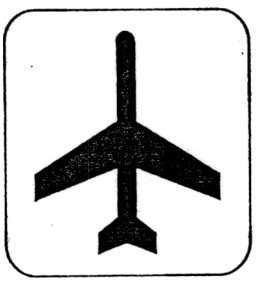
Airport Master Plan

McNary Field
Salem, Oregon



Final Report

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FINAL REPORT

McNARY FIELD
AIRPORT MASTER PLAN

Prepared for

City of Salem
Salem, Oregon

October 1997

Prepared by

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Airport Master Plan Update

McNary Field
Salem, Oregon

Salem Airport-McNary Field
Airport Master Plan
Executive Summary

Salem Airport-McNary Field, is a civil aviation facility that also accommodates military facilities with the Oregon Army National Guard. The airport is certified by the Federal Aviation Administration (FAA) as a commercial service airport under Federal Air Regulations (FAR) Part 139. The airport is included in the National Plan of Integrated Airport Systems (NPIAS) as a public use airport. As part of the national airport system, Salem Airport-McNary Field is considered to be in the public interest and is eligible for financial assistance for airport planning and development under the Airport and Airway Improvement Act of 1982.

This Airport Master Plan updates previous master planning conducted in 1979 and 1987. The master plan documents and airport layout plan drawings contained herein, replace all earlier versions as the official planning guidance for the airport.

To guide the preparation of the master plan update, a twelve-member Airport Master Plan Subcommittee was formed. The subcommittee held eight meetings to review and comment on the draft materials as prepared by the consultant. A public forum was held to present plan recommendations; the draft plan was presented to the City of Salem Airport Commission, Planning Commission, and the City Council through a series of public meetings. The substantial participation of the Airport Master Plan Subcommittee was a very important contribution to the success of the master planning process. The master plan provides a clear direction for the future development of the airport while maintaining an effective balance with the overall spirit and values of the community.

The objective of the master plan is to provide a ten to twenty-year guide for future operation and development of the airport. The airport is in conformance with the City Comprehensive Plan, including the Airport Overlay Zone which coincides with FAR Part 77 airspace surfaces. The predominate zone designation on the airport is PS-Public Service, with IP-Industrial Park on the southwest portion of the airport, near Airway Drive and the southeast portion of the airport adjacent to Turner Road. The portion of IP zoning located adjacent to the taxiway connecting the ends of Runways 31 and 34 should be changed to PS, to reflect recommended development of aircraft hangars and other related aviation activities. Beyond this change, the existing zoning on the airport appears to have adequate flexibility to accommodate projected development needs.

Salem's potential for commercial air service was evaluated as part of the master plan. The air service market is dynamic, highly competitive, and ever-changing. Although the market area available to Salem is sufficient in size to support scheduled service, competition from established air service points (Portland and Eugene) with convenient access via Interstate 5, currently accommodates demand. Factors such as convenience (travel time to/from the airport), cost (ticket prices), and choice (frequency of flights, number of airlines, destinations, etc.) are weighed by the traveling public when choosing among many options.

Airport and community leaders believe that Salem and the surrounding market will soon be sufficient to attract scheduled air service. An aggressive community-based effort is generally required for any airport seeking to establish service or expand on existing service. Salem Airport-McNary Field is strategically located to play a role in accommodating the region's future air service needs.

The primary airport facilities--runways, taxiways, aircraft parking, terminal, navigational aids, control tower, lighting, and airport rescue and fire fighting (ARFF)--are all capable of accommodating scheduled service without significant upgrades. Longer term improvements to terminal facilities may be addressed as demand materializes. A terminal area reserve has been identified to accommodate potential expansion requirements of the terminal building, curbside, surface access and parking which may be associated with the resumption of scheduled air service through and beyond the twenty-year planning period.

The master plan identified alternative development concepts which were each capable of accommodating projected airport needs. The preferred alternative protects the fundamental aviation needs of the airport, while also identifying areas of the airport that can be developed to support non-aviation tenants.

It is the primary objective of the City of Salem to facilitate private sector development at the airport through the lease of land, thereby generating additional income for airport operations, maintenance, and capital improvements. There is existing demand for hangar space on the airport. Recommended taxilane improvements on the west side of the airfield will permit the development of several conventional hangars for larger business aircraft. Areas at south end of the existing aircraft parking apron have been identified as sites for aircraft T-hangars, which will require minimal site preparation or improvements (i.e., extension of electrical power).

Aviation and light industrial development opportunities are identified for the approximately 38 acres located on the east side of the airport, adjacent to Turner Road. This property is available for development with services adjacent to the sites. Careful consideration must be given to construction pad elevations, detention basins, and changes in the existing floodway located in the area along Turner Road. In south portion of the airport approximately 61 acres may be available for light industrial/aviation development.

These properties will require fill and utility extension. This area is also located within the Fairview Urban Renewal Area. Resources of the renewal process, as they become available over the next three to five year period, are planned to be utilized in readying this area for development.

In summary, the master plan provides an effective tool to manage and improve the airport as community needs continue to evolve. The master plan has the flexibility to respond to unanticipated needs without abandoning the overall development concept. McNary Field has both the existing facilities and the undeveloped land necessary to accommodate a wide range of users through the current twenty-year planning period and beyond.

note.

Portions of this executive summary were drawn from a summary staff report prepared by Richard A. Hayden, Urban Development Director, City of Salem.

Chapter One
INVENTORY

INTRODUCTION

The development of a master plan for McNary Field requires the collection and evaluation of information relating to the airport and the surrounding area. This information includes:

- Physical inventories and descriptions of existing facilities and services.
- Local and regional population and socioeconomic information.
- Existing local or regional plans and studies for the area.

An accurate and complete inventory is essential to the success of a master plan. The findings and assumptions made in the plan are dependent on collected information concerning conditions on and around the airport. This information was obtained through both on-site investigations of the airport and personal interviews. City of Salem staff (airport, community planning, public works, etc.), the fixed base operator (FBO) at the airport, county planning staff, tenants, and other airport users provided important information during this process. Available documents and studies pertaining to the airport and area were also reviewed.

This project updates the Airport Master Plan completed by Foresite Group, Inc., in August 1987. The 1979 McNary Field Airport Master Plan (Hodges & Shutt) also provided historical facility data.

AIRPORT SETTING

Locale

Salem is located approximately 45 miles southwest of Portland and 60 miles northeast of Eugene in the mid-Willamette Valley. Salem, located in Marion County, is the Oregon state capitol. The outlying areas surrounding Salem include portions of Polk and Yamhill counties. Salem is located on the main valley floor, with the foothills of the Cascade Mountains rising within 15 miles east of the city, and the Coast Range 15 miles to the west. The Willamette River travels through the western side of the city, and also serves as the Polk/Marion County boundary. State Highways 99E, 22, and 221 connect in Salem, and U.S. Interstate 5 (I-5) which travels in a north-south direction, running east of the airport. **Figure 1-1** depicts the location of Salem relative to other communities in the area.

Salem is an incorporated city, with an elected mayor and city council. Municipal services include police and fire protection, utilities, street maintenance, park and recreation programs, wastewater treatment, planning and zoning, and library facilities. The airport is owned by the City of Salem and operated by the Community Development Department.

Climate

The mid-Willamette Valley has a modified marine climate, which is characterized by moderate year-round temperatures and precipitation. Moist maritime air masses moving inland over the Coast

Range, produce heavy precipitation; the masses aretempered by the Coast Range and continue to move eastward across the Willamette Valley and to the western slope of the Cascade Mountains.

Annual precipitation averages 39.2 inches at the airport in Salem. Approximately 70 percent of the annual precipitation occurs between November and March. Snowfall during the winter months is usually less than 2 to 3 inches, lasting a day or two. The winter (January) average temperature in Salem is 39.6 degrees Fahrenheit, while the summer (August) temperature averages 66.7 degrees. Wind conditions vary by season, with (annual) prevailing winds from the south at 7 miles per hour; a seasonal wind shift occurs between winter and summer--summer winds are north and northwest.

Airport Location

McNary Field is located approximately two miles southeast of downtown Salem, immediately west of U.S. Interstate 5. The west side of the airport accommodates the terminal area, airport fire station, air traffic control tower, and weather station, general aviation and corporate hangars, the fixed base operator, and a variety of aviation and aviation-related tenants. FedEx, Oregon DOT Aeronautics, a restaurant located adjacent to the general aviation parking area, Salem Air Center and several other tenants are located on the west side of the field. The east side of the airport accommodates the Oregon Army National Guard complex, and several business-related users such as II-Morrow and West Coast Washers.

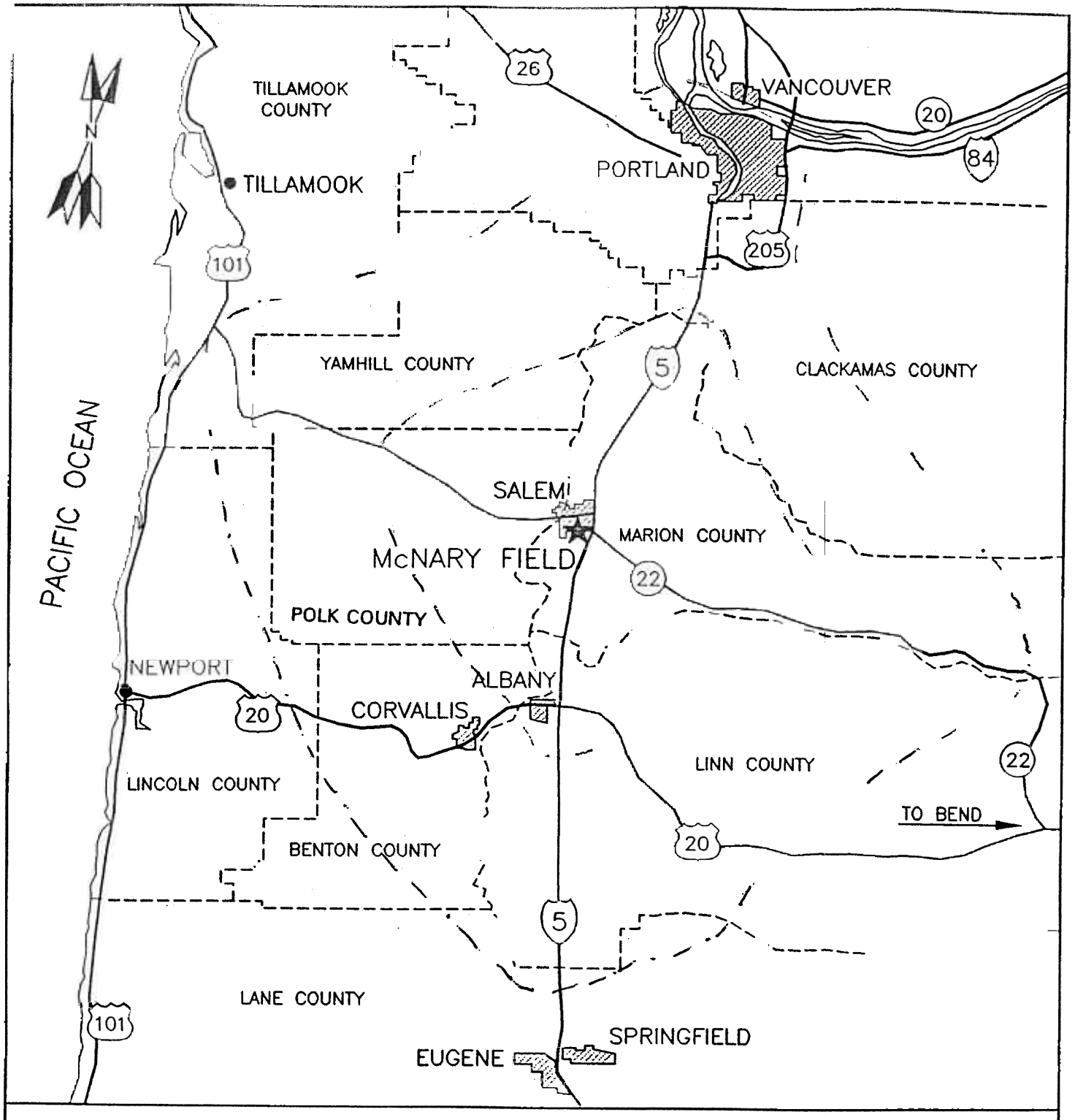
Access to the airport is provided from I-5 (Exit 253), which connects to Highway 22--North Santiam Highway via 25th Street S.E. to the west side of the airport. Turner Road, which accesses the east side of field, is also connected to Highway 22. 25th Street SE travels in a north-south direction along the western edge of the airport, and connects with Airway Drive SE and Turner Road at the southern end of the airport.

