical Surface

The conical surface is an outer band of airspace, which abuts the horizontal surface. The conical surface begins at the elevation of the horizontal surface and extends outward 4,000 feet at a slope of 20:1. The top elevation of the conical surface is 200 feet above the horizontal surface and 350 feet above airport elevation. An area of terrain penetration was identified within the conical surface on the 1994 Airspace Plan southwest of the runway. The status of obstructions within the conical surface will be reviewed as part of the airspace drawing update.

AIRSIDE REQUIREMENTS

Airside facilities are those directly related to the arrival and departure and movement of aircraft:

- *Runways*
- *Taxiways*
- *Airfield Instrumentation and Lighting*

Runways

The adequacy of the existing runway system at Lebanon State Airport was analyzed from a number of perspectives including runway orientation, airfield capacity, runway length, and pavement strength.

Runway Orientation

The orientation of runways for takeoff and landing operations is primarily a function of wind velocity and direction, combined with the ability of aircraft to operate under adverse wind conditions. When landing and taking off, aircraft are able to maneuver on a runway as long as the wind component perpendicular to the aircraft's direction of travel (defined as crosswind) is not excessive. For runway planning and design, a crosswind component is considered excessive at 12 miles per hour for smaller aircraft (gross takeoff weight 12,500 pounds or less) and 15 miles per hour for larger aircraft. FAA planning standards indicate that an airport should be

planned with the capability to operate under allowable wind conditions at least 95 percent of the time.

The 1994 ALP included a wind rose that was based on observations recorded at Albany Municipal Airport in 1959. The 1990 Lebanon State Airport Master Plan states *"…wind data is not available for Lebanon, however, Runway 16-34 at Albany has 95% wind coverage for 15 MPH crosswinds."* Wind coverage on Runway 16/34 is generally considered to be adequate (estimated at approximately 95 percent at 15 miles per hour), although coverage at 12 miles per hour is likely to be lower than the FAA-recommended threshold of 95 percent. However, the space limitations associated with the existing site do not permit any significant shift in runway orientation or construction of a crosswind runway.

Runway Length

Runway length requirements are based primarily upon airport elevation, mean maximum daily temperature of the hottest month, runway gradient, and the critical aircraft type expected to use the runway. A summary of FAA-recommended runway lengths for a variety of aircraft types and load configurations are described in **Table 4-7**.

Runway 16/34 accommodates predominantly small aircraft (less than 12,500 pounds) operations. Since the airport accommodates limited activity from aircraft weighing more than 12,500 pounds, the current evaluation of runway length requirements should be based on the FAA's model for "small airplanes." A summary of the typical runway length requirements for large aircraft weighing between 12,500 and 60,000 pounds is provided for comparison, although most aircraft in this category are unable to operate at Lebanon State Airport.

Based on local conditions and the methodology outlined in AC 150/5325-4A, at 2,877 feet, **Runway 16/34 can accommodate approximately 88 percent of the small airplane fleet** under the conditions common during a typical summer day in Lebanon. If the south end of Runway 16/34 is relocated 120 feet north to meet RSA and OFA standards, the useable runway length would be reduced to 2,757 feet, which would reduce the percentage of the small aircraft fleet that could normally be accommodated to about 84 percent.

Extending usable runway at the north end may be feasible if standard OFA and RSA are maintained. This option should be considered in the alternatives analysis. It would also be prudent to identify a runway extension reserve on the ALP at the south end of Runway 16/34 to encourage local community leaders to eventually relocate Airport Road in the future.

The existing width of Runway 16/34 is 50 feet, which is 10 feet less than the ADG I standard (60 feet). Widening the runway to 60 feet is recommended as part of a future runway rehabilitation major reconstruction project.

TABLE 4-7: FAA-RECOMMENDED RUNWAY LENGTHS

(From FAA Computer Model)

Runway Length Parameters for Lebanon State Airport

- *Airport Elevation: 344 feet MSL*
- *Mean Max Temperature in Hottest Month: 81 F*
- *Maximum Difference in Runway Centerline Elevation: 3 feet*
- *Existing Runway Length: 2,877 feet*

Small Airplanes with less than 10 seats	
75 percent of these airplanes	*2,520 feet*
95 percent of these airplanes	*3,060 feet*
100 percent of these airplanes	*3,650 feet*
Small airplanes with 10 or more seats	*4,170 feet*
Large Airplanes of 60,000 pounds or less	
75 percent of these airplanes at 60 percent useful load	*5,330 feet*
75 percent of these airplanes at 90 percent useful load	*7,000 feet*
100 percent of these airplanes at 60 percent useful load	*5,500 feet*
100 percent of these airplanes at 90 percent useful load	*7,700 feet*

Airfield Pavement

According to the data contained in the 2004 pavement condition report,[19] Lebanon State Airport pavements ranged from "excellent" to "failed." **Table 4-8** summarizes the five-year maintenance program recommended for Lebanon State Airport and additional pavement maintenance items anticipated during the current twenty-year planning period. The rate of deterioration of airfield pavements increases significantly as they age. A regular maintenance program of vegetation control, crack filling, and sealcoating is recommended to extend the useful life of all airfield pavements.

[19] Pavement Consultants Inc. (8/2001 inspection).

TABLE 4-8: SUMMARY OF RECOMMENDED AIRFIELD PAVEMENT MAINTENANCE

Pavement Section	5-Year Recommended Maintenance	Other Recommended Maintenance During 20-Year Planning Period[1]
Runway 16/34	Slurry Seal (2004)	Overlay (2009) Slurry Seal (2014) Slurry Seal (2020)
East Parallel Taxiway	South Section: 2" AC Overlay (2005) Midfield-South Section: Slurry Seal (2005) North Section: Slurry Seal (2003) Exit Taxiways/Connectors:Fog Seal/Slurry Seal (2004)	N. Sec. Overlay (2010) Slurry Seal (2012) Slurry Seal (2018) Slurry Seal (2024)
West Parallel Taxiway & Exit Taxiways	Fog Seal/Slurry Seal (2004)	Slurry Seal (2013) Slurry Seal (2018) Overlay (2020)
Main Apron	Slurry Seal (2003)	Overlay (2009) Fog Seal (2013) Slurry Seal (2019) Slurry Seal (2024)

1. The dates identified for long-term pavement maintenance assume that any deferred 5-year maintenance recommended in Years 1 and 2 (2004-2005), will be completed by 2006 with all subsequent schedules based on 5 year intervals for slurry seals and rehabilitation timing based on 2001 PCI ratings.

For planning purposes, it is assumed that the useful life of most airfield pavements (asphalt) is approximately 20 years; however, the useful life can be significantly reduced if routine maintenance is performed on a less frequent basis. In some cases, the intervals between asphalt overlays or reconstruction can exceed 20 years depending on level and type of use, weather conditions and design of the pavement and underlying base course. Vegetation removal and crack filling should be performed annually; sealcoats should be applied on 5- or 6-year intervals.

Runway 16/34

The 2004 PCI report indicates that without the recommended maintenance, the runway rating will decline to "good" or "very good" condition by 2014. Based on the age and composition of the runway pavement, it is anticipated that an asphalt overlay will be required early in the planning period.

The FAA standard pavement strength for runways designed to accommodate small aircraft exclusively is 12,500 pounds (aircraft with single wheel landing gear configurations), which is recommended for Lebanon State Airport based on existing and forecast design aircraft.

Parallel Taxiways

The 2004 PCI report indicates that without the recommended rehabilitation or reconstruction, the south section of the east parallel taxiway rating will continue to be rated "failed" by 2014; however the numerical rating will decline from 10 to 0 during the period, indicating worsening deterioration will continue. The rating for the northern section of the east parallel taxiway will decline to "good" by 2014.

The west parallel taxiway pavement ratings will decline to "very good" (south section) and "fair" (north section) by 2014 without recommended maintenance. It is anticipated that all sections of west parallel taxiway will require rehabilitation or reconstruction within the current 20-year planning period.

Aircraft Aprons

The 2004 PCI report indicates that aircraft apron will decline to "good" by 2014, without recommended maintenance.

Airfield Capacity

The capacity of a single runway with a parallel taxiway typically ranges between 60 to 90 operations per hour during visual flight rules (VFR) conditions.

The existing runway/taxiway configuration provides efficient ground movement for aircraft; based on forecast demand, the runway is expected to remain well below capacity during the twenty-year planning period in its existing configuration.

Taxiways

Runway 16/34 is served by a full-length parallel taxiway on the east side and a partial-length parallel taxiway on the west side. As noted earlier, the existing runway-parallel taxiway separations meet or slightly exceed ADG I (small) standards. The existing parallel taxiways widths vary between 20 and 30 feet. The ADG I standard for taxiway width is 25 feet. The number and location of exit taxiways appears to be adequate.

The aircraft holding area located at the Runway 16 and 34 ends on the east parallel taxiway allows pre-departure aircraft checks and run-ups to be conducted without blocking taxiway access to the runway for other aircraft.

Future extension of the west parallel taxiway may be required if west side hangar development continues. Options for reducing the existing 220-foot runway-west parallel taxiway separation to the ADG I (small) standard (150 feet) may be considered in the future as part of any required rehabilitation or reconstruction project. Any planned north extension of the west parallel taxiway may use a 150-foot runway separation in order to maximize use of the narrow land area for future hangar construction or aircraft parking.

Airfield Instrumentation, Lighting and Marking

Runway 16/34 has medium-intensity runway edge lighting (MIRL) that is in good condition. Runways 16 and 34 are equipped with visual approach slope indicators (VASI). Replacement of the VASI units should be expected during the current twenty-year planning period as the VASI units reach the end of their useful life or replacement parts become more difficult to obtain. Precision Approach Path Indicators (PAPI) are currently the primary visual guidance system used at general aviation airports. Lighted wind cones and the airport rotating beacon should be maintained in good operating condition and replaced as needed.

The existing taxiway system does not have edge lighting but some sections have edge reflectors. Based on the relatively low level of nighttime operations, edge reflectors will be adequate for current operations.

Overhead lighting is available in most aircraft hangar and apron areas. Additional flood lighting is recommended for all expanded operations areas for improved utilization and security.

Lebanon State Airport has basic markings for the runway (runway numbers, centerline stripe) and taxiways (centerline stripe, aircraft hold line), which are adequate for anticipated use.

On-Field Weather Data

The airport does not have automated weather observation system (AWOS/ASOS) or 24-hour human observation. The nearest weather observation data is located at Corvallis Airport (AWOS-3), located 15 miles west.

LANDSIDE FACILITIES

The purpose of this section is to determine the space requirements during the planning period for landside facilities. The following types of facilities are associated with landside aviation operations areas:

- *Hangars*
- *Aircraft Parking and Tiedown Apron*
- *Fixed Base Operator (FBO) Facilities*

Hangars

In Fall 2004, there were 45 conventional hangars located at Lebanon State Airport, an increase of 14 hangars since the 1994 ALP was completed. For planning purposes, it is estimated that at approximately 90 percent of the airport's locally based aircraft will be stored in hangars during the current 20-year planning period. This percentage is consistent with historic trends and current conditions.