Access to the west side of the airport is also provided from Madrona Street, which connects with 25th Street SE, at the airport terminal area access road.

Major surface transportation lines are located immediately adjacent to the airport. Interstate 5 (I-5), state highways, city surface streets, and the existing railroad line provide opportunities to support multi-modal transportation at the airport. The existing use of McNary Field facilities to support surface movement of Salem area passengers and cargo are examples of intermodal transportation activities being combined with traditional airport-based air transportation functions.

Airport History

The McNary Field site was originally acquired by the City of Salem in 1928; a single 2,700-foot runway (13-31) was later constructed, then paved. During World War II, the U.S. Army operated the airfield, added Runway 16-34, extended Runway 13-31, and upgraded aircraft hangars, parking and taxiways. Ownership of the airport reverted back to the City of Salem following the war. The airport has been upgraded and expanded during the subsequent years to include a terminal building, control tower, approach lighting systems, instrument landing system, and runway lights.



VICINITY MAP

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McNARY FIELD

note: this map is for illustrative purposes only and does not include all major roads, communities, etc.

FIGURE 1-1

TABLE 1-1
MCNARY FIELD - AIRFIELD FACILITIES

Owner:	City of Salem
Classification:	Service Level (NPIAS): Commercial Service-Other; Design Type: **Basic Transport** Certification: FAR **Part 139 Airport** Airport Rescue and Firefighting (ARFF) **Index: A**
Runways:	**13-31** - 5,811 x 150 feet (Asphalt); HIRL; VASI; ODALS; MALSR **16-34** - 5,145 x 140 feet (Asphalt)
Taxiways:	Parallel Taxiways - Runway 13-31 (east side); Runway 16-34 (west side); access taxiways
Aircraft Parking/Hangars:	Local and Itinerant Tiedowns (150+), Corporate Parking; conventional and T-hangars (west side of airfield)
Lighting:	**Runway 13-31**: High Intensity Runway Edge Lighting (HIRL), Medium-Intensity Approach Light System with Runway Alignment Indicator Lights (MALS-R) (Rwy 31); Visual Approach Slope Indicators (VASI) - Rwy 13; Omnidirectional Approach Light System (ODALS) - Rwy 13; Threshold Lighting. **Runway 16-34**: Medium Intensity Runway Edge Lighting (MIRL); VASI; Threshold Lighting. Rotating Beacon; 3 Lighted Wind Cones
NavAids/ Communication:	ILS, Localizer, DME, NDB; GPS; Air Traffic Control Tower (ATCT); Class D/E Airspace (based on ATCT hours of operation)
Services:	Fixed Base Operator - Fuel (AVGAS, Jet A), Aircraft Maintenance; Avionics Repair; Aircraft Charter; Aircraft Sales; Flight Training
Utilities:	Water, Electrical, Sewer, Telephone
Maintenance:	City of Salem

EXISTING AIRFIELD FACILITIES

Airfield facilities include runways, taxiways, aircraft parking aprons, and airfield lighting. These items are included in the following paragraphs, as they serve both an air carrier and general aviation function at the airport. Existing airport facilities at McNary Field are depicted in **Figure 1-2** and summarized in **Table 1-1**. A summary of airfield pavements is provided in **Table 1-2**.

AIRFIELD FACILITIES

Runways and Taxiways

McNary Field has two runways, which are oriented in a north-south direction, 30 degrees apart. The airport has an air traffic control tower (ATCT), which operates on a 14-hour per day schedule.

Runway 13-31 is the primary runway, 5811 feet long by 150 feet wide. The runway has an asphalt grooved surface and precision markings. The runway is equipped with high intensity runway edge lighting (HIRL). Runway 31 has a medium-intensity approach light system, with runway alignment indicators (MALS-R); Runway 13 has a visual approach slope indicator (VASI), and an omnidirectional approach lighting system (ODALS). A 200-foot stopway is designated at the Runway 13 end.

Runway 16-34 is the secondary runway, 5,145 feet long by 140 feet wide. The runway has an asphalt concrete surface with basic markings. The runway has medium intensity runway edge lighting (MIRL). Runways 16 and 34 have visual approach slope indicators (VASI). A 350-foot stopway is designated at the Runway 16 end.

The taxiway system at the airport provides parallel taxiways for Runways 13-31 (Taxiway B) and 16-34 (Taxiway A). All runway ends have taxiway access, although the end of Runway 31 cannot be reached directly via Taxiway B. Aircraft accessing Runway 31 from the east side of the airfield must back-taxi approximately 800 feet to reach the runway end, or use one of the mid field crossing taxiways to access Taxiway A/F. The section of Taxiway G located between Runway 13-31 and the end of Runway 16, is closed. The main taxiways are 50 feet wide and have medium-intensity taxiway lighting (MITL).

Airport Lighting & Signage

As noted above, both runways and the main taxiways have edge lighting; the runways also have threshold lights located along the edge of approach/departure edge of the runways. The airport beacon is located west of the intersection of the runways. Three lighted wind cones are located between, and south, of the intersection between the two runways.

The airport completed an upgrade of airport signs in 1993, which included the installation of 66 new signs (i.e., mandatory instruction, location, direction, destination, runway distance remaining). The updated signage plan meets all FAA standards outlined in Advisory Circular 150/5340-18C.

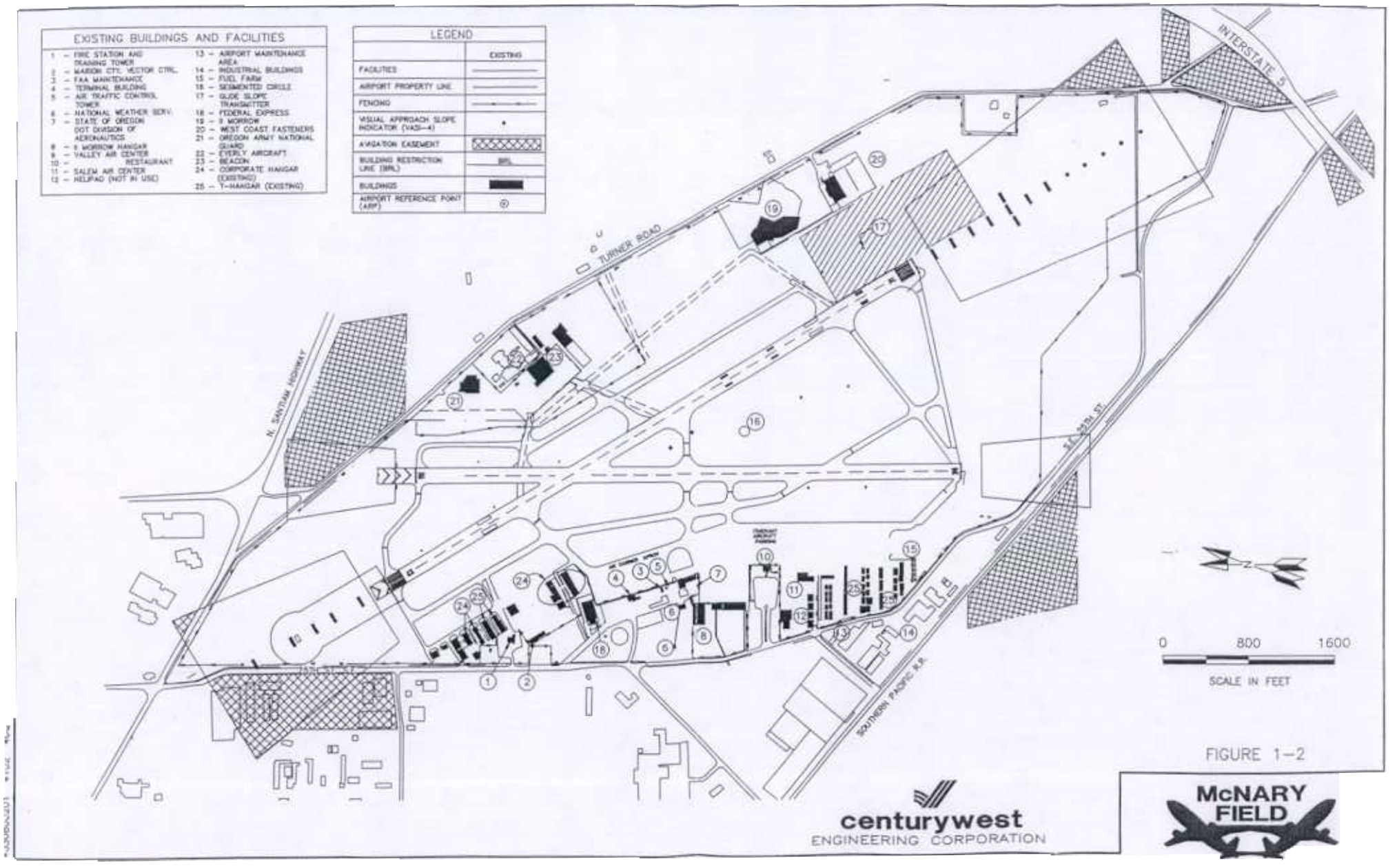

FIGURE 1–2

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McNARY FIELD

TABLE 1-2 MCNARY FIELD PAVEMENT SUMMARY

Runway	Dimensions (feet)	Surface	Strength (000#)	[illegible]dition
13-31	5,811 x 150	Asphalt	100SW/122DW/185DT	Excellent (Resurfaced and Grooved in 1996)
16-34	5,145 x 140	Asphalt	30 maximum	
Taxiway	**Dimensions (feet)**	**Surface**	**Strength (000#)**	**Condition**
Alpha	5,500 x 60 Rwy 16-34 W Parallel	Asphalt	100SW/135DW/210DT	Good
Bravo	4,300 x 40 Rwy 13-31 E Parallel	Asphalt	U - Large AC	Excellent
Charlie	3,600 x 50 West Apron Access	Asphalt	30 maximum	Fair
Foxtrot	1,700 x 50 Connector Rwy 31-31	Asphalt	68SW/90DW/145DT	Fair
Golf	1,600 x 35 (Closed)	Asphalt	U- GA	Poor-Failed
Hotel	400 x 50 Exit	Asphalt	U - GA	Good
Juliet	550 x 60 Exit/Connector	Asphalt	U - Large AC	Good
Kilo	800 x 60 Exit	Asphalt	U - Large AC	Good
Lima	330 x 50 Exit	Asphalt	U- Large AC	Good
Mike	900 x 35 Connector - Rwys 13-16	Asphalt	U - GA	Fair
November	1350 x 50 Connector	Asphalt	U - Large AC	Excellent
Taxilanes	**Dimensions**	**Surface**	**Strength (000#)**	**Condition**
N. Hangar	240 x 20 (2 sec.); 640 x 20	Asphalt	U - GA	Good
N.Terminal	300 x 30	Asphalt	U - GA	Good
S. Hangar	550/500/450/400/250 (5) x 20	Asphalt	7SW	Fair
Apron	**Dimensions**	**Surface**	**Strength (000#)**	**Pavement Condition**
N.Terminal	720 x 290 feet; 235 x 90 ODOT Hgr Sec.	Asphalt	100SW/135DW/210DT	Good-Fair; Section fronting ODOT Aeronautics: Poor/Failed
Mid	450 x 620 feet (varies)	Asphalt/ Concrete	18SW - Asphalt 30SW/40DW(concrete)	Fair-Poor; Cracking, vegetation; Concrete surface good; joint filling required
South	1250 x 290 feet	Asphalt	U - GA	Fair; Cracking, vegetation

Wheeled Type Landing Gear; DW=Dual Wheeled Type [illegible]g Gear; DTW=Dual Tandem Type Landing Gear.
ction Course. U: Unspecified Weight Bearing Strength - [illegible]able to Runway Design

AIRFIELD SUPPORT AREAS

Aircraft Parking Apron

McNary Field has three primary aircraft aprons on the west side of the airfield. The northern apron area is the terminal apron. The terminal area portion of the main apron is approximately 23,000 square yards and can accommodate up to four Boeing 737/Douglas DC9 aircraft. The apron is marked with four aircraft taxi lead-in lines (170-foot separation between lines), which accommodate unassisted taxiing in/out of the ramp positions. The terminal apron has an asphalt concrete surface and has received sealcoat applications.

A small section of apron at the southern end of the terminal apron fronts the Oregon DOT Aeronautics office and hangar. The asphalt-surfaced apron is approximately 2,400 square yards and accommodates limited transient parking. The apron is in poor condition, with extensive cracking, depressions, and areas of failed pavement. The outer portion of the apron, which is showing the most wear, also receives regular fuel truck traffic.

The mid apron area consists of a two parking areas which combine for approximately 52,000 square yards. The portion of the apron which extends in an east-west direction, fronts Val Avionics and West Coast Washer hangars. The concrete surfaced ramp (30,000 sq.yds.), which extends from north of the Airport Restaurant, to the south of the Salem Air Center fueling area, accommodates based and itinerant parking, including corporate parking. The concrete section of the apron is in good condition, although it requires additional joint-filling. Salem Air Center also has a small apron (approximately 1,600 sq.yds.) located at the north end of its hangar/office for aircraft parking.

The southern apron is approximately 19,000 square yards, has an asphalt surface, and accommodates 40 light aircraft tiedowns. Access to the southern hangar area taxilanes is provided from the west side of the apron.

The airport has three general aviation hangar areas on the west side of the airfield. Two hangar areas are located north of the terminal apron, which accommodate approximately 21 aircraft hangars. The third hangar area is located adjacent to the South Apron. The southern section of this area has six taxilanes which access approximately 50 T-hangar and conventional hangars. New hangars recently constructed west of Salem Air Center have taxiway access which connects to the taxilane located immediately south of the building.

The Oregon Army National Guard maintains an aircraft apron (approximately 28,000 sq.yds.) immediately adjacent to airport property for their fixed-wing and rotor-wing aircraft. The apron is connected to the Runway 13-31 parallel taxiway (Bravo) via Taxiway N. Aircraft access is also provided to II-Morrow via Taxiway G.

TERMINAL FACILITIES

Terminal facilities at McNary Field consist of a one-floor building which accommodates air carrier gaming charter operations, Hut Airport Shuttle, and office space for rental tenants. The terminal houses offices, passenger ticketing, secured boarding areas, passenger waiting areas, baggage claim area, public restrooms, public telephone and vending machines. Charter carriers are responsible for passenger security screening and control for their flights. Security screening of passengers is accommodated in the departure area adjacent to the main lobby. One ground-level gate is available for passenger boarding. The terminal does not have a covered

walkway or enclosed loading bridge. Passengers walk to the aircraft across the apron to one of four aircraft parking positions. The ground floor of the terminal also accommodates the Airport Manager's office and maintenance offices.

Vehicle parking is available along the north side of the passenger terminal building. The parking area accommodates short and long-term parking. Visitor, employee and tenant parking areas are located on the south side of the terminal building. A gravel-surfaced overflow parking area is located on the west side of the terminal access road. Additional parking is available adjacent to FBO lease areas, airport-based businesses, and in aircraft hangar areas.

Aircraft Rescue and Fire Fighting (ARFF)

McNary Field has an "Index A" certificate under the Code of Federal Regulations 14, Part 139. Part 139 governs the operation of land airports serving DOT-certified air carrier activities. Within these regulations, specific requirements for the operation of airport rescue and fire fighting equipment and service have been established. Under Index A, prior permission is required for unscheduled air carrier operations with aircraft having more than 30 seats. During these periods, Salem Fire Department personnel are dispatched to the airport 15 minutes prior to arrival, and remain 15 minutes after departure.

The ARFF equipment at McNary Field consists of one Oshkosh fire/rescue vehicle equipped with 1,500 gallons of water and 180 gallons aqueous film forming foam (AFFF); and 450 pounds of dry chemical agent. A 3,000-gallon tanker is also maintained downtown by the Fire Department. The fire equipment is located at the station which is adjacent to the North Hangar Area, on the west side of the airfield. A dedicated fire lane connects directly from the station to Taxiway Alpha.

Airport Security

Passenger security clearance for charter operations is provided by each carrier in the passenger terminal and apron areas. City staff provides airport maintenance and the required ARFF service for unscheduled air carrier flights. The City of Salem Police Department is available to respond to the airport on an as-needed basis. McNary Field has security fencing around the perimeter of the airfield. Access to secured areas is controlled through several keypad entry gates located along the airport fence.

Fuel Facilities

Salem Air Center provides retail fuel sales on the field. They maintain their own fuel storage tanks and trucks. Salem Air Center presently has three underground storage tanks and two trucks. The fixed tanks are located adjacent to their hangar on the west side of the airport. Other fuel storage on the airport includes the Oregon Army National Guard, and several corporate tenants with both above-ground and underground storage tanks. **Table 1-3** lists the aviation fuel storage capacities available for commercial sale; individual fuel storage and the OANG capacities are not included.

TABLE 1-3
FUEL STORAGE CAPACITIES

Tank Owner	Fuel Grade	Storage Capacity	Type of Tanks
Salem Air Center (Fixed Base Operator)	Jet Fuel	1 - 12,500 gal. 1 - 2,500 gal.	Underground Truck
Salem Air Center	AVGAS 80/87 AVGAS 100LL AVGAS 100LL	1 - 10,000 gal 1 - 12,100 gal. 1 - 1,200 gal.	Underground Underground Truck
Fuel Storage Summary			
AVGAS	Above Ground: Underground Trucks: Total AVGAS Storage	0 gallons 22,100 gallons - 2 Tanks 1,200 gallons - 1 Truck 23,300 gallons	
Jet Fuel	Above Ground: Underground: Trucks: Total Jet Fuel Storage:	0 gallons 12,500 gallons - 1 Tank 2,500 gallons - 1 Truck 15,000 gallons	

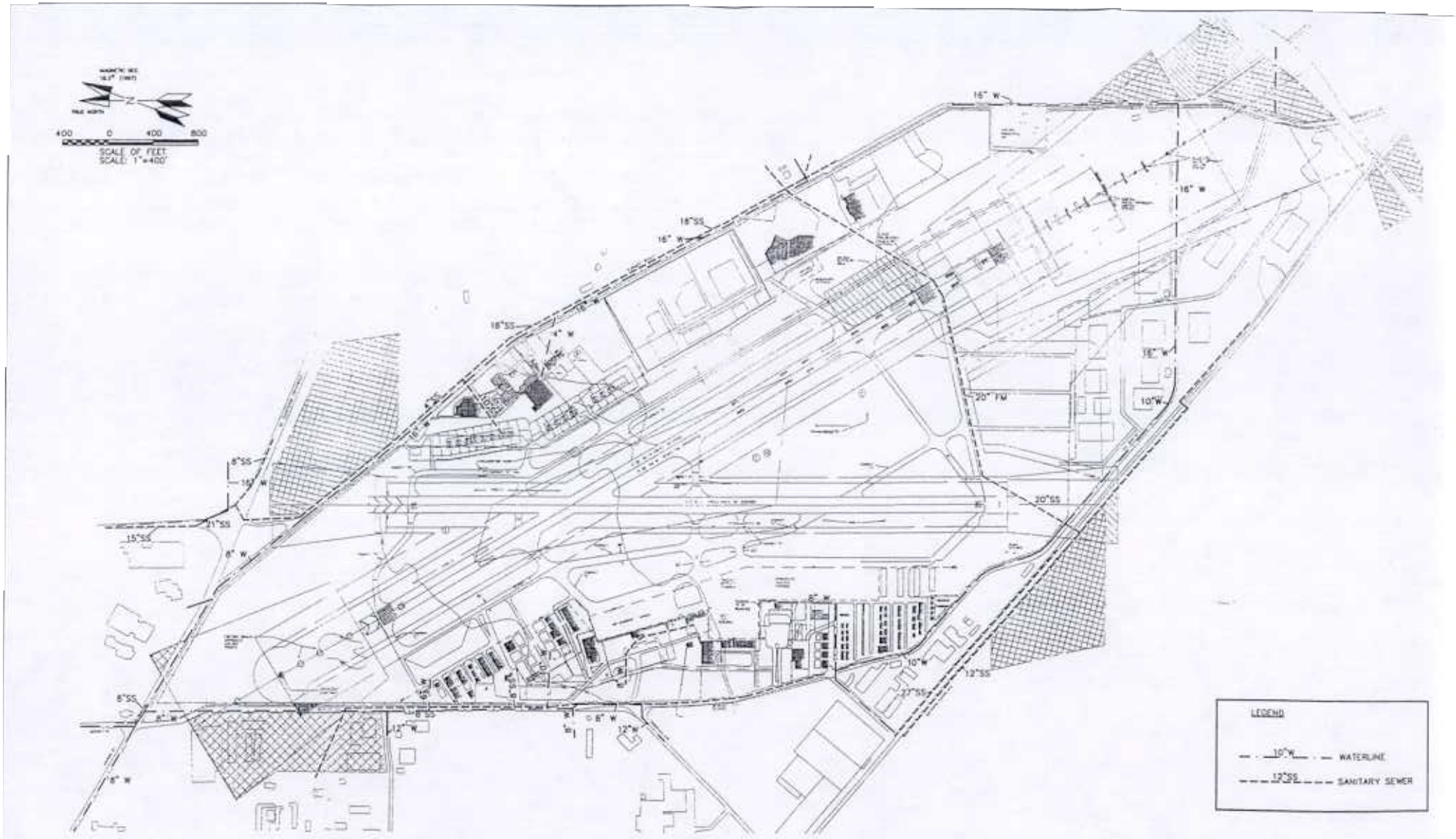
Maintenance

Airport maintenance services are provided for both airside and landside facilities at McNary Field by the City of Salem. Maintenance responsibilities include airfield facilities, parking areas, apron and ramp areas, public and employee parking areas, and all airport property not leased. Snow removal, minor pavement repair, runway/taxiway cleaning, brush removal, and general airport upkeep are included among the tasks performed by field maintenance personnel.

Utilities

Electrical power to the airport area is provided by Pacific Power; water and sewer service is provided by the City of Salem; telephone service is provided by U.S. West; natural gas service is provided by Northwest Natural Gas. Major utility lines run immediately east and west of the airport, providing service to airport tenants.

Major water, sewer, and electrical utility lines serve existing developments on the eastern and western sides of the airfield. Future development of the southern section of the airfield will require extensions of utilities from existing service points. **Figure 1-3** depicts the location of existing utilities on the airport.



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DESIGNED BY: DW	DRAWN BY: WSW	CHECKED BY: WP	SCALE: AS SHOWN
DATE: 5/7/98		PROJECT NO: 4030800201	4103 BOY DWG

McNARY FIELD
MASTER PLAN UPDATE

EXISTING UTILITY PLAN

FIGURE 1-3

AIRSPACE AND AIR TRAFFIC CONTROL

Airspace configuration is important in determining whether existing facilities and procedures allow optimum use of the airport. Arrival and departure routes are situated in the most compatible positions, relative to the surrounding terrain. Further development must be consistent with sustaining a safe operating environment for all aircraft that use the airspace and airport. The Federal Aviation Administration holds the ultimate responsibility for all decisions pertaining to airspace management and air traffic control at the airport.