A planning standard of 1,500 square feet per based aircraft stored in hangars is used to project gross space requirements. As indicated in the aviation activity forecasts, the number of based aircraft at Lebanon State Airport is projected to increase by 12 aircraft during the twenty-year planning period. Based on projected hangar utilization levels, long-term demand for *new* hangar space hangars is estimated to be 11 spaces, or approximately 16,500 square feet. For planning purposes, it is assumed that the existing hangar capacity (45 hangars) is fully utilized and that all future demand would be accommodated through new construction. The projected hangar needs are presented in **Table 4-9**.

It should be emphasized that individual aircraft owner needs vary and demand can be influenced by a wide range of factors, often beyond the control of an airport. For this reason, it is recommended that adequate hangar development reserves be established to accommodate any unanticipated demand beyond the modest forecasts contained in this ALP report

Aircraft Parking and Tiedown Apron

Aircraft parking apron should be provided for locally based aircraft that are not stored in hangars and for transient aircraft visiting the airport. The existing aircraft apron has 18 light aircraft tiedowns. An additional 12 aircraft parking positions are located along west edge of the east

parallel taxiway, although these parking positions do not meet FAA taxiway object free area clearance standards. The 1994 ALP identified these tiedowns "to be removed."

During recent airport visits, typically 3 to 5 aircraft have been observed parked on the main apron. It appears that less than 10 percent of locally based aircraft are normally parked on the apron, which suggests that the existing capacity is adequate to serve both current and forecast demand. For long-term planning purposes, it will be assumed that 10 percent of locally based aircraft will require apron parking; locally based aircraft tiedowns are planned at 300 square yards per position.

FAA **Advisory Circular 150/5300-13** suggests a methodology by which itinerant parking requirements can be determined from knowledge of busy-day operations. Based on estimates of activity peaking (peak month equals 10% of annual activity; even weekly distributions during peak month; peak day equals 20% of busy week, etc.), the demand for itinerant parking spaces was estimated based on 30 percent of busy day itinerant operations (30% of busy day itinerant operations divided by two, to identify peak parking demand). Based on these assumptions, typical itinerant parking demand is estimated to be 6 to 8 light aircraft tiedowns during the planning period. The FAA planning criterion of 360 square yards per itinerant aircraft was applied to the number itinerant spaces to determine future itinerant ramp requirements. The projected aircraft parking area requirements are summarized in **Table 4-9.**

TABLE 4-9: APRON AND HANGAR FACILITY REQUIREMENTS SUMMARY

Item	Base Year (2004)	2009	2014	2019	2024
Based Aircraft (Forecast)	**57**	**60**	**63**	**66**	**69**
Aircraft Parking Apron *(Existing Facilities)*					
Light Aircraft Tiedowns *(not including tiedowns adjacent to east parallel taxiway)*	18				
Total Apron Area	8,400 sy				
Projected Needs *(Demand)* [1]					
Itinerant Aircraft Parking (@ 360 SY each)		6 spaces / 2,160 sy	7 spaces / 2,520 sy	7 spaces / 2,520 sy	8 spaces / 2,880 sy
Locally-Based Tiedowns (@ 300 SY each)		6 spaces / 1,800 sy	6 spaces / 1,800 sy	7 spaces / 2,100 sy	7 spaces / 2,100 sy
Itinerant Helicopter Parking (@ 1,200 SY each)		1 space / 1,200 sy	1 space / 1,200 sy	1 space / 1,200 sy	2 spaces / 2,400 sy
Total Apron Needs		**13 spaces 5,160 SY**	**14 spaces 5,520 SY**	**15 spaces 5,820 SY**	**17 spaces 7,380 SY**
Aircraft Hangars *(Existing Facilities)*					
Existing Hangars	45 buildings[3]				
Projected Needs *(Demand)* [2]					
(New) Hangar Space Demand (@ 1,500 SF per space) *(Cumulative 20-year projected demand: 11 spaces / 16,500 SF)*		**+3 spaces / 4,500 sf**	**+3 spaces / 4,500 sf**	**+3 spaces / 4,500 sf**	**+2 spaces / 3,000 sf**

1. Aircraft parking demand levels identified for each forecast year represent forecast gross demand, which may be accommodated through a combination of existing and future parking areas.
2. Hangar demand levels identified for each forecast year represent the net increase above current hangar capacity.
3. The existing 45 aircraft hangars accommodated approximately 57 aircraft in Fall 2004.

As noted in **Table 4-9**, the existing parking capacity of the apron exceeds projected demand. However, it is recognized that the narrow configuration of the existing apron and the potential development of additional hangars along the back edge of the apron may eliminate several existing tiedowns.

As with aircraft hangars, reserve areas should be identified to accommodate unanticipated demands for aircraft parking, which may exceed current projections. A development reserve area equal to 50 percent of the 20-year parking demand will provide a conservative planning target to

accommodate unanticipated demand, changes in existing apron configurations, and demand beyond the current planning period. The location and configuration of the development reserves will be addressed in the alternatives analysis.

Helicopter Parking

In order to accommodate occasional itinerant helicopter activity, it is recommended that a designated helicopter parking position be located on the apron with adequate separation from fixed wing tiedowns. One designated helicopter parking position would appear to be adequate to accommodate periodic demand.

FBO Facilities

The FBO building has office and classroom space, restrooms, and pilot & passenger waiting areas. FBO facility requirements are driven primarily by market conditions and the particular needs of the FBO and its customers. Because future FBO facility needs are difficult to quantify, the best planning approach is to identify development reserves that could accommodate new or expanded FBO facilities. The 1994 ALP identified the area directly adjacent (north) of the current FBO building as "flightline dependent." This location has direct access the aircraft apron and fueling facilities and could accommodate a variety of business related aviation enterprises.

Although it appears unlikely that Lebanon State Airport will be able to support more than one FBO during the current planning period, the airport should be capable of accommodating an additional FBO, should that interest develop. In order to meet FAA grant assurances, the airport needs to provide equal access to prospective tenants, without discrimination. However, in the event that interest in establishing a new FBO occurs, ODA's minimum standard guidelines for commercial operators would be used to define the minimum services that would be required.

Surface Access Requirements

Surface access to the east side of the airport is provided via Airway Road with connections to Airport Road and Oak Street. Access to the west side of the airport is provided by a paved access road that connects to Airport Road. Extension of the access road will be required to accommodate continued development of hangar sites on the west side of the runway. The existing access for facilities located on the east side of the runway appears to be adequate to support current and future development. A narrow strip of developable aviation use land located

at the northeast corner of the airport may require access from the north (West Oak Street) if access is not provided via the main apron.

The vehicle parking area adjacent to the FBO building has approximately 27 designated spaces, which, combined with parking available adjacent to individual hangars, appears to be adequate for most user needs. However, additional vehicle parking may be required in this area depending on the type of development that occurs in the space between the main apron and Airway Road. The development of a designated vehicle parking area may also be required on the west side of the runway as expansion occurs.

SUPPORT FACILITIES

Aviation Fuel Storage

The airport has one aboveground fuel storage tank that meets all current Oregon DEQ and EPA regulations for spill detection and containment. The tank is used for 100LL aviation gasoline (AVGAS) and it is equipped with cardlock system. The storage capacity of the tank appears to be adequate to accommodate current demand levels. The frequency of restocking would be expected to increase marginally as aircraft activity increases during the planning period.

Airport Utilities

The east side of the airport has access to water, sanitary sewer, electrical and telephone service. The existing utilities on the east side of the airport appear to be adequate for current and projected needs. As is noted in the Inventory Chapter, the eastern section of the airport has direct access to the utility lines at two points. Providing any additional utility connections along the east side of the airport would require easements or acquisition of adjacent privately owned parcels.

There is currently no water service on the west side of the airfield. The local fire department has indicated that the lack of water service to the west hangar area limits fire response capabilities. Extending water service and fire hydrants to the west side of the airport is recommended to provide adequate fire protection for existing and any future hangars.

Security

The airport has standard chain-link fencing around the perimeter of the airport operations area with automated vehicle gates located at the primary access points. Additional fencing and vehicle gates are located adjacent to the aircraft apron and FBO vehicle parking lot. The section of airport-owned land located south of Airport Road (the Runway 34 RPZ and inner approach area) has limited wire fencing.

There are no major security concerns at the airport. However, as an unattended airport, local pilots have the primary responsibility for monitoring suspicious activity and alerting airport management and local law enforcement. Additional flood lighting should be provided around the aircraft parking apron, fueling area, and new hangar areas to maintain adequate security.

FACILITY REQUIREMENTS SUMMARY

The projected twenty-year facility needs for Lebanon State Airport are summarized in **Table 4-10**. As noted in the table, the primary facility requirements are largely focused on correcting safety area and related deficiencies found at the south end of Runway 16/34; maintaining existing airfield pavements; facilitating new hangar construction on the airport; extending taxiways to serve new landside development; and extending water service to the west side of the runway. Airport management will also consider property acquisition to accommodate development of additional hangars beyond the airport's existing land capacity.

The forecasts of aviation activity contained in Chapter Three anticipate modest growth in activity that will result in specific airside & landside facility demands. The existing airfield facilities have the ability to accommodate a significant increase in activity, with targeted facility improvements. For the most part, the need for new or expanded facilities, such as aircraft hangars, will be market driven, although there will be significant costs associated with site preparation, utility extensions, and taxiway construction. Future expansion of landside capacity through property acquisition will depend on airport management's ability to justify and fund the action. In the event that the conflict between the runway and Airport Road is eliminated in the future, extending Runway 16/34 to the south is recommended.

TABLE 4-10: FACILITY REQUIREMENTS SUMMARY

Item	Short Term	Long Term
Runway 16/34	Correct RSA/OFA Deficiency (south end) Relocate Rwy 34 end 100 feet (+-); retain existing displaced threshold location. 250-foot Extension at North End of Runway; retain existing Rwy 16 threshold location. Pavement Maintenance[1]	Overlay Pavement Maintenance South Runway Extension Reserve
Parallel Taxiways	Pavement Maintenance Overlay (East Parallel – south section)	Overlay (East Parallel – north section) Overlay (West Parallel) Taxiways to Serve New Hangars Pavement Maintenance
Aircraft Apron	Pavement Maintenance Remove Aircraft Tiedowns located within OFA for Taxiway A (south section, west side)	Pavement Maintenance Overlay Apron Apron Development Reserves
Hangars	Business/Commercial Hangars (east reserve) Develop T-hangar and Conventional Hangar sites (based on market demand)	Development Reserves
Navigational Aids and Lighting	Parallel Taxiway Edge Reflectors	PAPI (Rwy 16 & 34) Flood Lighting (a/c parking & hangar areas)
Fuel Storage	None	Reserve
FBO and Related Facilities	FBO Building/Apron Expansion Reserve Aircraft Wash Pad Public Restrooms	Reserve for 2nd FBO
Utilities	Extend Water to West Side of Runway; extend electrical service to new hangars	Same
Roadways & Vehicle Parking	Extend Internal Access Roads to new facilities; vehicle parking adjacent to commercial hangars	Same
Security	Flood Lighting	Additional Electronic Vehicle Gates
Property Acquisition	Additional west landside development area (approximately 23 acres)	Same

1. Vegetation control, crackfill, sealcoat

CHAPTER FIVE
AIRPORT DEVELOPMENT ALTERNATIVES

INTRODUCTION

This chapter presents development alternatives for accommodating the forecast demand and facility needs defined in the previous chapters. Initially, two preliminary alternatives will be presented for review and evaluation by airport management and the planning advisory committee. Through the process of evaluating preliminary concepts, a preferred alternative will emerge that can best accommodate all required facility improvements. The refinement of the preferred alternative will continue as it is integrated into the airport layout plan drawing. A brief summary of each alternative is presented on the following pages and are also presented graphically at the end of the chapter.

As noted in previous chapters, the major recommendations of the previous master plan have not been implemented. The recommendations have been eliminated from consideration at this time based on a variety of local land use and surface transportation issues and the overall limitations associated with the airport site. Long-term planning for Lebanon State Airport will be based on small single- and multi-engine aircraft, weighing less than 12,500 pounds, included in airplane design group I (ADG I), rather than the ADG II design aircraft assumptions used in the previous master plan.

The primary focus of this alternatives evaluation will be to address current and long-term landside needs, including hangars, aircraft parking and associated improvements. Limited runway-taxiway improvements that can be accommodated within the existing operating areas of the airfield will be evaluated.

The airport is physically limited by public roadways at both ends of the runway. As a result, major runway extension options will not be considered at this time. However, depicting a reserve area for a potential south runway extension may be appropriate to preserve the option of future extensions in the event that local roadway issues can be resolved.

The potential for expanding the airport landside area on the west side of the runway appears to be feasible based on the availability of large areas of agricultural lands. A development alternative will be prepared to specifically incorporate property acquisition capable of accommodating landside facility expansion. Amending the Lebanon city limits or urban growth boundary to include the lands west of the airport would be an important step toward expanding the airport's land base westward.

The conceptual options are intended to encourage an open discussion of development needs and priorities through a collaborative process between the consultant, airport management, community leaders, FAA and airport users. The process will allow the widest range of ideas to be considered and the most effective facility development concept to be defined. As noted earlier, the evaluation of development alternatives for the ALP Report is focused on options that have a reasonable chance of being implemented.

In summary, the preliminary alternatives provide airport management with two distinctly different strategies for future development of Lebanon State Airport:

- **Alternative 1** – No property acquisition required; maximize potential of existing land base.

- **Alternative 2** – Acquire approximately 11 acres of property on the west side of the airport to accommodate future hangar and other landside facility development. An additional 12 acres is also depicted, adjacent to the proposed development area, as a long-term aviation use development reserve.

ALTERNATIVE 1

Alternative 1 identifies areas for expansion of hangars (conventional and T-hangar), aircraft apron, and runway-taxiway improvements within existing airport property boundaries. No changes are required to adjacent public roadways in order to implement Alternative 1.

Runway-Taxiway Improvements

Alternative 1 includes two changes in runway-taxiway configuration. At the south end of the runway, approximately 91 feet of runway is converted into taxiway. This existing displaced threshold location is not affected, although the length of useable runway would be reduced from 2,877 feet to 2,786 feet. This change in runway configuration is needed to address existing deficiencies in runway safety area and several other design elements created by the close

proximity of Airport Road to the runway end. For ADG I runways, the safety area required beyond the end of the runway is 240 feet, which would be provided by relocating the end of the runway (by marking and lighting) as indicated in this option.

In part to compensate for the loss of useable runway at the south end of the runway, **Alternative 1** depicts a 251-foot extension at the north end of Runway 16/34. The east parallel taxiway would also be extended in conjunction with the north runway extension. In this configuration, both ends of Runway 16/34 would meet ADG I standards for runway safety area, object free area, etc. In order to maintain adequate obstruction clearance for aircraft landing on Runway 16, the runway threshold would remain in its current location and would become "displaced" when additional runway was added beyond the threshold (north). With the north and south runway end reconfigurations completed, the useable runway length would be approximately 3,037 feet, although landing distance available in both directions would be reduced by displaced thresholds.

West Side Improvements

In this alternative, the existing row of small conventional hangars is extended northward along the west parallel taxiway to the midfield taxiway exit. This area has capacity to accommodate 10 to 12 additional small hangars. The existing west parallel taxiway is maintained at its current runway separation (225 feet).

The northern section of west side development includes an extension of the parallel taxiway with a reduced runway separation of 150 feet, which meets the ADG I (small) design standard. The area located between the future parallel taxiway and the western airport property line has limited, but sufficient depth to accommodate a single row of "stacked" T-hangars. As proposed, four "stacked" 12-unit T-hangars are located end-to-end, along the north section of the future west parallel taxiway. Stacked T-hangar buildings are designed to be narrower in depth (approximately 36 feet) compared to "nested" T-hangars that are deeper (approximately 48 to 52 feet). The use of "stacked" T-hangars in this area will allow the FAA parallel taxiway separation and taxiway OFA clearance standards to be met while providing adequate space on the west side of the building to accommodate a hangar taxilane and meet the taxilane OFA clearance requirements.

The proposed T-hangar configuration provides approximately 62 feet of separation between the parallel taxiway centerline and the front (east) edge of the building, which is clear of the taxiway OFA, which extends 44.5 feet from taxiway centerline. This configuration increases the physical separation that currently exists for the west side conventional hangars, where buildings are located immediately along the edge of the taxiway OFA. The proposed T-hangars are configured to provide 80 feet of separation between the western edges of the buildings and an airport

property line fence. The perimeter fence and the west edge of the T-hangars would define the outer edges of the taxilane object free area (ADG I standard: 79 feet). A 20-foot wide hangar taxilane would be constructed to serve the west side of the building. Aircraft stored in the east-facing hangar units would taxiway directly onto the parallel taxiway, as is the case with the existing west side conventional hangars. Due to the limited depth of the proposed west side hangar areas, it is recommended that sliding hangar doors be used, rather than bi-fold doors that could limit taxiing aircraft wingtip clearances.

With the addition of approximately 48 new aircraft in the proposed west T-hangar area, providing additional vehicle parking and alternative vehicle access is recommended. A new west side airport access connection and vehicle parking area is identified near the northwest corner of the airport. The access road and parking area are configured to remain outside of the Runway 16 protection zone and approach surface.

At full build-out **Alternative 1** would provide approximately 60 additional hangar spaces on the west side of the airfield through a combination of small conventional hangars and stacked T-hangars.

East Side Improvements

The proposed improvements for the east side of the airport in **Alternative 1** are limited to expansion of apron and conventional hangar development adjacent to the main apron and establishing a long-term aircraft parking reserve areas along the northeast edge of the runway and east parallel taxiway. Any remaining undeveloped hangar sites located along the southern sections of the east parallel taxiway will continue to be available for construction of small/medium conventional hangars.

As proposed, the main apron is expanded eastward to provide aircraft access to a row of medium conventional hangars. As part of the hangar and apron construction, four existing light aircraft tiedowns located at the back of the existing apron would be removed to provide a clear path for taxiing aircraft to/from the new hangars. Four hangars (approximately 60 x 60') are depicted in this area. Although precise building sizes would be determined by tenant needs, the area should be reserved for larger hangars and any proposed smaller hangars should be located elsewhere on the airport. Expanded fixed base operator (FBO) facilities could also be located in this area. Additional vehicle parking in this area would be provided by expanding the existing parking lot located adjacent the FBO.

A long-term apron reserve is identified on the east side of the airfield that extends from the north end of the main apron to the north airport boundary on Oak Drive. A new east side airport access connection and vehicle parking area is identified near the northeast corner of the airport. As with

the proposed west side improvements, the east side access road and parking area are configured to remain outside of the Runway 16 protection zone and approach surface.

The development potential of the northeast corner of the airport is very similar to the northwest corner. With a parallel taxiway separation of 150 feet, the area can accommodate additional apron or limited hangar development. However, since the proposed west-side improvements provide capacity well beyond forecast demand, the northeast area would be reserved for long-term aviation development. Alternatively, if airport management preferred to maximize development of the east side of the airfield before encouraging additional west side development, the northeast section of the airport could become the preferred site for new small conventional hangar construction.

ALTERNATIVE 2

Alternative 2 identifies areas for expansion of hangars (conventional and T-hangar), aircraft apron, and runway-taxiway improvements. In a different approach than presented in the first alternative, Alternative 2 utilizes expansion of the airport property to accommodate the proposed west side T-hangar and apron developments. A runway extension reserve is depicted across Airport Road, although extending the runway to south is not considered to be a realistic short-term prospect. No changes are required to adjacent public roadways in order to implement Alternative 2 (not including the south runway reserve area).

Runway-Taxiway Improvements

Alternative 2 depicts the same improvements at the north end of the runway as proposed in Alternative 1. Although not specifically depicted, the short-term reconfiguration at the Runway 34 end would also be recommended in Alternative 2. The runway/parallel taxiway extension reserve that is depicted beyond the south end of the runway illustrates the long-term potential for extending the runway to 3,900 feet if the local roadway issues can be resolved.

West Side Improvements

In this alternative, the existing row of small conventional hangars is extended northward along the west parallel taxiway to the midfield taxiway exit and a new landside development area is located beyond the (south) western border of the airport.

Alternative 2 requires approximately 11 acres of property acquisition (plus an additional 12 acres of development reserve) to accommodate future T-hangars, aircraft apron, support facilities, access roads, and vehicle parking. The T-hangar development configures the hangar

rows perpendicular to the runway and parallel taxiway, served by a main hangar access taxiway that runs parallel (west) to the parallel taxiway and the existing row of small conventional hangars. As proposed, the development would accommodate seven 10/12 unit T-hangars (depending on building design), which could provide approximately 70 to 84 hangar spaces. The T-hangars depicted in this alternative are "nested," which results in slightly wider, and shorter buildings to provide the desired number of units. Taxilanes would be added between the hangar rows, with connections to the main hangar access taxiway.

The west aircraft apron is intended to provide additional parking for local and itinerant aircraft and could also accommodate fueling or other FBO facilities. Vehicle access to the west side development would be provided via an internal access road connection to Airport Road.

The existing west row of conventional hangars has capacity to accommodate approximately 8 additional small hangars while reserving adequate space to provide taxiway access through to the adjacent T-hangar area. The existing west parallel taxiway is maintained at its current runway separation (225 feet).

The northern section of west side development includes an extension of the parallel taxiway with a reduced runway separation of 150 feet, which meets the ADG I (small) design standard. The area located between the future parallel taxiway and the western airport property line is configured with a single row of east-facing small/medium conventional hangars. As proposed, 21 individual hangars are depicted including a combination of hangar sizes.