Air traffic at McNary Field consists of a mixture of aircraft types operating under instrument flight rules (IFR) and visual flight rules (VFR). VFR flights require pilots to be responsible for maintaining adequate visibility and clearance from clouds. When weather conditions do not permit flying under VFR, pilots certified for IFR flight may opt to file flight plans and operate under IFR conditions. On IFR flights, pilots operate in reference to aircraft instrumentation and air traffic control instruction under any weather condition.

Low-altitude airways pass near McNary Field, although their minimum enroute altitudes (MEA) ensure that no conflicts exist in the local airspace. Victor 495 passes within 6 miles west of the airport, between the Corvallis VOR/DME and Newberg VORTAC, with an MEA of 4,000 feet. Victor 23 passes 3 miles east of the airport, between the Eugene VORTAC and Battleground VORTAC, with an MEA of 5,000 feet in the vicinity of Salem. Several high-altitude (Jet) airways pass east and west of the airport, starting at 18,000 feet MSL.

McNary Field has controlled airspace (Class D) extending five statute miles from the airport. This airspace category is associated with an operating control tower. The air traffic control tower at McNary Field operates on a frequency of 119.1 Megahertz (MHz), an automatic terminal information service (ATIS) at 124.55 MHz.

Nine small privately-owned airstrips are located within a ten-mile radius of McNary Field; Independence State Airport is the nearest public-use airport, located 9 miles southwest of McNary Field. Maximum elevation figures (MEF's) depicted on the Seattle Sectional Chart in the quadrangles surrounding the airport are 3,200 feet mean sea level (MSL) (southwest); 4,700 feet (southeast); 3,800 feet (northwest); and 2,600 feet (northeast). Terrain elevations on the valley floor generally vary between 150 and 250 feet MSL; rising terrain on the east and west sides of the valley create the higher MEFs. The airspace surrounding the airport is depicted in **Figure 1-4**.

Navigational Aids

Navigational aids (navaids) include any visual or electronic device, either airborne or on the ground, which provides point-to-point guidance or position data for an aircraft in flight. McNary Field utilizes a variety of navigational aids. The airport presently has four published instrument approaches; descent and visibility minimums listed in **Table 1-4** reflect approach Category A and B (up to 120 knot approach speed) aircraft and straight-in procedures; other minima apply to larger aircraft and circling procedures.

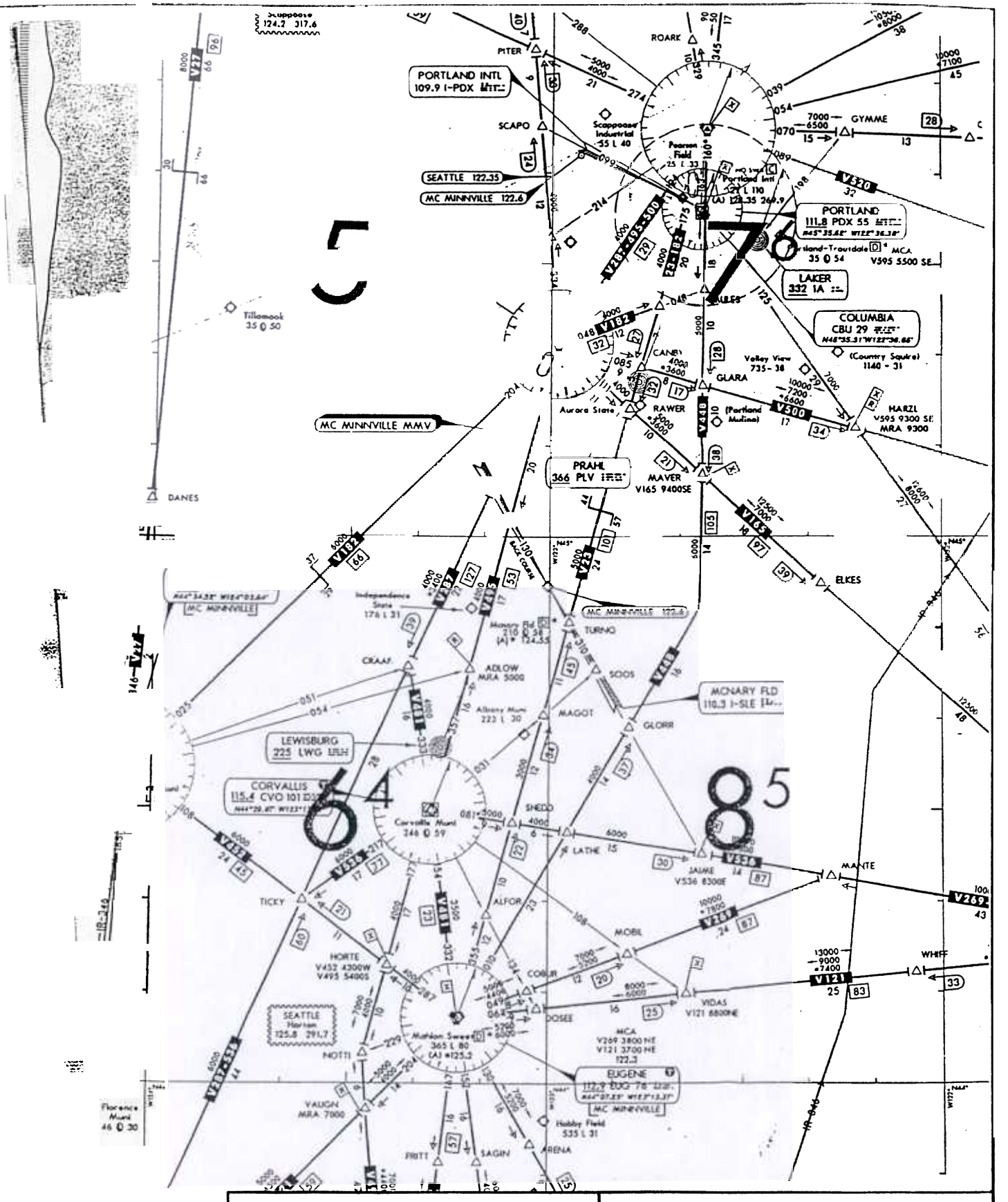


Figure 1-4

AREA AIRSPACE

McNARY FIELD

Table 1-4
Instrument Approach Capabilities

Runway	Approach Type	Landing Minima (DH or MDA) (ft. MSL/AGL)	Visibility Minima
31	ILS	410/200	2,400 RVR
31	LOC/DME	780/570	2,400 RVR
13	LOC BC	700/500	3/4 Mile
31	NDB or GPS	1,100/890	4,000 RVR

Instrument Landing System (ILS): ILS facilities consist of a localizer for course guidance and a glideslope for descent guidance. The ILS provides an approach path for precise alignment and descent of an aircraft during final approach to a runway.

Runway 31 at McNary Field is equipped with an ILS. The localizer operates on frequency 110.3 MHz, with distance measuring equipment (DME) on Channel 40. The Salem ILS is aligned on a 310/130 degree course. The published minimums for most aircraft types on the ILS approach is a decision height (DH) of 410 feet mean sea level (MSL), (200 feet above the touchdown [HAT]), and visibility of 2,400 feet (Runway Visual Range) or ½-mile. When the glideslope portion of the ILS is inoperative, the localizer approach minimums are 960 feet MSL, with a 2400 RVR to 2-mile visibility minimum.

Non-Directional Beacon (NDB): NDB's are low/medium frequency radio beacons which transmit non-directional signals. Since the transmission is non-directional, it does not provide the pilot accurate course guidance. To effectively navigate using an NDB, aircraft must have automatic direction finder (ADF) capability to determine the aircraft's relative bearing from the NDB facility.

The NDB used at McNary Field is located 3.9 miles southeast of the airport and operates on a frequency of 266 kilohertz (KHz). The NDB is identified as the Turno NDB and transmits a continuous two-letter identifier code, SL, in international morse code. Although subject to noise interference, the beacon can be used at a range of up to 200 miles. The Turno NDB serves as a homing device for the airport and as the initial approach fix and outer marker for the instrument approach procedures.

The minimum descent altitude for the NDB approach is 620 feet MSL (608 feet above airport) with minimum visibility ranging from 1 to 2 statute miles for straight-in approach to Runway 4. For circling approaches, the MDA ranges from 720 to 1,000 feet MSL. Minimum visibility ranges from 1 mile to 3 miles, depending on aircraft category.

Global Positioning System (GPS) has been adopted by the FAA as the new platform for enroute and terminal instrument navigation. The use of GPS, will eliminate or significantly reduce dependence on ground-based navigational equipment. The FAA is currently publishing "overlay" GPS approaches at airports with existing conventional nonprecision approaches. The next step in system development will provide overlays for precision Category I instrument landing system

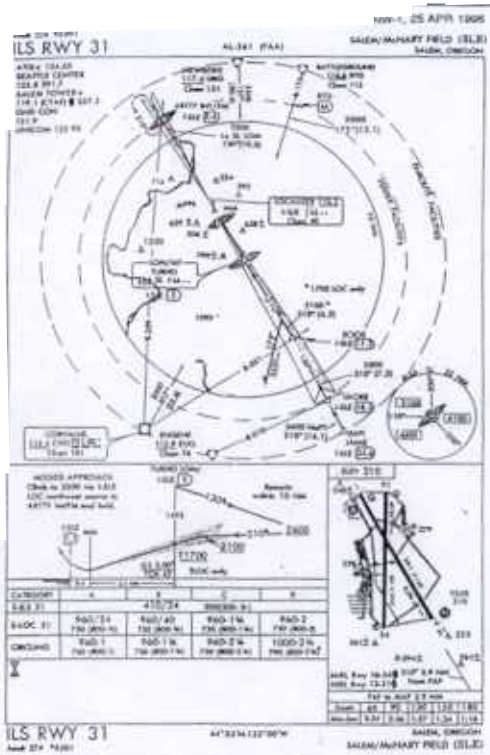
(ILS) approaches. The development of new stand-alone GPS approaches is also scheduled, and enroute navigation via GPS is now available.

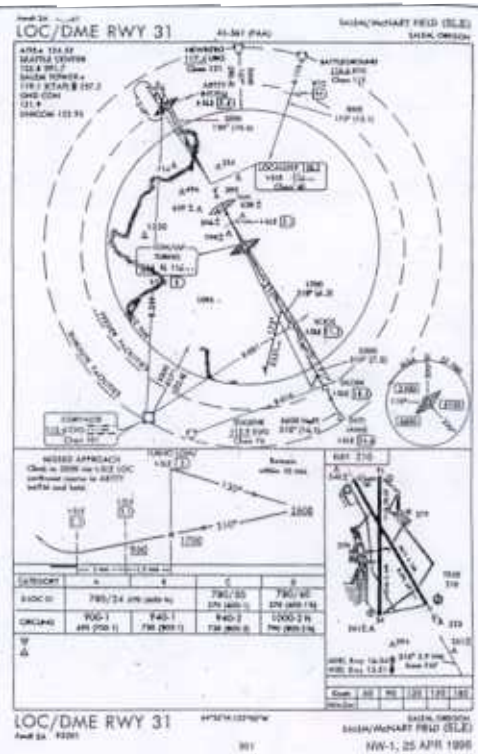
McNary Field has a GPS approach procedure which has been designed to duplicate the existing NDB approach to Runway 31. The "overlay" approach utilizes the same procedure and minima as the NDB approach.