At full build-out **Alternative 2** would provide approximately 113 additional hangar units/spaces on the west side of the airfield through a combination of conventional hangars and T-hangars.

East Side Improvements

The proposed improvements for the east side of the airport in **Alternative 2** are very similar to the first alternative, with the exception that the main apron (east side) is expanded rather than reserved for development of larger hangars.

PREFERRED ALTERNATIVE

Based on review of the preliminary options presented, ODA airport management selected a preferred alternative that optimizes facility development within the existing airport boundaries, but also includes a property expansion element (west side) that would permit significant expansion of landside facilities at the airport. The recommended configuration of the facilities was created to allow distinct short-term and long-term development phases that are mutually

compatible. The ability to pursue specific facility improvements that are not dependent on property acquisition, while pursuing longer term property expansion options will allow airport management to accommodate current demand for small box hangars and limited T-hangar construction, without precluding longer-term expansion. As noted in the facility requirements analysis, the narrow configuration of the existing airfield and lateral clearances provided for existing taxiways, aircraft parking, fueling facilities and hangars will limit upgrades in instrument approach capabilities to the utility-visual runway designation under FAR Part 77, which would allow development of a daytime non-precision approach with a circle-to-land to procedure.

The primary elements of the preferred alternative include the following:

- Minor runway reconfiguration (south) and north extension to provide standard RSA, OFA, OFZ and primary surface dimensions.
- Landside facility improvements and aviation-use development reserves on the east side of the airfield utilizing the limited remaining undeveloped areas available.
- North extension of the west parallel taxiway.
- Landside facility improvements on the west side of the airfield utilizing the limited remaining undeveloped areas available within existing airport property. Development sites are identified for a limited number of small conventional hangars and narrow ("stacked") T-hangars.
- Property acquisition (23 acres +-) along the west side of the airport to accommodate expansion of landside facilities and additional development reserve areas.
- Development sites for combination of T-hangars and conventional hangars.
- Aircraft apron, fuel storage area, FBO reserve, auto parking, and access road.

These items were incorporated into a preferred alternative (**Figure 5-3**). The conceptual development options presented in this chapter illustrate the progressive process of alternatives evaluation and do not necessarily reflect the final preferred configuration of facilities depicted on the airport layout plan that resulted from the overall review process. Additional detail has been added to the ALP drawing for future aircraft apron, hangar and access road configurations. The draft set of airport layout plan drawings is presented at the end of this chapter.

FIGURE 5-1: ALTERNATIVE 1

FIGURE 5-2: ALTERNATIVE 2

FIGURE 5-3: PREFERRED ALTERNATIVE

AIRPORT LAYOUT PLAN DRAWINGS

The options that were considered for the long-term development of Lebanon State Airport were described in the Alternatives section of this chapter. This evaluation resulted in the selection of a preferred alternative. The preferred alternative has been incorporated into the airport layout plan drawings, which are summarized in this section. The set of airport plans, which is referred to in aggregate as the "Airport Layout Plan" (ALP) has been prepared in accordance with FAA guidelines. The drawings illustrate existing conditions, recommended changes in airfield facilities, existing and recommended property ownership, land use, and obstruction removal. The ALP set is presented at the end of this chapter:

- *Drawing 1 – Cover Sheet*
- *Drawing 2 – Airport Layout Plan*
- *Drawing 3 – FAR Part 77 Airspace Plan*
- *Drawing 4 – Airport Land Use Plan with 2009 Noise Contours*

Airport Layout Plan

The Airport Layout Plan (ALP) presents the existing and ultimate airport layout and depicts the improvements that are recommended to enable the airport to meet forecast aviation demand. Airport vicinity and location maps, and data blocks for the overall airport and the runway are presented on the ALP. A declared distances table, legend of symbols and line types, and building/facility table (with corresponding numbers depicted on the airport layout plan drawing) are also provided. The improvements depicted on the ALP reflect all major airfield developments recommended in the twenty-year planning period. Airport Reference Code B-I (small aircraft) airport design standards and utility runway designation for airspace planning purposes is recommended for current and long-term planning at Lebanon State Airport.

Decisions made by ODA regarding the actual scheduling of projects will be based on specific demand and the availability of funding. Long-term development reserves are also identified on the ALP to accommodate potential demand that could exceed current expectations or could occur beyond the current twenty-year planning period.

It is noted that approximately 23 acres of property acquisition (planned development area and reserve abutting the west side of airport) is depicted on the ALP. Substantial landside facility improvements are recommended within this expansion area. In the event that the property is not acquired, future improvements would be limited to those items located within the existing airport property boundaries. The major items depicted on the ALP are summarized below.

Improvements Not Dependent on West Property Acquisition:

- The south end of Runway 16/34 is relocated (reduced) approximately 120 feet to provide standard RSA, OFA, OFZ and primary surface dimensions, which are currently limited by a boundary fence. The precise location of the future runway end will need to be determined through a survey with a minimum of 240 feet of clearance provided from the runway end to the fence. The pavement located between the physical end of the pavement and the relocated runway end will be converted into taxiway, with yellow markings and blue taxiway edge lights.

- A 258-foot runway extension is depicted at its north end to compensate for lost runway at the south end and to provide a minor increase in overall length (3,015 feet). The east parallel taxiway will also be extended in conjunction with the project.

- Future takeoff distance available for both runways is estimated to be 3,015 feet; the landing distances available will be 2,757 feet (Rwy 16) and 2,748 feet (Rwy 34).

- Runway 16/34 is widened to 60 feet as part of a future major rehabilitation project. It is anticipated that the existing runway edge lighting system (MIRL) will be replaced as part of the widening project.

- An aircraft wash pad site is identified adjacent to the southeast airport taxiway and vehicle gate.

- The existing row of tiedowns located on the runway side of the east parallel taxiway (near south end of the runway) will be removed to meet the ADG I taxiway OFA clearance standard.

- Pubic restroom development sites are identified adjacent to the east tiedown apron and the planned aircraft wash pad (a final siting decision will be made by ODA during design). In general, it is preferable to locate restroom facilities in close proximity to itinerant aircraft parking, fueling facilities, etc. Locating the facilities near the SE corner of the airport would be reasonably convenient, although aircraft parking in this area is very limited. It is recommended that the restroom facilities be accessible to airport users only, with a combination lock set to the Unicom/CTAF frequency.

- An apron expansion reserve is identified in the area east of the east tiedown apron. In the interim, this area will continue to be used as open space for local airport events.

- An east apron development reserve is identified along the northeast corner of the airport. Due to the narrow depth of airport property in this area, the apron would need to have a configuration similar to the existing east tiedown apron, with vehicle access provided at the north end (Oak Street).

- The west parallel taxiway is extended to from the midpoint of the runway to the end of Runway 16 with a separation of 150 feet, based on ARC B-I (small) design standards.

- Development sites for three "standard" T-hangars are identified within existing airport property on the northwest side of the runway and future parallel taxiway. The limited depth of developable area between the runway and the existing west property line cannot accommodate typical "nested" T-hangar buildings, which range from about 48 to 54 feet wide. Standard T-hangars designed to accommodate most small single engine aircraft are typically 36 feet wide.

- ADG I taxilanes and taxiways are depicted to provide access to the hangar development sites.

- Vehicle access and parking at the existing northwest corner of the airport property for limited access (through secured gate) to adjacent hangars.

- Development sites are identified for 6 to 8 additional small conventional hangars on the west side of the west parallel taxiway.

Improvements Dependent on West Property Acquisition:

- Approximately 23 acres of property acquisition is identified along the western side of the airport. The 350-foot wide strip of land will accommodate a variety of landside facilities and is divided into planned development (north section) and long-term development reserve (south section).

- West landside development includes:

    - Seven T-Hangar Sites, with buildings oriented perpendicular to runway
    - Access Taxiways and Hangar Taxilanes
    - Aircraft Apron
    - FBO and Fuel Storage Reserves
    - 2,100-foot (+-) North Access Road and Vehicle Parking. Two access options are depicted to provide vehicle access from Oak Street to the west side of the airport.

- Fencing on the future west property line.
- Long-term aviation development reserve (southern half of the west property acquisition).

Projects such as maintenance or reconstruction of airfield pavements, which are not depicted on the ALP, are described in the Capital Improvements Program, in Chapter Six.

Airspace Plan

The FAR Part 77 Airspace Plan for Lebanon State Airport was developed based on Federal Aviation Regulations (FAR) **Part 77, Objects Affecting Navigable Airspace**. The Airspace Plan provides the plan view of the airspace surfaces, profile views of the runway approach surfaces, and a detailed plan view of the runway approach surfaces. This information is intended to define and protect the airspace surfaces from encroachment due to incompatible land uses, which could adversely affect safe airport operations. By comparing the elevations of the airspace surfaces with the surrounding terrain, an evaluation of potential obstructions to navigable airspace was conducted.

The airspace surfaces depicted for Lebanon State Airport reflect the ALP-recommended (ultimate) runway length of 3,015 feet for Runway 16/34. Based on the current and planned use of B-I (small aircraft) design standards, Runway 16/34 will be designed for use by aircraft weighing 12,500 pounds and less, which places it in the "utility" category under FAR Part 77. Both runway ends are planned based on visual approach capabilities. As noted in the facility requirements analysis, this airspace configuration is also compatible with development of a non-precision instrument approach with a circling procedure that is authorized for daytime use only. A 5,000-foot horizontal surface radius is used for each runway end to protect future visual approach capabilities.

An area of terrain penetration is identified within the conical surface southwest of the runway. No terrain obstructions are identified within the runway approaches, primary surface or transitional surfaces. However, a fence and Airport Road are located within the existing primary surface beyond the end of Runway 34 (within 120 to 130 feet). The planned relocation of the runway end to provide standard extended runway safety area will result in these items being removed from the primary surface and located within the approach surface. However, the existing displaced threshold for Runway 34 currently provides a clear 20:1 approach path over these obstructions and no changes are recommended. The planned extension of the north end of the runway will retain the existing threshold location for Runway 16. For the future

configuration, Runway 16 will have a 258-foot displaced threshold to maintain an unobstructed 20:1 approach path.

The obstruction table for the drawing lists five items (fences and roads at both runway ends; terrain). As noted earlier, the use of displaced thresholds (existing on Runway 34 and planned for Runway 16) provides clear 20:1 approach paths to both runway ends. The approach surface plan and profile views provide additional detail for the runway approaches and the runway protection zones. The profile view depicts existing and future FAR Part 77 20:1 approach surfaces, in addition to the 20:1 surfaces that are provided by the displaced thresholds.

Airport Land Use Plan with 2009 Noise Contours

The Airport Land Use Plan for Lebanon State Airport depicts existing zoning in the immediate vicinity of the airport. The airport is located in the City of Lebanon's Limited Industrial (ML) Zone. The area surrounding the airport is predominately zoned agricultural and manufacturing/industrial to the west; with large areas of residential zoning located north and east, within one mile and beyond. The majority of land areas west of the airport are currently in agricultural use, although a portion of the area directly abutting the airport is zoned manufacturing. The urbanized areas of Lebanon are located within the eastern boundaries of the airport's FAR Part 77 airspace surfaces. It is recommended that the City of Lebanon and Linn County update airport overlay zoning to reflect the boundaries of the FAR Part 77 airspace surfaces, consistent with the updated airport layout plan.

Noise exposure contours based on the 2009 forecasts of aircraft activity are depicted on the Land Use Plan. The noise contours were created using the FAA's Integrated Noise Model (INM). Data from activity forecasts and aircraft fleet mix are combined with common flight tracks and runway use to create a general indication of airport-generated noise exposure. The noise contours are plotted in 5 DNL increments starting at 55 DNL. The size and shape of the contours is consistent with the airport's runway utilization and aircraft traffic. Although limited areas of residential development exist in the vicinity of the airport, sparse development patterns appear to have prevented significant levels of aircraft noise exposure to more densely populated areas. Local planning authorities should discourage land use patterns that would increase population densities in the vicinity of the airport, particularly beneath the runway approach surfaces. See Chapter Seven for a detailed description of the noise analysis.

Drawing 1 – Cover Sheet

Drawing 2 - Airport Layout Plan

Drawing 3 – Airport Airspace Plan

Drawing 4 - Airport Land Use Plan

CHAPTER SIX

FINANCIAL MANAGEMENT AND DEVELOPMENT PROGRAM

The analyses conducted in the previous chapters have evaluated airport development need based on forecast activity and the associated facility requirements. One of the most important elements of the master planning process is the application of basic economic, financial and management rationale so that the feasibility of the implementation can be assured. The amount of local and outside funding (state, federal, etc.) that will be available during the current twenty-year planning cannot be guaranteed. In cases when the overall capital needs of an airport exceed available funding, projects will be deferred until funding can be obtained. In this situation, it is particularly important to establish and maintain priorities so that completion of the most essential improvements is assured.

Historically, the primary source of funding for major capital projects at the airport has been federal aviation trust fund monies with local matching funds provided by ODA. Hangar construction, which has not been eligible for FAA funding in the past, has been privately funded. Utility improvements at the airport are also not typically eligible for FAA funding and have been funded by ODA.

The maintenance of airfield pavements ranges from very minor items such as crack filling to fog seals or patching. Minor pavement maintenance items such as crack filling are not included in the capital improvement program, but will need to be undertaken by the City on an annual or semi-annual basis. The Pavement Management Program (PMP) managed by ODA provides airfield pavement maintenance on established multi-year cycles. This program is intended to preserve and maintain existing airfield pavements in order to maximize their useful lives and the economic value of the pavement. As noted earlier, several short-term pavement maintenance projects are identified for Lebanon State Airport in the current PMP, which will require local matching funds.

AIRPORT DEVELOPMENT SCHEDULE AND COST ESTIMATES

The analyses presented in Chapters Four and Five, described the airport's overall development needs for the next twenty years. Estimates of project costs were developed for each project based on 2005 dollars. A 30 percent contingency overhead for engineering, administration, and unforeseen circumstances has been included in the estimated component and total costs. In future years, as the plan is carried out, these cost estimates can continue to assist management by adjusting the 2005-based figures for subsequent inflation. This may be accomplished by converting the interim change in the United States Consumer Price Index (USCPI) into a multiplier ratio through the following formula:

$$\frac{X}{I} = Y$$

Where:
X = USCPI in any given future year
Y = Change Ratio
I = Current Index (USCPI)

USCPI
193.3
(1982-1984 = 100)
March 2005

Multiplying the change ratio (Y) times any 2005-based cost figures presented in this study will yield the adjusted dollar amounts appropriate in any future year evaluation.

The following sections outline the recommended development program and funding assumptions. The scheduling has been prepared according to the facility requirements determined earlier. The projected staging of development projects is based upon anticipated needs and investment priorities. Actual activity levels may vary from projected levels; therefore, the staging of development in this section should be viewed as a general guide. When activity does vary from projected levels, implementation of development projects should occur when demand warrants, rather than according to the estimated staging presented in this chapter. In addition to major development projects, the airport will require regular facility maintenance.

A summary of development costs during the twenty-year capital improvement plan is presented in **Table 6-1**. The twenty-year CIP is divided between short-term and long-term projects. The table provides a listing of the major capital projects included in the twenty-year CIP, including

each project's eligibility for FAA funding. The FAA will not generally participate in vehicle parking, utilities, building renovations or projects associated with non-aviation developments. Some changes in funding levels and project eligibility were included in the current Airport Improvement Program (AIP) legislation (extends through FY 2007). FAA funding levels have been increased from 90 percent to 95 percent, although the FAA indicates that a return to the previous 90 percent funding level may occur in future bills. Therefore, for planning purposes, FAA-eligible projects are estimated based on a 90 percent level of FAA funding.

The general aviation entitlement funding level is established up to $150,000 per year, with a maximum rollover of four years. Projects such as hangar construction or fuel systems, which have not traditionally been eligible for funding, are currently eligible, although the FAA indicates that this category of project would be funded only if there were no other project needs at a particular airport. Based on the overall facility needs and anticipated levels of federal funding, it has been assumed that hangar construction will not rely on FAA funds.

The short-term phase of the capital improvement program includes the highest priority projects recommended during the first five years. Long-term projects are expected to occur beyond the next five years, although changes in demand or other conditions could accelerate or slow demand for some improvements. As with most airports, pavement related improvements represent the largest portion of CIP needs at Lebanon State Airport during the current planning period.

Short-Term Projects

The short-term projects at Lebanon State Airport include both property acquisition and several improvements to facilities within existing airport property boundaries. The short-term improvement projects are not dependent on the planned west side property acquisition. Since the process of airport property acquisition often extends over a period of several years due to complex negotiations, appraisal, and funding challenges, it is recommended that the property acquisition be initiated at the earliest possible opportunity while other improvement projects are completed. It is noted that the property recommended for acquisition has been annexed into the city limits, is zoned for manufacturing use and could quickly be committed to other non-airport uses if not acquired for airport use.

Several pavement slurry seal projects are recommended in the short-term period (runway, north section of the east parallel taxiway, west parallel taxiway, and main apron). The relocation of the end of Runway 34 to provide standard extended runway safety area is recommended to be done in conjunction with the slurry seal and application of reconfigured runway markings. An overlay of the southern section of the east parallel taxiway and a minor (250-foot) north runway

extension are also recommended in the short-term period. A project to eliminate the open drainage ditches located in the RSA is also included in the short-term program.

Other short-term projects include a new aircraft wash facility and public restrooms, both to be located adjacent to the main apron, east of the runway. The extension of city water service to the west side of the airfield is also a high priority project that is needed to provide fire suppression capabilities within the existing and future hangar developments.

Long-Term Projects

The recommended long-term projects at Lebanon State Airport include the following:

- West parallel taxiway extension (north section - midpoint of the runway to the end of Runway 16).
- Taxilanes/taxiways to provide access to the hangar development sites (west side of airport, within current airport boundary)
- West Landside Area (expanded airport property) is anticipated to be developed based on actual demand levels through multiple phases through the 20-year planning period and beyond:
- T-Hangar Sites
- Access Taxiways and Hangar Taxilanes
- Aircraft Apron
- 2,100-foot North Access Road and Vehicle Parking.
- Widen Runway 16/34 to 60 feet; MIRL replacement.
- Replace existing VASI with PAPI for both runway ends.

TABLE 6-1:
20-YEAR CAPITAL IMPROVEMENT PROGRAM
2006 TO 2025

Project	Qty.	Unit	Unit $	Total Cost*	FAA Eligible	Sponsor
Short Term Projects (Years 1-5)						
2005-2006						
Slurry Seal Runway 16/34, Visual Mkgs (relocate Rwy 34 end for RSA); relocate rwy end lights	15,980	SY	$3.60	$70,028	$63,025	$7,003
Property Acquisition (west landside development)	23	acres	$10,000	$230,000	$207,000	$23,000
Subtotal - 2005-2006				**$300,028**	**$270,025**	**$30,003**
Engineering & Contingency (30%)				**$90,008**	**$81,008**	**$9,001**
Total - 2005-2006				**$390,036**	**$351,033**	**$39,004**
2007						
RSA Drainage Ditch Improvements	1	LS	$50,000	$50,000	$45,000	$5,000
Aircraft Wash Pad	1	LS	$25,000	$25,000	$22,500	$2,500
Environmental Assessment (Rwy/Txy Extension)	1	LS	$35,000	$35,000	$31,500	$3,500
Water Line Extension (west airfield)	3,600	LF	$45.00	$162,000	$145,800	$16,200
Subtotal - 2007				**$272,000**	**$244,800**	**$27,200**
Engineering & Contingency (30%)				**$81,600**	**$73,440**	**$8,160**
2007- Total				**$353,600**	**$318,240**	**$35,360**
2008						
North Runway Extension (250 feet) w/ East Parallel Txy Connection	2,680	SY	$40.00	$107,200	$96,480	$10,720
Overlay E. Parallel Taxiway - (south section)	6,920	SY	$12.00	$83,040	$74,736	$8,304
Subtotal - 2008				**$190,240**	**$171,216**	**$19,024**
Engineering & Contingency (30%)				**$57,072**	**$51,365**	**$5,707**
2008- Total				**$247,312**	**$222,581**	**$24,731**
2009						
Public Restroom (pre-engineered/modular)	1	LS	$35,000	$35,000	$0	$35,000
Slurry Seal West Parallel Taxiway; Overlay South Connecting Taxiway	5,780	SY	$3.60	$28,308	$25,477	$2,831
Slurry Seal East Parallel Taxiway (north section)	6,500	SY	$3.60	$23,400	$21,060	$2,340
Slurry Seal Main Apron (East Tiedown Apron)	8,700	SY	$3.60	$31,320	$28,188	$3,132
Subtotal - 2009				**$118,028**	**$74,725**	**$43,303**
Engineering & Contingency (30%)				**$35,408**	**$22,418**	**$12,991**
2009- Total				**$153,436**	**$97,143**	**$56,294**
Total Short Term Projects				**$1,144,385**	**$988,996**	**$155,388**