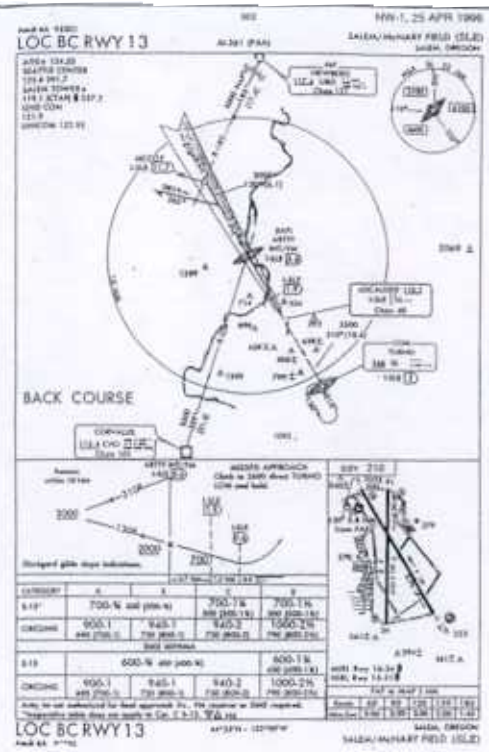
Very High Frequency Omnidirectional Range (VOR): The VOR is a ground-based facility which provides course guidance to an aircraft by means of a very-high frequency (VHF) radio frequency. When combined with an ultra high-frequency (UHF) line of sight tactical air navigation system, the facility is referred to as a VORTAC.

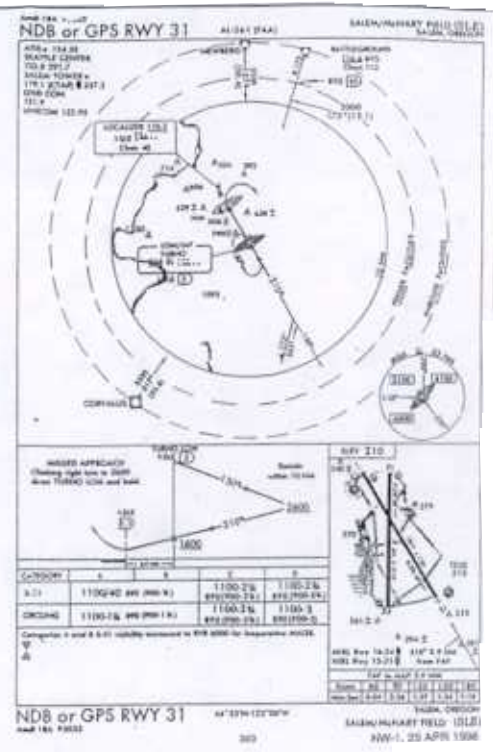
The nearest VOR facilities to McNary Field are located 30.4 miles northwest (Newberg VORTAC) and 25.6 miles southwest (Corvallis VOR/DME) of the airport. These facilities provide approach and departure support for instrument procedures at the airport.

McNary Field also has a standard instrument departure (SID). The **Salem Two Departure** is a radar vector (via Seattle Center) departure to assigned route. **Figure 1-5** depicts the instrument approach procedures published for McNary Field.









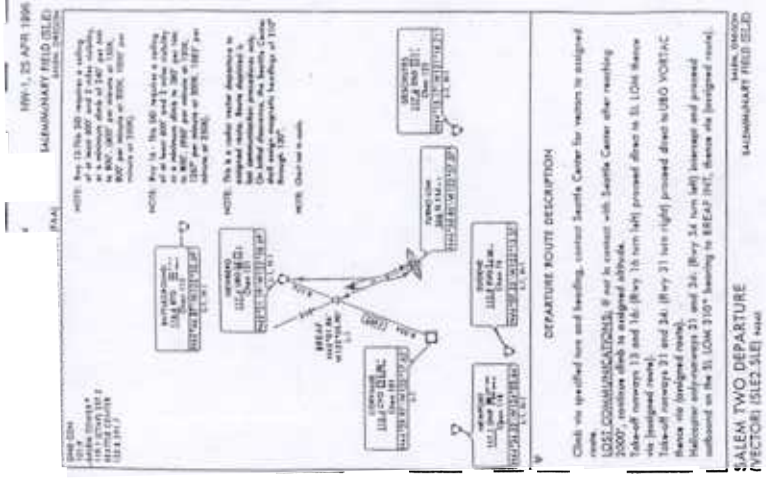


Figure 1-5
INSTRUMENT APPROACH
PROCEDURES

McNARY FIELD

AIR TRAFFIC ACTIVITIES

Overall air traffic activities at McNary Field are recorded by the air traffic control tower. The tower is operated on a 14-hour per day schedule; it is estimated that less than one percent of airport operations occur during the period the tower is closed. Commercial carriers serving the airport provide the monthly summaries of traffic (departures, passengers). Overall airport activity data is maintained by the airport through tower monthly reports and other reported data. This data is also summarized on an annual basis by the airport **Table 1-5** summarizes air traffic at McNary Field for 1995.

Salem does not currently have scheduled air carrier service. Seattle-based Horizon Airlines discontinued service to Salem in 1994. The airport has accommodated a variety of air carrier service over the years, including daily Boeing 737 service by United Airlines in the mid-1970's regulated air service market. Most recently, Horizon provided daily service to Portland and Klamath Falls with Swearingen Metro III 18-seat twin-engine turboprop aircraft between 1984 and 1994.

Salem receives several gambling excursion charter flights each month to Reno, Las Vegas, or Laughlin, Nevada. Four charter operators have provided this service in recent years: Casino Express; Great American Airways; Viscount Air Service; and Empire Airlines each operate transport category jet aircraft such as the Boeing 737, Douglas DC9, BAC 111, and Bae146. The airport also accommodates regular cargo/express service from a United Parcel Service (UPS) contract carrier. Sport Air Travel averages approximately 10 operations per week for UPS with Cessna 402 aircraft. FedEx and UPS maintain operations facilities on, or near the airport; however, neither express carrier operates their own aircraft at McNary Field on a regular basis.

Table 1-5
McNary Field 1995 Activity Summary

Activity (Aircraft Operations)	
Air Carrier	243
Air Taxi	556
General Av. (Local)	19,752
General Av. (Itinerant)	36,828
Military	5,600
Total	**62,989**
Based Aircraft	
Single-Engine	141
Multi-Engine	17
Jet	3
Glider	1
Helicopter	1
Military	23
Total	**186**

Source: City of Salem; ATCT Reports; FAA 5010.

SOCIOECONOMIC DATA

Population

Population in the area is recorded on a local basis (i.e., Salem Metropolitan Statistical Area-SMSA) and on a county basis. The combined population of the SMSA communities is approximately 313,186, according to data maintained by Portland State University's Center for Population Research and Census. Population within the region increased by 12.6 percent since the 1990 census. Historical population is listed in **Table 1-6.**

Table 1-6
Historic and Projected Population

Year	Salem	Marion	Polk	Yamhill	Oregon	U.S.
1970	186,658	151,309	35,349	40,213	2,091,500	203,302,000
1980	249,895	204,692	45,203	55,332	2,633,100	226,546,000
1990	278,024	228,483	49,541	65,551	2,842,300	248,710,000
1994a/1995b	313,186 b	252,800 a	54,400 a	72,800 a	3,126,873	259,157,000
Overall Growth	*68.0%*	*67.1%*	*54.0%*	*81.0%*	*49.5%*	*27.5%*
Avg Annual 1	*2.1%*	*2.1%*	*1.8%*	*2.5%*	*1.6%*	*1.0%*

Source: Portland State University Center for Population and Census; U.S. Census. *1 - 1970-1994/5*

Economy

According to the State of Oregon Department of Employment, the basic sectors of the Salem-area economy include government (local, state, federal), agriculture, wood and paper products, tourism, and export-based industries such as manufacturing. Public sector employment related to the operation of the state capitol is included in the government sector. It is also noted that income from retirement, investments, and transfer payments is a growing part of the area's economic base. Non-basic industries are those which meet the demands generated by local households to purchase local goods and services.

Government	25.4%
Services (Business/Professional/Health)	25.0%
Trade (Wholesale & Retail)	21.9%
Manufacturing (Durable Goods)	8.9%
Manufacturing (Non-Durable; Agricultural)	6.2%
Finance, Real Estate, and Insurance	5.2%
Construction	4.4%
Transportation, Come., Utilities	2.8%
Mining	0.2%
Total	100.0%

Source: Oregon Regional Economic Profile (1996)

Government (local, county, state and federal) is the leading employment segment, accounting for more than 25 percent of total employment. Major employers in the area include State of Oregon (various departments), Salem School District, Salem Hospital, Norpac Foods, U.S. Government Agencies, AGRIPAC, City of Salem, SAIF, State Farm Insurance, Marion County, Chemeketa Community College, and Willamette University.

LAND USE AND ZONING

Land use planning and zoning for the areas immediately surrounding the airport is under the jurisdiction of the City of Salem. Areas located outside the Salem city limits, but within the city's

Urban Growth Boundary, are administered by Marion County. The City of Salem has an Airport Overlay Zone currently in effect for McNary Field which coincides with the standards FAR Part 77 airspace surfaces for the airport.

Zoning and Comprehensive Plan Designations in the vicinity of the airport include:

PS - Public Use (Public Service)

All portions of the active airfield areas with the exception of the Oregon Army National Guard facilities, are zoned PS. The PS zone represents public service use which is not limited to airport facilities. Other permitted uses within the PS category include: transportation, communications, electric, gas, and sanitary services; retail trade; services; public administration; and manufacturing.

PA - Public Use (Public Amusement)

The OANG site located on the east side of the airfield is zoned PA. One category of permitted uses for PA-zoned districts is "Public Administration" and the subcategory "national security." The military nature of the activity is presumably the basis for the present zoning. The airport is designated "Community Service - Airport" in the Comprehensive Plan.

IP - Industrial Park

The airport has two areas zoned IP, including a narrow strip of land located near the southeast corner of the airport, adjacent to Turner Road. This area is located south of the development which includes IIMorrow facilities. The second IP area on the airport is located between the south ends of each runway, clear of the south approaches. The eastern area is designated "Community Service - Airport" in the Comprehensive Plan, while the southern area is designated "Industrial."

IG - General Industrial

IG zoned lands are located along the western edge of the airport. A portion of this area is located within airport property boundaries and currently supports industrial development. Large areas of IG zoning are located immediately west of 25th Street SE. A small section of IG zoning is located immediately adjacent to the OANG site. The land supports a storage yard and shop space for an arcade/amusement firm.

IC - Industrial Commercial

As with IG zoning, IC zoning is located along the western edge of the airport (25th Street SE). Large areas of IC zoning are also found immediately east of Turner Road, east of the OANG facilities and west of the Cascade Gateway Park. The Industrial Commercial designation of these lands also appears in the Comprehensive Plan.

IBC - Industrial Business Campus

IBC zoning is located along the airport's southern side (opposite the railroad tracks) in the Fairview Industrial Park. Portions of this area also have existing airport avigation easements in place to protect the immediate airspace.

CG - General Commercial

A limited amount of CG zoning abuts the airport on its southeast side (east of Turner Road), and at the northern end of the airport, near the intersection of 25th Street SE and North Santiam Highway.

RM - Multiple Family Residential

The residential area located between the southeast corner of the airport and Interstate 5, is zoned RM. This area is designated "Industrial" in the Comprehensive Plan.

An area located directly north of the Kuebler Road interchange on I-5 is identified in the Comprehensive Plan as "Developing Residential." However, more recent zoning information provided by the City of Salem identifies the area closest to the airport as "Industrial." Single- and multi-family residential zoning is depicted in the northwest, southwest, and northeast corners of the interchange.

Physical Features

The airport site is relatively level with surface roadways or railroad lines surrounding the entire area. Portions of the southern airfield are located within the floodplain according to existing federal flood mapping. The southern section of the airport has several small wetland areas, including a drainage ditch, located adjacent to existing roadways; two larger wetland areas are located near the extreme south end of the airport, adjacent to I-5 and the railroad line.

Local flooding in February 1996 also affected the airport. A number of off-site factors may have contributed to the flood levels on the airport. The City of Salem is currently evaluating community flooding issues to determine what corrective measures may be required.