TABLE 6-1 (CONTINUED)
20-YEAR CAPITAL IMPROVEMENT PROGRAM
2006 TO 2025

Project	Qty.	Unit	Unit $	Total Cost*	FAA Eligible	Sponsor
Long Term Projects (Years 6 - 20)						
West Parallel Txy Extension (north section) (1480 x 25')	4,610	SY	$40.00	$184,400	$165,960	$18,440
West Landside Development - Access Taxiways (2)	1,160	SY	$40.00	$46,400	$41,760	$4,640
NW T-Hangar Taxilanes (Phase 1)	2,600	SY	$40.00	$104,000	$93,600	$10,400
Overlay East Parallel Taxiway - (north section) (2008)	6,500	SY	$12.00	$78,000	$70,200	$7,800
Overlay Main Apron (East Tiedown Apron) (2010)	8,700	SY	$12.00	$104,400	$93,960	$10,440
Runway 16/34 - Widen & Overlay, Visual Mkgs (2012)	18,680	SY	$18.00	$336,240	$302,616	$33,624
MIRL (replacement system)	3,035	LF	$45.00	$136,575	$122,918	$13,658
West Landside Develop. - Vehicle Access Rd. & Parking	2,100	LF	$40.00	$198,000	$178,200	$19,800
NW T-Hangar Taxilanes (Phase 2)	4,200	SY	$40.00	$168,000	$151,200	$16,800
West Landside Development - N/S Main Access Txy	3,670	SY	$40.00	$146,800	$132,120	$14,680
West Landside Area - Hangar Taxilanes Phase 1	1,950	SY	$40.00	$78,000	$70,200	$7,800
PAPI - Rwy 16 & 34 (replacements for VASI)	2	ea	$60,000	$120,000	$108,000	$12,000
West Landside Development - Aircraft Parking Apron	9,375	SY	$40.00	$375,000	$337,500	$37,500
Overlay East Terminal Area Access Rd. and Vehicle Pkg	1,390	SY	$12.00	$16,680	$15,012	$1,668
Main Apron (East Tiedown Apron) Expansion	2,850	SY	$40.00	$114,000	$102,600	$11,400
REIL (Rwy 34)	1	ea	$25,000	$25,000	$22,500	$2,500
Slurry Seal West Hangar Taxiways/Taxilanes (2012)	10,700	SY	$3.60	$38,520	$34,668	$3,852
Slurry Seal East Parallel Taxiway (2012)	14,213	SY	$3.60	$51,167	$46,050	$5,117
Slurry Seal West Parallel Taxiway (2013)	10,400	SY	$3.60	$37,440	$33,696	$3,744
Slurry Seal West Apron (2014)	9,375	SY	$3.60	$33,750	$30,375	$3,375
Slurry Seal Runway 16/34, Visual Mkgs (2014)	20,230	SY	$3.60	$80,328	$72,295	$8,033
Slurry Seal Main Apron (East Tiedown Apron) (2015)	8,700	SY	$3.60	$31,320	$28,188	$3,132
West Landside Area - Hangar Taxilanes Phase 2	1,950	SY	$40.00	$78,000	$70,200	$7,800
Slurry Seal East Parallel Taxiway (2017)	14,213	SY	$3.60	$51,167	$46,050	$5,117
Slurry Seal West Hangar Taxiways/Taxilanes (2018)	10,700	SY	$3.60	$38,520	$34,668	$3,852
Slurry Seal Runway 16/34, Visual Mkgs (2019)	20,230	SY	$3.60	$80,328	$72,295	$8,033
Slurry Seal West Apron (2020)	9,375	SY	$3.60	$33,750	$30,375	$3,375
Overlay West Parallel Taxiway (south section) (2020)	5,780	SY	$12.00	$69,360	$62,424	$6,936

Slurry Seal Main Apron (East Tiedown Apron) (2021)	11,550	SY	$3.60	$41,580	$37,422	$4,158
West Landside Area - Hangar Taxilanes Phase 3	1,950	SY	$40.00	$78,000	$70,200	$7,800
Slurry Seal East Parallel Taxiway (2023)	14,213	SY	$3.60	$51,167	$46,050	$5,117
Slurry Seal West Hangar Taxiways/Taxilanes (2024)	10,700	SY	$3.60	$38,520	$34,668	$3,852
Slurry Seal Runway 16/34, Visual Mkgs (2024)	20,230	SY	$3.60	$80,328	$72,295	$8,033
Slurry Seal West Parallel Taxiway (2025)	10,400	SY	$3.60	$37,440	$33,696	$3,744
Total Long Term Projects				**$3,182,179**	**$2,863,961**	**$318,218**
Engineering & Contingency (30%)				**$954,654**	**$859,188**	**$95,465**
Total Phase II Projects				**$4,136,833**	**$3,723,150**	**$413,683**
TOTAL SHORT & LONG TERM PROJECTS				**$5,281,218**	**$4,712,146**	**$569,072**

Dates listed for specific projects are general estimates intended to assist in long-term capital planning - actual dates will vary depending on funding and facility needs.

Several long-term pavement projects are also anticipated including overlays for the east parallel taxiway (north section), the main apron, west parallel taxiway and Runway 16/34 (in conjunction with widening to 60 feet). Slurry seal projects are recommended for all airfield pavements on a typical 5 to 6-year interval.

Pavement related projects listed in the CIP are listed in relative priority based on a general timeline. The actual timing for these projects may need to be periodically adjusted based on the ODA's need to accelerate or defer projects based on a variety of considerations. The specific years listed are intended to provide a general guide for project planning and illustrate the repetitive nature and substantial investment required in maintaining airfield pavements.

FINANCING OF DEVELOPMENT PROGRAM

Federal Grants

As proposed, approximately 89 percent of the airport's 20-year CIP will be eligible for federal funding. A primary source of potential funding is the Federal Airport Improvement Program (AIP). Funds from this program are derived from the Aviation Trust Fund, which is the depository for all federal aviation taxes collected on such items as airline tickets, aviation fuel, lubricants, tires, aircraft registrations, and other aviation-related fees. These funds are distributed under appropriations set by Congress to all airports in the United States that have certified

eligibility. The funds are distributed through grants administered by the Federal Aviation Administration (FAA).

Under current FAA guidelines, the ODA receives 95 percent participation on eligible projects. Lebanon State Airport is eligible under the Airport Improvement Program (AIP) to receive discretionary grants and general aviation entitlement grants. Under the current authorization, the airport may receive up to $150,000 per year in the GA entitlement grants. The future availability of the GA non-primary entitlement funding is dependent on congressional reauthorization and may change during the planning period. However, based on current legislation, these grants have become a very significant source of FAA funding for general aviation airports. Airports may combine up to four years of GA entitlement funding for projects. As noted earlier, a return to the previous 90 percent level may occur in the next federal funding bill. Discretionary grants are also available to fund larger projects that require additional funding.

The constraints of AIP funding availability will dictate in large part, the actual schedule for completing airport improvement projects through the planning period. As a result, some projects included in the twenty-year CIP may be deferred beyond the twenty-year time frame.

State/Local Funding

As currently defined, the ODA portion of the CIP is approximately 11 percent. For airport sponsors, one of the most challenging aspects of financial planning is generating enough revenue to match available federal grants for large projects. As noted earlier, FAA AIP grants usually represent the single largest source of funding for major capital projects.

As currently defined, the local share for projects included in the twenty year planning period is estimated to approximately $569,000, which includes the local 5% match for AIP-funded projects and projects not eligible for FAA funding, including a new public restroom .

Hangar construction has not been included in the CIP; hangars at the airport have historically been funded by private tenants. Recent changes in AIP legislation allow some FAA funding to be used for hangar construction, however, this type of development is considered to be a much lower priority than airfield improvement projects. The FAA has indicated that they consider funding requests for hangars only in cases where there are no other higher priority project needs outstanding. Since the projected twenty-year cost of improving and maintaining airport facilities exceeds anticipated AIP funding levels, it appears unlikely that the ODA could justify a request for FAA funding for hangar construction any time in the near future.

Pavement Maintenance Program

The Oregon Department of Aviation (ODA) pavement maintenance program provides a resource for airfield pavement maintenance projects. The program funds pavement maintenance and associated improvements (crack filling, repair, sealcoats, etc.), which have not traditionally been eligible for FAA funding.

Funding for the Pavement Maintenance Program (PMP) is generated through collection of aviation fuel taxes. ODA manages the PMP through an annual consultant services contract and work is programmed on a 3-year regional rotation. The program includes a regular schedule of inspection and subsequent field work. Benefits from the PMP include:

- Economy of scale in bidding contracts
- Federal/State/Local partnerships that maximize airport improvement funds
- PMP is not a grant program and local match is on a sliding scale (50% - 5% required).

The PMP includes the following features:

- Review prior year's Pavement Condition Index (PCI) reports
- Only consider PCIs above 70
- Apply budget
- Limit work to patching, crack sealing, fog sealing, slurry sealing
- Add allowance for striping
- Program to include approximately 20 airports per year, depending on funding levels.

CHAPTER SEVEN
ENVIRONMENTAL REVIEW

INTRODUCTION

The purpose of the Environmental Checklist is to identify any physical and environmental conditions of record which may limit improvement options for the Lebanon State Airport. In comparison to an Environmental Assessment (EA) or Environmental Impact Statement (EIS), the project scope for this study is limited, and focuses on compiling information of record from the applicable local, State and Federal sources pertaining to existing conditions of the subject site and its environs. The scope of the Environmental Review research does not involve extensive interpretation of the information, in-depth analyses, or the more comprehensive, follow-up correspondence and inquiries with affected agencies and persons as is normally associated with an EA or EIS.

All research activities, including correspondence, data collection and documentation, proceeded under the provisions of FAA Order 5050.4A, The Airport Environmental Handbook, which is intended to implement the requirements of Sections 1505.1 and 1507.3 of the National Environmental Policy Act (NEPA). This report briefly addresses, either in narrative or in checklist format, each potential impact category identified by Order 5050.4A as to be investigated under the EA processes. In instances where a particular environmental impact type does not appear likely or germane to the subject site, the checklist is noted accordingly, and little or no discussion appears in the narrative section of the report to address that impact category.

Included below is a brief summary of the categories in which potentially significant impacts were identified, or appear to be possible, and where notable ecological or social conditions appear pertinent to the future development of this facility.

AIRPORT LAND USE

The Lebanon State Airport is located at the western edge of the City of Lebanon in the City's Limited Industrial (ML) Zone. The airport is juxtaposed between Airport Road to the south and Oak Street to the north, and also borders narrow properties fronting on Airway Road, immediately east of the airfield. The ML Zone does not include airports and/or aviation activities as either conditionally or outright permitted uses. The consultant recommends that the City amend the zoning code or map, as desired or seems appropriate to local planners, to accommodate aviation and related development as an outright permitted use on all of the current and foreseeable future airport property. State statutes support and require adoption by local jurisdictions of airport friendly zoning on all lands within airport boundaries (ORS Ch. 836.616).

Land uses abutting the Lebanon State Airport are predominantly a mix of agricultural and limited industrial activities, with areas of residential development further north and east of the airport.

In meeting with the consultant, the Community Planning Director indicated that development which is currently occurring, and additional pending, southeast of the end of Runway 34, in the 'Residential Mixed Density' Zone, is occurring as single-family, detached dwellings. This zone allows multi-family residential development at a maximum density of nineteen units per acre, and the particular districts in question are situated in such a manner that they may be in proximity to approach and departure paths for Runway 34. The City should coordinate with the Oregon Department of Aviation (ODA) concerning any development in these locations which would exceed single-family residential development densities, to ensure compliance with height restrictions and ODA's airport compatibility standards.