Airport lands located adjacent to Turner Road are located near a designated floodway on current flood mapping. The existing building sites in this area are located outside the floodway and have been raised above the floodplain elevation. As with existing developments, individual tenant requirements will determine the design-specific site preparation for each parcel.

The following is an excerpt from a City of Salem staff report on the February 1996 flooding:

> "Several land owners along Turner Road have blamed the construction of the sight obstructing berms by the gravel pit operators on the east bank of Mill Creek and the removal of the levee immediately downstream of Kuebler Boulevard on the west bank for their (February 1996) flooding problems. A section of old levee immediately downstream of Kuebler Boulevard was removed when that street was constructed. Had it not been removed, this levee may have reduced or prevented the overflow at this location. The City, however, improved the channel from Turner Road to downstream of Kuebler Boulevard. This work and construction of Kuebler Boulevard eliminated flooding along Boone Road which would have flowed north and caused worse flooding west of Turner Road. This flow would have passed under the Turner Road and Interstate 5 underpass as it did in both 1964 and 1974. The flow that exited the main channel of Mill Creek immediately downstream of Kuebler Boulevard, flowed parallel to Mill Creek and joined the ponded water downstream of the Riverbed haul road. Water did not cross Turner Road upstream of the Turner Road and 37th Avenue intersection to any significant degree. The area upstream of Interstate 5 to the intersection Turner Road and 37th Avenue essentially became a lake....
>
> From the high water marks and topographical information, there was a direct connection between Mill Creek and the Turner Road underpass upstream (southeast) of the Interstate 5 bridge... The top of levee elevation immediately upstream of Interstate 5 is approximately 222.0. The high water

elevation upstream of the Turner Road underpass was 224.0...

Overland flow through the Turner Road underpass split into three directions at the downstream face: northwest to the East Fork of Pringle Creek basin along the SPRR railroad track, north in the ditches along Turner Road, and across the Salem Airport."

High Speed Rail Access

High speed rail between Eugene and Vancouver, BC is a long-term goal for many transportation agencies. The Oregon Department of Transportation's Willamette Valley Transportation Strategy, completed in 1995, recommends increased use of public transportation, including high speed rail. The timing is dependent on funding, and other transportation system priorities. This strategy was adopted by the Oregon Transportation Commission in August, 1995. Among the many recommended actions, the adopted strategy encourages upgrading rail trackage to allow speeds of 90-110 miles per hour, and the creation of intermodal stations in Eugene, Albany and Salem. It is unknown whether subsequent work has prioritized high speed rail investments, and identified station locations within each community.

Salem Airport-McNary Field has favorable qualities for this intermodal station because it is near the rail line, and offers the chance of connecting to commercial air service, when it becomes available. Other issues will need to be considered to know if the airport is the best location in Salem for this station. For example, proximity to population density and local bus services are quite important to overall viability. Additional considerations are the status and condition of the existing Amtrak station and rail sidings in Salem. In concept, Salem Airport-McNary Field deserves consideration for this station as the passenger and cargo facilities are likely to see increased use in coming years.

Chapter Two
FORECASTS

INTRODUCTION

The purpose of this chapter is to prepare forecasts of aviation activity for McNary Field. These forecasts will serve as the basis for planning the aviation facilities required to meet the needs of the airport and its users over the next twenty years. The forecasts will be applied to several phases of the Airport Master Plan. Initially, they will be used to identify individual segments of future activity. They will then be used in the evaluation of airfield capacity, and the facility requirements of the airfield and the terminal. From these evaluations, the need for new or improved facilities within the twenty-year planning period can be determined.

Events Since the Last Master Plan

The composition of air traffic at the airport has changed since the last master plan update. The most recent significant change at McNary Field occurred in 1994, with the termination of scheduled air service by Horizon Air. Although neither the level of service or passenger enplanements were particularly high, the loss of scheduled air service forced Salem-area travelers to seek alternative service at Portland International Airport (PDX) or Eugene Airport. Hut Airport Shuttle has continued to move the majority of passengers at McNary Field with high frequency bus service to PDX. One of the factors which has historically contributed to the low levels of airline activity at Salem is the short travel time to PDX, via Interstate 5. The time/distance factor appears to be one of the most significant items affecting passenger and cargo activity at McNary Field. However, the transportation needs and services within the local area have evolved to reflect a true intermodal relationship. Airport facilities are currently being used to support the movement of passengers and cargo through surface transportation links.

In recent years, Salem has accommodated gaming excursion charter flights to Nevada casinos. Although this activity appears to have declined slightly over the last three years, it currently represents 4 to 6 departures per month with transport-category jet aircraft.

Aviation activity at the airport has experienced periodic upward and downward shifts over the last ten years. The single largest decline in aircraft activity has occurred in "local" operations, which are generally associated with flight training. Local operations are currently only 30 percent of the levels experienced in the late 1970s; by contrast, general aviation itinerant activity levels are currently running at nearly 60 percent of the peak levels. While both segments have declined over earlier levels, it appears that reductions in flight training may be the most significant change in activity. Based aircraft totals have also fluctuated in the last ten years, with current levels comparable to the early 1980's

Business-related aviation activity has grown in recent years for both locally-based aircraft and itinerant aircraft. Many of the newer hangars constructed at the airport have been larger conventional hangars capable of accommodating several single-engine aircraft and/or helicopters,

twin-engine piston, turboprop aircraft, or business jets.

Air traffic fluctuations at McNary Field appear to occur without any direct relationship to changes in area population, which has increased steadily in recent years. A variety of local or regional economic factors, such as unemployment levels may have some impact on aviation activity. The sharp decline in airport activity which occurred in the early 1980s, coincided with very high local unemployment rates and a slow regional economy.

However, while unemployment levels have steadily declined since 1982, air traffic levels have remained relatively flat, fluctuating within a range of 56,000 and 67,000 during the same period.

It appears that aviation-specific factors such as fuel prices, insurance costs, the level of flight training, or the cost of owning general aviation aircraft may also have a significant effect on activity trends.

Forecast Update

The primary segments of activity at McNary Field, which will be included in the updated forecasts are listed below:

- General Aviation
  Based Aircraft
  Local and Itinerant Activity

- Commercial Aviation
  Charter Flights
  Cargo/Express Activity
  Air Taxi

- Military Activity

- Instrument Approaches

The forecasts contained in this master plan will serve only as a guide for facility and financial planning. Aviation activity is affected by many external influences, as well as by the aircraft and facilities available. Regulatory and economic conditions also create and affect activity patterns at most airports. It will be important for airport management to monitor any extended deviations from the aviation forecasts to determine what, if any response would be required.

Socioeconomic Conditions

As noted in Chapter One, the Salem area and Marion County population grew by more than 67 percent between 1970 and 1990. During the same period, Polk County's population increased by approximately 54 percent. Forecasts of population prepared by Portland State University (PSU) Center for Population and Census were reviewed for this analysis. PSU is projecting gains in population for both Marion (+26.5%) and Polk (+31.6%) counties through the year 2010; the Salem metropolitan statistical area (MSA) population is also projected to increase by 25.0 percent by 2010, reflecting average annual growth rates of 1.5 to 2.0 percent. PSU projects statewide population to increase by approximately 20.7 percent, or 1.3 percent annually between 1995 and 2010. The Salem area is expected is experience slightly higher rates of population growth than those projected for Oregon on a statewide basis. Historical and forecast population data is presented in **Table 2-1**.

Economy

According to the State of Oregon Department of Employment, the basic sectors of the Salem-area economy include government, services, agriculture, wood and paper products, tourism, and export-based industries such as manufacturing. It is also noted that income from retirement, investments, and transfer payments is a growing part of the area's economic base. Non-basic industries are defined as those which meet the demands generated by local households to purchase local goods and services.

Government (local, county, state and federal) is the leading employment segment, accounting for more than 25 percent of total employment. Major employers in the area include State of Oregon (various departments), Salem School District, Salem Hospital, Norpac Foods, U.S. Government, AGRIPAC, City of Salem, SAIF, State Farm Insurance, Marion County, Chemeketa Community College, and Willamette University.

Unemployment within the region has declined steadily since the early 1980s, when the Salem metro area had peak season unemployment rates as high as 12.2 percent. Current unemployment levels average between 5 and 6 percent, and are expected to continue at low-to-moderate levels into the near future.

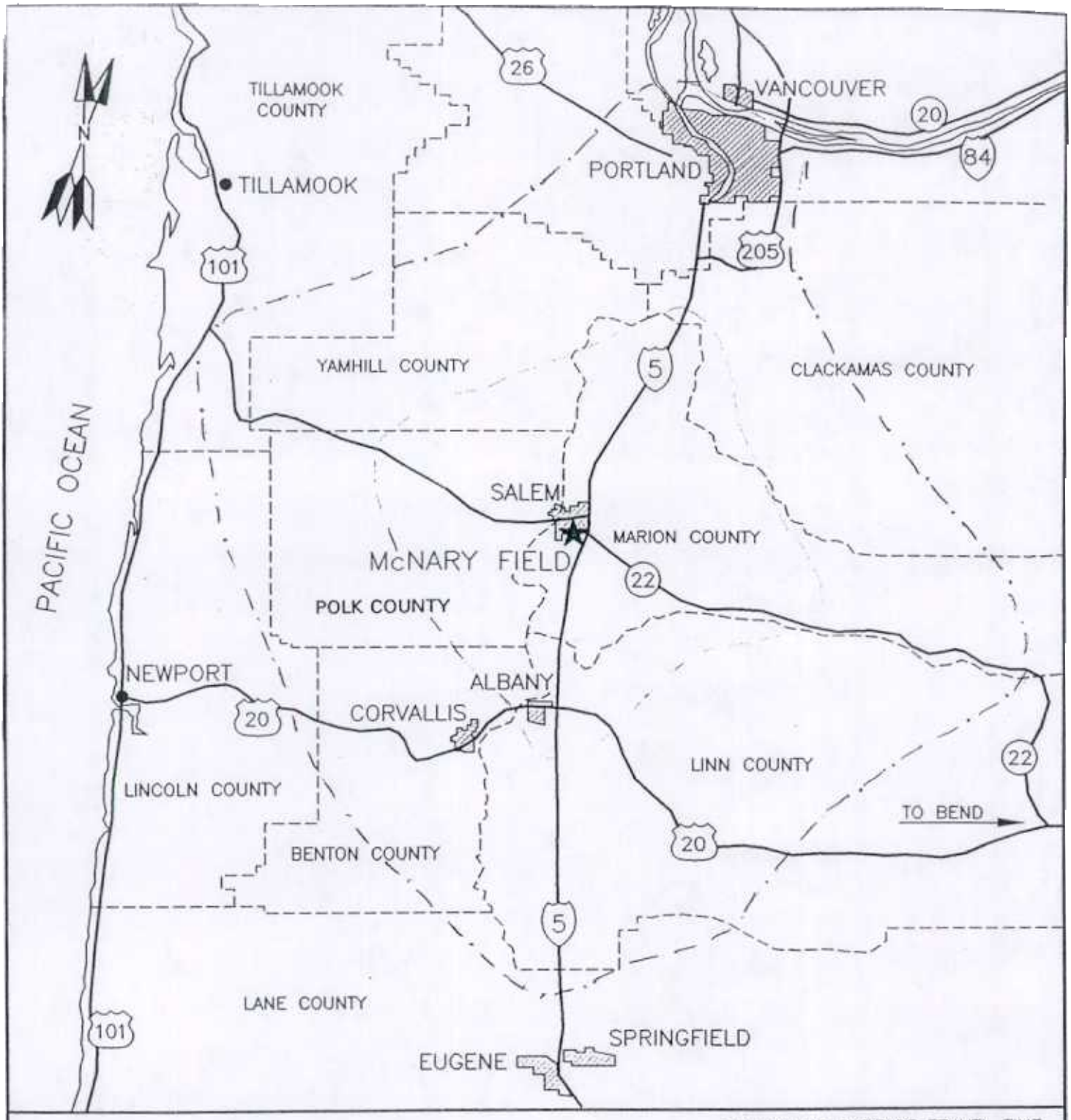
Although the region is heavily dependent on government-related employment, it provides a relatively stable base. State projections of employment within the region reflect an overall increase of 27.9 percent in the next nine years. Manufacturing-related jobs, which now account for approximately 15.2 percent of the region's employment, are expected to increase by 15.5 percent, but will account for a smaller portion of the region's employment by 2005. Non-manufacturing employment is expected to increase by 30.1 percent during the same period, increasing its share of total employment to 86.3 percent by 2005. Among the sectors expected to have the largest increases: Business & Professional Services (+83.9%); "Other Services" (non-business, professional, or health (+40.7%); "Other Retail Trade" (non-general merchandise or food) (+38.2%); and "Other Durable Goods" manufacturing (non-lumber & wood) (+32.5%).

Growth in government employment is expected at a lower pace; federal employment is expected to remain unchanged; state and local employment is expected to increase by 15.4 and 17.8 percent, respectively. As a result, government, which presently accounts for 25.4 percent of total employment within the region, will decline slightly to 22.9 percent by 2005.

Airport Service Area

An "Airport Service Area" is the geographic area which provides the majority of airport users for a particular airport. The boundary of the service area is usually defined by the surface travel time (usually not more than 30 to 60 minutes) between populated areas and the airport. The availability of other airports within the service area will often affect demand for facilities. The McNary Field Service Area is depicted in **Figure 2-1**

Other general aviation airports within the McNary Field service area include Independence State, Albany Municipal, Corvallis Municipal, McMinnville Municipal and Lebanon State Airport. This group of airports provides general aviation users a wide range of options for basing aircraft.



VICINITY MAP
FIGURE 2-1

centurywest
ENGINEERING CORPORATION

McNARY FIELD

note: this map is for illustrative purposes only
and does not include all maior roads. communities.

Table 2-1
Historic and Projected Population

Year	Salem	Marion	Polk	Yamhill	Oregon	U.S.
1970	186,658	151,309	35,349	40,213	2,091,500	203,302,000
1980	249,895	204,692	45,203	55,332	2,633,100	226,546,000
1990	278,024	228,483	49,541	65,551	2,842,300	248,710,000
1994a/1995b	313,186 b	252,800 a	54,400 a	72,800 a	3,126,873	259,157,000
Overall Growth	*68.0%*	*67.1%*	*54.0%*	*81.0%*	*49.5%*	*27.5%*
Avg Annual 1	*2.1%*	*2.1%*	*1.8%*	*2.5%*	*1.6%*	*1.0%*
2000	342,148	280,438	61,710	84,123	3,357,591	274,634,000
2010	391,333	319,729	71,604	99,925	3,773,678	297,716,000
Overall Growth	*25.0%*	*26.5%*	*31.6%*	*37.3%*	*20.7%*	*14.9%*
Avg Annual 2	*1.5%*	*1.5%*	*1.7%*	*2.0%*	*1.3%*	*0.9%*

Sources: Portland State University Center for Population and Census; U.S. Census. *1 - 1970-1994/5 2 - 1994/5-2010*

McNary Field is unique within the service area by offering a full range of facilities, instrument approach capabilities, and aircraft services including fuel and maintenance. Commercial service passengers located within the airport service area are currently required to use Portland International Airport (PDX) or Eugene Airport. Cargo/express service is available to customers within the trade area, although most of the inbound and outbound freight is transported by truck to and from PDX.

Primary Forecasting Assumptions

Forecasts of aviation demand at McNary Field will be developed based on current conditions, past trends, and expectations about the future. Several basic assumptions are made regarding growth in demand for aviation activity during the current twenty-year planning period:

1. Government employment will continue to be the leading employment segment within the local/regional economy. Demand for trade and services will also increase as the economy expands and diversifies.

2. The population growth projected for Marion and Polk Counties over the next 20 years reflects a continued trend of moderate growth, sustained over an extended period.

3. The Airport Service Area for McNary Field will experience an increase in population, thereby creating additional demand for aviation services.

4. The short surface travel time to PDX has historically affected commercial passenger and

cargo service at Salem. This factor is expected to continue during the current planning period.

5. Military activity will remain relatively steady at current levels, based on current fleet projections and mission requirements

6. Cargo activity at the airport will continue to be limited primarily to light aircraft used by express carriers.

7. General aviation activity will increase as both the area's population and economy expand.

8. Improvements in facilities at other general aviation airports within McNary Field's Service Area will offer local and itinerant aircraft owners and users increased choices for obtaining aviation services.

GENERAL AVIATION FORECASTS

General aviation activity, which basically includes all activity other than commercial, air taxi and military, is examined to evaluate the impact future general aviation activity may have on facilities. Based aircraft, fleet mix, and annual operations are forecast for the current twenty-year planning period. Historical data is presented in **Table 2-2**.

Table 2-2
Historical Aviation Activity

		Operations					
Year	Enp. Pass.	Air Carrier	Air Taxi	GA Itinerant	GA Local	Military	Total
1995	2,800est.	243	556	36,828	19,752	5,610	62,989
1994	3,736	918	n/a	31,995	18,058	6,185	57,456
1993	6,220	949	312	31,234	17,940	6,195	56,630
1992	4,045	66	385	35,021	18,223	8,349	62,054
1991	5,010	45	597	38,186	19,978	8,288	64,094
1990	694	1,289	620	35,014	18,510	10,013	65,446
1989	2,174	77	1,813	35,433	21,793	9,612	68,728
1988	3,427	64	1,227	34,969	18,493	9,021	63,774

Source: Airport Records

Based Aircraft

According to airport records, there are currently 186 aircraft based at the airport, including OANG aircraft:

141 - Single-engine
17 - Multi-engine
3 - Business jet
1 - Helicopter (Civilian)
1 - Glider
23 - Military (2 fixed-wing; 21 rotor)
186 - Total

The previous master plan listed 182 based aircraft for 1986, including 141 single-engine, 38 multi-engine, and 3 jet aircraft. It also appears that the total of 182 aircraft did not include Oregon Army National Guard (OANG) aircraft located at the airport. The number of based aircraft have fluctuated over the last twenty years, with a low of 156 and a high of 219. As noted earlier, it is not clear in all historical years whether military aircraft were included in the totals. Over the last ten years, the based aircraft have ranged from 184 to 210.

Based Aircraft Forecasts

Updated forecasts of based aircraft were prepared using three different techniques, described below. In addition, historical data was compared to existing forecasts in order to evaluate the forecasts and identify recent trends.

A number of general indicators suggest that general aviation, while not yet regaining the strength enjoyed during the 1970's, may be entering a renewed period of activity. Piston-engine aircraft production by major manufacturers (Cessna, Piper, Beechcraft, Mooney), is expected to resume to levels not seen since the early 1980s. The continued strength of turbine-powered business aircraft production, and the growth in non-traditional general aviation aircraft (i.e kit planes, homebuilts, newly certificated production models, etc.) suggests that general aviation activity may experience a modest resurgence in the late 1990s.

Based on both local and industry factors, it appears that modest growth in general aviation activity can reasonably be expected during the current planning period. If past trends continue into the future, short-term fluctuations in activity may also be expected at McNary Field.

The Oregon Army National Guard indicates that changes in their aircraft fleet are expected to occur within the next five years, although the number of overall aircraft should remain stable at current levels. For planning purposes, the current number of military based aircraft will be maintained through the forecast period. As a result, when calculating growth rates and evaluating activity ratios, military aircraft will not be included, but will be added to the totals for each forecast year.

The **1987 Airport Master Plan** (Foresite) forecast based general aviation aircraft to increase from 182 (1985) to 310 in 2006, reflecting an average annual increase of 2.6 percent. The master plan projected based aircraft in 1995 to be 240, well above the current level of 163. The **1989 Oregon Aviation System Plan (OASP)** *Forecast Update* projected based general aviation aircraft to increase from 169 (in 1989) to 199 in 2000. The **1995 OASP** *Forecast Update* projects based general aviation aircraft to increase from 147 (in 1994) to 182 in 2014. The **FAA's Terminal Air Forecasts (TAF)** projects based aircraft to increase from 238 to 271 by 2010; it appears that the TAF includes military aircraft, although the base year also appears high.

When reviewing existing forecasts, it became evident that there is a wide range among base year aircraft totals, even when excluding military aircraft. Airport records indicate a current total of 163 general aviation aircraft and 23 military aircraft. Because of the apparent counting inconsistencies, it may be more useful to focus on the updated projected growth rates for each forecast, rather than the specific numbers. The existing forecasts and their average growth rates are summarized in **Table 2-3.**

The initial forecast years from the previous master plan and 1989 OASP forecasts can now be compared to actual data. For the 1995/1996 forecast year, the master plan and system plan projected 240 and 189 based aircraft, respectively.

Updated forecasts of based aircraft were developed using three techniques: First, a comparison between historical based aircraft and area population was made. From this, a ratio of aircraft-to-population was identified, which could then be applied to future population forecasts. The second method is a time-series projection, which reflects a twenty-two year trend of based aircraft at the airport. A third projection was prepared by evaluating McNary Field's activity as a percentage, or market share, of the statewide totals for Oregon. This approach evaluates the historical relationship that the airport has within a larger segment of activity

Growth in area population has been relatively consistent, with a continuous upward trend over an extended period. Both population and based aircraft have increased by more than 60 percent since 1970. However, unlike population, which has maintained a steady upward trend, based aircraft experienced rapid growth in the 1970's, but have since declined, and subsequently stabilized below 1980 levels. The current ratio of 5.2 based aircraft per 10,000 population, is considerably lower than the peak levels (6.9:10,000) experienced fifteen years ago. However, the 5.2 ratio provides a level which has been maintained over the last 25 years. Based on this established trend, it is considered a reasonable benchmark for future projections. For population-based projections, a ratio of 5.2 was held constant through the forecast period. This method results in an average growth rate of 1.6 percent per year, over the twenty year planning period.

Table 2-3
Existing Based Aircraft Forecasts

Actual: 163/ 198(1995)	1987 MP*	1989 OASP	1995 OASP**	FAA TAF
1995	240	189	147	238
2000	280	199	152	254
2005	310	n/a	161	263
2010	n/a	n/a	172	271
2015	n/a	n/a	182	n/a
AAR%	2.6%	1.5%	1.0%	0.9%

* Forecast years 1996; 2001; 2006; ** Forecast years 1994; 1999; 2004; 2014. AAR%: Average Annual Growth Rate

Table 2-4
General Aviation Aircraft/Population

Year	Population Salem MSA	Based AC McNary Field*	Based AC per 10,000 Population
1970	186,658	101	5.4
1980	249,895	173	6.9
1990	278,024	165	5.9
1995	313,186	163	5.2
Forecast*			
2000	342,148	178	5.2
2005	366,741	191	5.2
2010	391,333	203	5.2
2015	421,650**	222	5.2

* Non-military Aircraft ** Population Extrapolated by Century West Engineering from Portland State University Forecasts

A time-series projection was prepared for based aircraft using data from 1974 to 1996. Reflecting the fluctuations which occurred through the period, a least-squares curve was identified which provides the "best fit" curve. By using the variables of based aircraft and time, a trend line is generated which reflects the historical relationship. A basic limitation of a simple time-series projection is the assumption that events which affected activity during the historical period will be extended through the projection. Although this projection has distinct limitations, it does provide a basic indication of how past activity trends could continue into the future if conditions did not significant change. Because of the fluctuations in activity experienced in recent years, the time-series projection reflects a relatively low annual average growth rate of 0.8 percent.

A market share projection was developed based on the historical level of McNary Field based aircraft as a portion of the Oregon statewide levels.

the 1995 OASP forecast growth rates are very similar to the time-series data, with an annual increase averaging 1.0 percent. The three updated based aircraft forecasts are presented in **Table 2-5.** The projection utilizing the historical based aircraft/population ratio was selected as the preferred forecast for based aircraft. The preferred forecast represents an average annual growth rate of 1.6 percent.