Across Airway Road, east of the runway, some areas are zoned City of Lebanon, Mixed Use (MU). A very wide range of activities are permitted, subject to review by the Planning Commission, in this zone, per Section 4.310(3)(a)-(ak). The consultant recommends that ODA and the FAA be given opportunity to comment on the appropriateness of uses permitted specifically under subsections (d)-(g), (o) and (aa), and that any uses permitted under these sections on land near the airport be held to applicable height restrictions and be approved by ODA for compatibility in proximity to aviation.

Section 4.311, Procedures for Preliminary Approval in the MU Zone, requires an application for approval, and planning commission review, of development plans for all uses in the MU Zone. Subsection (2)(a) provides the decision criteria, and includes:

"(2) The standards of this ordinance and other regulations."

Upon the City's formal adoption of the current round of land use regulation amendments, or LURA's, this criterion will reference airport compatibility rules adopted by the State of Oregon and incorporated into the pending local code amendments. It is nonetheless advised that a fourth criterion, which would require adherence to FAA regulations concerning critical airspaces, and ODA's compatibility rules, be added to this section as follows:

"(4) Applicable rules and regulations of the Oregon Department of Aviation (ODA) and Federal Aviation Administration (FAA)."

Of additional concern is the Willamette Speedway located similarly in relation to Runway 34, but southwest of the runway rather than southeast. Although the speedway is located outside the runway protection zone (RPZ) and the approach surface for Runway 34, the consultant recommends that local planners perform a thorough analysis of the frequency of activities at the speedway in relation to its physical relationship to the common traffic, to determine the level of hazard which is posed by this land use.

The local social environment appears to be generally supportive of the airport, after some discussions over past years of potentially relocating the facility. The City of Lebanon has expressed its support for the Lebanon State Airport in specifically earmarking, in the Comprehensive Plan, adjacent lands for future airport expansion; by adopting long-standing standards, and working over the years to update the same in response to changes in state law, to protect critical airspaces and implement protective zoning around the airport; and by recognizing the airport as an economic opportunity and "…*an important transportation element in the economic growth of the community*" (Comprehensive Plan page 7-P-4).

Oregon Revised Statutes (ORS) Chapter 836.600 through 836.630 addresses the appropriate zoning and protection of Oregon's airports and their surroundings. Under the statute, height restrictive zoning and, to some extent, use-restrictive zoning, are indicated as necessary components affecting land uses in the immediate vicinity of a public airport. The City's current round of Land Use Regulations Amendments will implement changes to local zoning codes and mapping consistent with the state's airport planning rules. Based upon the consultant's considerable experience with local Oregon jurisdictions since codification of ORS 836 and OAR 660-013, the City is to be commended in this significant and leading accomplishment.

An Airport Overlay Zone, which protects necessary airspaces and limits incompatible uses in proximity to an airfield, is the primary means of ensuring the compatibility of surrounding land uses with operations of a general aviation airstrip. While overlay zoning exists in the City of Lebanon and Linn County, in the case of the County, the regulations date to the early 1980's. The Linn County airport safety zoning provisions and mapping should be amended in a manner

consistent with those of the City of Lebanon resulting from the LURA, potentially even incorporating, in both cases or as desirable, the airport hazard overlay mapping which will be produced under this airport layout plan report update directly. The record reflects that the City of Lebanon has coordinated closely in the past with ODA in refining its overlay zoning.

Whenever hazard overlay mapping affects more than one jurisdiction, it is highly advisable that the two work in conjunction to ensure consistency among planning documents relative to the best manner in which to protect the airport and its neighbors from hazards and incompatibilities. Since the airport is within the jurisdiction of the City of Lebanon, and since the City has the benefit of their model of pending amendments to share with the County, City planners might most appropriately initiate this inter-jurisdictional coordination. ODA's technical assistance remains available for jurisdictions implementing the state's airport planning rules. It is further recommended that Linn County review their Transportation System Plan (TSP), in conjunction with ODA and the City of Lebanon, to ensure full compliance with ORS Chapter 836.600-630, and to acknowledge this facility as an important part of the regional and County-wide transportation network.

In addition, future transportation network changes, namely the planned "parkway alignment" to divert traffic around downtown Lebanon, and implementation of recommendations of the City's TSP, may result in the closure of either Airport Road or Oak Street. This will have implications for the airport beyond just vehicular access, as future runway extensions may be driven in part by which if any current roadways are vacated, and where future alignments will occur. Airport representatives, City and County planners, and local officials should work together to identify the most mutually-beneficial configurations for streets and roads in this section of the local infrastructure, with an ever-present objective of protecting the airport's viability to continue to operate and grow in response to market demands.

NOISE EVALUATION

Noise is sometimes defined as unwanted sound. However, sound is measurable, whereas noise is subjective. The relationship between measurable sound and human irritation is the key to understanding aircraft noise impact. A rating scale has been devised to relate sound to the sensitivity of the human ear. The A-weighted decibel scale (dBA) is measured on a "log" scale, by which is meant that for each increase in sound energy level by a factor of 10, there is a designated increase of 1 dBA. This system of measurement is used because the human ear functions over such an enormous range of sound energy impacts. At a psychological level, there is a rule of thumb that the human ear often "hears" an increase of 10 decibels as equivalent to a "doubling" of sound.

The challenge to evaluating noise impact lies in determining what amount and what kind of sound constitutes noise. The vast majority of people exposed to aircraft noise are not in danger of direct physical harm. However, much research on the effects of noise has led to several generally accepted conclusions:

- The effects of sound are cumulative; therefore, the duration of exposure must be included in any evaluation of noise.
- Noise can interfere with outdoor activities and other communication.
- Noise can disturb sleep, TV/radio listening, and relaxation.
- When community noise levels have reached sufficient intensity, community wide objection to the noise will likely occur.

Research has also found that individual responses to noise are difficult to predict[20]. Some people are annoyed by perceptible noise events, while others show little concern over the most disruptive events. However, it is possible to predict the responses of large groups of people – i.e. communities. Consequently, community response, not individual response, has emerged as the prime index of aircraft noise measurement.

On the basis of the findings described above, a methodology has been devised to relate measurable sound from a variety of sources to community response. It has been termed "Day-Night Average Sound Level" (DNL) and has been adopted by the U. S. Environmental Protection Agency (EPA), the Department of Housing and Urban Development (HUD), and the Federal Aviation Administration (FAA) for use in evaluating noise impacts. In a general sense, it is the yearly average of aircraft-created noise for a specific location (i.e., runway), but includes a calculation penalty for each night flight.

The basic unit in the computation of DNL is the sound exposure level (SEL). An SEL is computed by mathematically summing the dBA level for each second during which a noise event occurs. For example, the noise level of an aircraft might be recorded as it approaches, passes overhead, and then departs. The recorded noise level of each second of the noise event is then added logarithmically to compute the SEL. To provide a penalty for nighttime flights (between 10 PM and 7 AM), 10 dBA is added to each nighttime dBA measurement, second by second.

[20] Beranek, Leo, *Noise and Vibration Control*, McGraw-Hill, 1971, pages ix-x.

Due to the mathematics of logarithms, this calculation penalty is equivalent to 10-day flights for each night flight[21].

A DNL level is approximately equal to the average dBA level during a 24-hour period with a weighing for nighttime noise events. The main advantage of DNL is that it provides a common measure for a variety of different noise environments. The same DNL level can describe an area with very few high noise events as well as an area with many low level events.

Noise Modeling and Contour Criteria

DNL levels are typically depicted as contours. Contours are an interpolation of noise levels drawn to connect all points of a constant level, which are derived from information processed by the FAA-approved computer noise model. They appear similar to topographical contours and are superimposed on a map of the airport and its surrounding area. It is this map of noise levels drawn about an airport, which is used to predict community response to the noise from aircraft using that airport. DNL mapping is best used for comparative purposes, rather than for providing absolute values. That is, valid comparisons can be made between scenarios as long as consistent assumptions and basic data are used for all calculations. It should be noted that a line drawn on a map by a computer does not imply that a particular noise condition exists on one side of the line and not on the other. These calculations can only be used for comparing average noise impacts, not precisely defining them relative to a specific location at a specific time.

2009 Airport Noise Contours

The noise contours depicted on the Airport Land Use Plan drawing in Chapter Five are plotted in 5 DNL increments starting at 55 DNL based on the 2009 forecast activity levels. The size and shape of the contours is consistent with the airport's runway utilization and overall volume of aircraft traffic. Runway 34 is the primary landing and departure runway, which results in contours extending beyond the end of Runway 16 over a longer distance, reflecting the flatter

[21] Where Leq ("Equivalent Sound Level") is the same measure as DNL without the night penalty incorporated, this can be shown through the mathematical relationship of:

$$Leq_d = 10 \log \left(\frac{N_d \times 10^{(SEL/10)}}{86{,}400} \right) \qquad Leq_n = 10 \log \left(\frac{N_n \times 10^{((SEL+10)/10)}}{86{,}400} \right)$$

If SEL equals the same measured sound exposure level for each computation, and if N_d = 10 daytime flights, and N_n = 1 night-time flight, then use of a calculator shows that for any SEL value inserted, $Leq_d = Leq_n$.

climb profiles of aircraft takeoff. The 55 DNL contour extends beyond airport property both north and south; the majority of the 60 DNL contour is contained within airport property, although a portion extends beyond the airport to the north; the majority of the 65 DNL contour is contained within airport property; a small 70 DNL noise contours closely follows the runway and is entirely contained within airport property. Under federal guidelines, all land uses, including residential, are considered compatible with noise exposure levels of 65DNL and lower.

Care should be taken by local land use authorities to avoid creating potential long-term land use incompatibilities in the vicinity of the airport by permitting development of incompatible land uses such as residential subdivisions within areas of moderate or higher noise exposure. Oregon's airport noise and land use compatibility guidelines discourage residential development within the 55 DNL contour, although it is not prohibited.

Noise and Land-Use Compatibility Criteria

Federal regulatory agencies of government have adopted standards and suggested guidelines relating DNL to compatible land uses. Most of the noise and land-use compatibility guidelines strongly support the concept that significant annoyance from aircraft noise levels does not occur outside a 65 DNL noise contour. Federal agencies supporting this concept include the Environmental Protection Agency, Department of Housing and Urban Development, and the Federal Aviation Administration.

Part 150, Airport Noise Compatibility Planning, of the Federal Aviation Regulations, provides guidance for land-use compatibility around airports. **Table 7-2** presents these guidelines.

TABLE 7-2
LAND-USE COMPATIBILITY WITH DNL

Land Use	Yearly Day-Night Average Sound Level (DNL) In Decibels					
	Below 65	65-70	70-75	75-80	80-85	Over 85
Residential						
Residential, other than mobile homes & transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile Home Parks	Y	N	N	N	N	N
Transient Lodgings	Y	N(1)	N(1)	N(1)	N	N
Public Use						
Schools	Y	N(1)	N(1)	N	N	N
Hospitals and Nursing Homes	Y	25	30	N	N	N
Churches, Auditoriums, and Concert Halls	Y	25	30	N	N	N
Governmental Services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
Commercial Use						
Offices, Business and Professional	Y	Y	25	30	N	N
Wholesale and Retail—Building Materials, Hardware and Farm Equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail Trade--General	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing General	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and Optical	Y	Y	25	30	N	N
Agriculture (except livestock) and Forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock Farming and Breeding	Y	Y(6)	Y(7)	N	N	N
Mining and Fishing, Resource Production and Extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor Sports Arenas, Spectator Sports	Y	Y(5)	Y(5)	N	N	N
Outdoor Music Shells, Amphitheaters	Y	N	N	N	N	N
Nature Exhibits and Zoos	Y	Y	N	N	N	N
Amusements, Parks, Resorts and Camps	Y	Y	Y	N	N	N
Golf Courses, Riding Stables and Water Recreation	Y	Y	25	30	N	N

Y (Yes)	Land-use and related structures compatible without restrictions.
N (No)	Land-use and related structures are not compatible and should be prohibited.
NLR	Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into design and construction of the structure.
25, 30 or 35	Land uses and structures generally compatible; measures to achieve NLR or 25, 30, or 35 dB must be incorporated into design and construction of the structure.

TABLE 7-2 NOTES:

1. Where the community determines that residential uses must be allowed, measures to achieve outdoor to indoor Noise Levels Reduction (NLR) of at least 25dB and 30dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB; thus, the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year-round. However, the use of NLR criteria will not eliminate outdoor noise problems.
2. Measures to achieve NLR of 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.
3. Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.
4. Measures to achieve NLR of 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received office areas, noise sensitive areas, or where the normal noise level is low.
5. Land-use compatible, provided special sound reinforcement systems are installed.
6. Residential buildings require an NLR of 25.
7. Residential buildings require an NLR of 30.
8. Residential buildings not permitted.

SOURCE: Federal Aviation Regulations, Part 150, Airport Noise Compatibility Planning, dated January 18, 1985.

Compatibility or non-compatibility of land use is determined by comparing the noise contours with existing and potential land uses. All types of land uses are compatible in areas below 65 DNL. Generally, residential and some public uses are not compatible within the 65-70 DNL, and above. As noted in **Table 7-2**, some degree of noise level reduction (NLR) from outdoor to indoor environments may be required for specific land uses located within higher-level noise contours. Land uses such as commercial, manufacturing, some recreational uses, and agriculture are compatible within 65-70 DNL contours.

SOCIOECONOMIC ISSUES

Lebanon State Airport contributes to the economic vitality of the City of Lebanon and Linn County. A forthcoming study by the Oregon Department of Aviation intends to attempt to quantify the economic impact of each individual publicly owned airport in the State of Oregon. Improvements under the preferred alternative will allow the Lebanon State Airport to better accommodate the existing and future users of the facility. In addition, positive social impacts may be anticipated in the forms of improved vehicular access and airside and landside improvements, as detailed in other sections of this report.

As is typical with general aviation airport improvement projects, foreseeable induced or secondary impacts of the project relate primarily to the positive economic impacts associated with jobs creation during construction; potential for increased employment base in aviation related industry; and an opportunity for increased commerce for businesses reliant upon the airport.

Improvements to runway lighting, taxiways, surface transportation routes, and landside buildings (hangar, etc.) will accrue additional positive impacts over time as users enjoy the benefits of the enhanced safety and convenience these amenities will provide. The development of hangars on the west side of the runway requires an extension of city water service primarily for fire protection and public safety. No disparate impacts will occur upon any one economic, ethnic, social or other identifiable, segment of the population.

WATER QUALITY

In consultation with the Oregon Department of Environmental Quality (DEQ), the consultant was advised that the Albany / Lebanon area is "in attainment" for air quality standards, meaning air quality conditions in the area are considered to be compliant with applicable pollution control regulations. Water quality impacts are always a concern with any construction project, and especially when considering sites where potentially hazardous materials, such as aviation fuel, fire retardants, de-icing agents, and/or agricultural chemicals are involved.

DEQ routinely recommends for airport projects that, at a minimum, investigations be performed which divulge past agricultural spraying practices, aviation fuel storage facilities, and other potential sources for adverse water quality impacts associated with past, present and potential future activities at the site. Agricultural and/or forestry-related chemical operators and airport sponsors must ensure that wash down, collection, treatment and storage areas and devices comply with Oregon Administrative Rule 340-109 and all applicable environmental standards.

In this case, agricultural and forestry-related chemicals and other hazardous materials may have been present, based upon the predominance of agriculture in the Linn County area, and the historical orientation of Lebanon's economy toward timber and agricultural resources. The airport sponsor must ensure that the facility's fuel storage is in fully compliant, above-ground tanks with adequate collection areas.

DEQ recommends that any existing National Pollutants Discharge and Elimination Permit (NPDES) be updated in consideration of the current proposed project. If a current NPDES Permit is not in effect, one will be necessary in conjunction with the project. Special precautions are advised during construction to protect ground and surface waters from contamination as a result of the activities. Untreated runoff from construction and from standard airport operations must not be allowed to enter the any ditch or pervious surfaces except those designed specifically for storm water treatment. Adherence to Appendix 2 of FAA Order 1050.1.B., "Prevention, Control, Abatement of Environmental Pollution at FAA Facilities", would work to ensure against adverse impacts to water quality. Additionally, adherence to the applicable local, state, and

federal regulations and standards; observance of DEQ's "Best Management Practices for Storm Water Discharges Associated with Construction Activities" (2000); and compliance with the guidelines of FAA Advisory Circular 150/5370-10 are advised to minimize potential construction-related impacts to water quality associated with planned development.

CULTURAL RESOURCES

As of April 15, 2001, the Oregon State Historic Preservation Office, SHPO, requires considerable documentation be provided by any party inquiring about the existence of significant cultural resources in a given location. The new procedure requires such information as architectural classification, window and roof types of all structures within the study area; if they may be considered as a resource; dates of any alterations; and "Significance Statements" for all types of resources. SHPO has provided specific forms, "Section 106 (of the National Historic Preservation Act) Documentation Forms" and "Section 106 Level of Effect Forms", for use in making such a request. This level of investigation surpasses the scope of this ALP Update Report.

The consultant forwarded a project description to the Tribal Planner of the Confederated Tribes of the Siletz Indians of Oregon. Written response was provided, but no input pertinent to the project was enclosed nor attached. The consultant infers that the Tribe has no comment on the project.

The Kalapuya Indians, who were consolidated by federal action with the Siltez in the early 20th century, and are now very nearly or entirely extinct, are known to have inhabited most of this portion of Linn County and the Willamette Valley. Settlements and burial mounds in the valley are most often located adjacent to long-established drainages, rivers and creeks. Should any historic or cultural resources be discovered on this site during construction, the sponsor will be responsible for immediately notifying SHPO, the Tribes, and the other appropriate authorities. Work would be required to be halted until the physical extent and relative cultural significance of the resource(s) could be identified, and a protection plan developed and implemented, if warranted.

The Oregon Natural Heritage Program's (ORNHP) Information Center, which was recently transferred to Oregon State University from the Nature Conservancy and the US Department of Interior's Fish and Wildlife Service (USFWS) was a primary source for environmental data collection. A search of the Natural Heritage's database revealed one species which is a Candidate for federal protection status, the Western yellow-billed cuckoo, *Coccyzus americanus occidentalis*, as occurring near the subject property. This specimen was recorded along the

Santiam River in 1970. In addition, the Northwestern pond turtle, Emys marmorata marmorata, was recorded in Mill Pond / Cheadle Lake, south of the City of Lebanon. Four species of plants which are either Threatened, Endangered, or Species of Concern to the Natural Heritage Program, are also recorded in the general vicinity of the airfield.

FLORA AND FAUNA

US Department of Interior's Fish and Wildlife Service (USFWS) records list one bird as a "Threatened" Species which may be affected by an airport improvement project at this location. The Bald Eagle, or *Haliaeetus leucocephalus,* is reported within proximity to the project site. Fender's blue butterfly, *Icaricia icarioides fenderi,* and six species of flora, are additional Endangered or Threatened species which may be found in the project vicinity.

Species which may occur and which are 'Candidates' for some type of Federal protective listing, but are "not yet the subject of a proposed rule," include but are not limited to the Yellow-billed cuckoo, *Coccyzus amreicanus* and Streaked horned lark, *Eremophilia alpestris strigata*; the Oregon Spotted Frog, *Rana pretiosa*; and Taylor's checkerspot, *Euphydras editha taylori*. Finally, "Species of Concern" to the USFWS, in addition to those discussed under the other categories of protection above, include: six species of bats; a gopher; two voles; the California wolverine, *Gulo gulo luteus*; eleven birds including three woodpeckers, a duck, sparrow and the Purple martin, *Progne subis*; six amphibians; seven invertebrates, including five caddisflies; and six species of plants. Please see the attached USFWS correspondence for the species and scientific names of these species of concern.

The USFWS correspondence states a Biological Assessment is required for "*construction projects (or other undertakings having similar physical impacts) which are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (NEPA) (42 U.S.C. 4332 (2) (c)). For projects other than major construction activities," the USFWS' correspondence continues, "the Service suggests that a biological evaluation similar to the Biological Assessment be prepared to determine whether they may affect listed and proposed species."* It is foreseeable that the scope of this proposed project may not be considered by the FAA as a major undertaking which would "*significantly affect…the quality of the human environment as defined in the…NEPA"* per the above definition. In this case, a full biological assessment would not be required.

WETLANDS

According to a review of the US Fish and Wildlife Service's National Wetlands Inventory (NWI), no jurisdictional wetlands would be affected by the airport expansion. It is possible that wetlands nonetheless occur on the site, since NWI maps are conceived through interpretations of aerial photography, and as such, are typically considered in the industry to be generally only around 30 percent (or less) accurate. Any development activities which would impact a wetland resource must be preceded by the necessary permit(s) from the Oregon Division of State Lands (DSL) and/or US Army Corps of Engineers (ACOE), as applicable. DSL will advise which is the permitting authority for a given project.

FLOODPLAIN / SOILS

Mapping and soils descriptions available on the web site of the USDA's Natural Resources Conservation Service (NRCS) local office depict the soils on the site as predominantly a silt loam which is described as wet to very wet. Agricultural Capability Classifications range from VIIw, indicating a severe limitation to potential productivity due to wetness, to IIw, indicating a relatively high productivity potential which is somewhat limited by wetness. No conversion of farm land is contemplated under the current preferred alternative, although conversion may be necessary in the future to accommodate the airport's long term demand for growth and to accommodate a prospective runway extension. No further analysis is required under the Farmland Protection Policy Act.

Silt fences, runoff diversion tactics, and storm water detention are commonly implemented in similar construction projects, and should be utilized for any project on the airport in order to minimize adverse impacts of development related activities.

FAA Advisory Circular 150/5370-10 provides additional measures which are advised to be implemented to minimize adverse impacts of airport construction activities. In addition, as discussed under Water Quality Impacts, above, DEQ's 2000 publication "Best Management Practices for Storm Water Discharges Associated with Construction Activities" should be followed during all phases of the project. Please see the above-related discussion regarding water quality impacts.