As noted earlier, the relationship between historic population and based aircraft does not demonstrate a strong correlation. However, it appears that many of the external factors which have negatively affected general aviation activity throughout the country have contributed to the nominal growth in based aircraft at McNary Field despite growth in local population. As noted earlier, many segments of the general aviation market appear to be regaining some strength. In the absence of strong historical indicators, it is reasonable to provide modest projections of activity which follow the general direction of growth in the local economy and population.

Table 2-5
Updated Based Aircraft Forecasts

Year	Time Series	Market Share	Population
1995	163	163	163
2000	176	189	176
2005	183	200	183
2010	190	214	203
2015	199	227	222

Based Aircraft Fleet Mix

The existing fleet mix for based aircraft is:

Single-Engine - 75.8%
Multi-Engine - 9.2%
Business Jets - 1.6%
Rotor (Civilian) - 0.5%
Glider - 0.5%
Military Rotor -11.3%
Military Fixed Wing - 1.1%

It is expected that the fleet mix will shift slightly during the planning period. As noted earlier, the military aircraft fleet numbers are expected to remain relatively stable during the planning period. Military aircraft now account for 12 percent of the airport's fleet; the percentage is expected to decline slightly, to around 9 percent by the end of the planning period. It is expected that multi-engine aircraft, business jets, and civilian helicopters will increase from around 10 to 15 percent of the fleet by the end of the planning period. The forecast fleet mix for locally-based aircraft is presented in **Table 2-6.**

AIRCRAFT OPERATIONS

The primary source of the historical data were air traffic control tower records, airport activity records and airline traffic statistics. As noted earlier, aircraft operations at McNary Field surged in the mid-to-late 1970s exceeding 100,000 operations for six consecutive years (1975-80). However, that period was followed by a comparable decline, which included a 50 percent drop in operations between 1980 and 1982. Since that time, aircraft operation levels have remained relatively stable, with a range of only 11,000 operations separating the high and low traffic counts during the last fifteen years.

Overall aircraft operations (takeoffs and landings) at McNary Field have fluctuated moderately since the sharp decline of 1978-82. During the period between 1984 and 1995, a trend developed where several consecutive years of declining traffic were followed by several years of increasing traffic, with the cycle repeated again. These trends typically extend over a three to four year period, with a net increase/decrease ranging from 11 to 17 percent. The airport is currently on an upward trend, with an increase in operations of 11.2 percent above 1993 levels. The result of these repetitive upward and downward fluctuations is that 1995 operations at the airport were approximately the same as 1982 levels. The highest single-year activity increase was 11.1 percent, while the largest single-year decline was 10.8 percent. Aircraft operations at McNary Field have not exceeded 70,000 since 1981.

Table 2-6
Fleet Mix Forecast

	Single Engine	Multi Engine*	Business Jet	Rotor (Civ.)	Other**	Military ***	Total
1995	141	17	3	1	1	23	186
2000	153	18	4	2	1	23	201
2005	160	19	6	4	2	23	214
2010	169	22	6	4	2	23	226
2015	180	27	9	4	2	23	245

* Includes piston and turbine aircraft ** Ultralights, gliders, etc. *** Rotor & Fixed Wing

A review of general aviation traffic over the last six years indicates a very consistent split between local and itinerant activity. Local operations are classified as all takeoffs and landings of aircraft operating within the local traffic area, with touch and go landings typically representing the majority of local activity. Local operations currently account for approximately 35 percent of total GA activity and itinerant operations account for 65 percent. Combined local and itinerant GA operations currently account for approximately 90 percent of total activity at the airport. It is interesting to note that during the busiest years in the 1970's, local operations accounted for 45 to 50 percent of general aviation activity. The higher percentage of local traffic would be consistent with the popularity of flight training during the period. Another indication of changing conditions at the airport is that local GA operations in 1978 (62,657) exceeded *all* operations (GA, Commercial, and Military) at McNary Field in the last several years.

Military activity has also fluctuated, but in recent years typically accounted for 9 to 11 percent of total airport traffic. In some years, military activity has accounted for up to 15 percent of total traffic. Annual totals will vary from year to year, depending on mission requirements. However, military activity is expected to account for an average of 10 percent of total traffic during the current planning period.

In recent years, the average number of general aviation operations per based aircraft at Salem has ranged between 280 and 360 with operations fluctuating between 49,000 and 57,000 over the last eight years. Overall, 1995 GA operations were only 6 percent above 1990 levels.

Aircraft Operations Forecasts

The **1987 Airport Master Plan** forecast general aviation operations to increase from 48,345 (1985) to 100,700 in 2005, reflecting an average annual increase of 3.6 percent. The master plan projected GA operations in 1995 to total 67,900, which is about 20 percent above current levels. The **1989 Oregon Aviation System Plan (OASP)** *Forecast Update* projected general aviation operations to increase from 56,680 (in 1989) to 67,000 in 2000. The **1995 OASP** *Forecast Update* projects general aviation operations to increase from 51,261 (in 1994) to 63,620 in 2014. The FAA's **Terminal Air Forecasts (TAF)** projects general aviation

operations to increase from 54,078 to 79,821 by 2010. For purposes of comparison, the 1989 OASP and the TAF projections have been extrapolated to the year 2015.

The existing forecasts ratios of operations per based aircraft ranging from 260 to 360. The most recent forecasts (1995 OASP) utilized a constant ratio of 350 operations per based aircraft through 2014, although the base year data is ten percent lower than actual. The actual ratio between operations and based aircraft in 1995 was 347, although the average over the last six years was 309.

Updated forecasts of general aviation operations were developed using two techniques. A third method, utilizing a time-series projection, was attempted for periods varying from 5 to 22 years. However, the overall trend over the extended periods results in a negative trend line, which would continue to decline through the planning period. Although traffic has fluctuated in recent years, projecting a continued decline in activity does not reflect potential strengthening of general aviation and continued growth in the local area. A comparison between historical based aircraft and aircraft operations was made. From this, a ratio of operations per-based-aircraft was identified, which could then be applied to the preferred based aircraft forecast. A ratio of 320 operations per based aircraft was selected for use in the based aircraft utilization projection. This ratio is comparable to recent year averages and it provides a slightly more aggressive expectation of activity. This projection results in an average annual growth rate of 1.14 percent.

The second forecast method evaluated McNary Field's general aviation operations as a percentage of the statewide totals for Oregon. This market share approach evaluates the historical relationship that the airport has had in terms of statewide activity.

McNary Field's historic market share of statewide general aviation operations since 1988, has averaged 4.2 percent. The market share range during the last eight years is 3.2 to 5.5 percent. A projection was prepared using a static market share of 4.2 percent (.042) against the most recent forecasts of statewide aviation activity. This projection results in an average annual growth rate of 1.8 percent through the 20-year planning period.

The average annual growth rates for general aviation operations in the four existing forecasts range from 1.1 to 3.6 percent. Existing and updated forecasts of general aviation operations are summarized in **Tables 2-7 and 2-8**. The projections utilizing a ratio of operations per based aircraft was selected as the preferred forecast. This projection is consistent with the airport's historical performance over the last several years and provides a modest expectation of growth at 1.14 percent, per year.

Commercial Activity

Commercial air service activity at Salem has historically included regional air carriers, such as Horizon Airlines and Air Oregon, and prior to the deregulation of the airline industry, larger carriers such as United Airlines. The United Airlines service, which ended in 1980, consisted of two daily departures (one to Portland, one to Medford/San Francisco) with Boeing 737-200 aircraft.

Table 2-7
Existing General Aviation Forecasts

Act.: 95 56580	1987 MP Ops*	1987 MP Based AC	1989 OASP Ops	1989 OASP Based AC	1995OASP OPS**	1995OASP Based AC**	FAATAF OPS	FAATAF Based AC
1995	67,900	240	63,600	189	51,261	147	54,078	236
2000	86,100	280	67,000	199	53,120	152	64,705	252
2005	100,700	310	n/a	n/a	56,240	161	73,547	261
2010	n/a	n/a	n/a	n/a	59,930	171	79,821	271
2015	n/a	n/a	n/a	n/a	63,620	182	n/a	n/a
AAR%	3.6%	2.6%	1.5%	1.5%	1.1%	1.1%	2.6%	0.9%

* Forecast years 1996; 2001; 2006; ** Forecast years 1994; 1999; 2004; 2014. AAR%: Annual Average Growth Rate. + Forecasts Extrapolated by Century West Engineering

Table 2-8
General Aviation Operations Forecasts

1995 Act. Ops 56,580	89 OASP	95 OASP	FAA TAF	Operations Per Based AC	Oregon Market Share
1995	63,600	51,261	54,078	--	--
2000	67,000	53,120	64,705	58,740	66,300
2005	72,300*	56,240	73,547	61,120	70,500
2010	78,000*	59,930	79,821	64,960	75,500
2015	84,200*	63,620	86,627*	71,040	80,500
AAR%	1.41%	1.09%	2.38%	1.14%	1.8%

* Extrapolated by Century West Engineering; note: AAR percentages for existing forecasts tied to forecast base years
Updated forecast AAR based on 1995 actual base year

Air Oregon, which later merged with Horizon Air, began offering service with 6-seat twin-engine aircraft and later, 18-seat Fairchild/Swearingen Metroliners, which continued until scheduled service ended in 1994. Horizon Air departures from Salem were typically connected to Portland, Seattle, or North Bend.

The level of service to Salem provided by Horizon was limited. In 1993, Horizon operated 534 departures with 18-seat Metro III aircraft, with a total of 1,733 passenger enplanements. The

enplanements represented a utilization of approximately 18 percent of available outbound capacity with an average of 3.2 passengers per departure.

Current commercial activity at Salem now consists of limited gaming charter flights to Reno, Las Vegas, or Laughlin, Nevada. Four companies (Casino Express, Great American Airways, Viscount Air Service, and Empire Air) have combined to serve Salem with several trips each month. McDonnell Douglas DC-9-15, Boeing 737-200, and BAE 146 aircraft seating between 85 and 115 passengers, are typically operated by these carriers. According to airport records, the number of charter departures has gradually declined over the last three years from 92 departures in 1993 to 57 in 1995. One factor which may be reducing demand for gaming charter flights is the development of several casinos within convenient driving distance of Salem.

In the last full year of Horizon scheduled service (1993), gaming charter flights accounted for nearly 72 percent of the 6,220 passenger enplanements at the airport. In 1994, charter enplanements increased to 87 percent of total enplanements, as Horizon terminated service to Salem in March. Charter flights now account for virtually all commercial passenger activity at McNary Field with 2,500 to 3,000 enplanements. It is expected that the current level will be maintained, or will decline gradually through the planning period. Changes to this segment of activity are expected to be driven by competition from Oregon-based casinos.

Aircraft operations by commercial charter operators have declined over the last three years from slightly more than 200 to around 100. It is expected that the current level of activity will be maintained for the near future, although growth in activity is not expected to exceed recent year highs. For forecasting purposes, air carrier activity will be estimated at 100 operations per year through the planning period. A separate assessment of scheduled commercial air service potential for Salem is included in Appendix A.

Airport-to-Airport Shuttle Bus Service (Salem-Portland)

Although not categorized as airline activity, the leading commercial passenger transport at McNary Field is Hut Airport Shuttle. Hut currently offers ten departures daily to Portland International Airport (PDX) with 18-passenger vans, providing more than 70,000 available seats annually. Although traffic data was not available, it appears that approximately 16,000 to 18,000 passenger boardings are currently accommodated at the airport annually. The volume of passengers carried by Hut appears to have remained strong over an extended period. (Note: by late summer 1997, Hut departures have increased to 18 per day).

Although these boardings are not included in airport traffic statistics, they do represent the majority of commercial passenger movement within the Salem area. From a planning standpoint, the airport terminal is a true intermodal transportation facility, accommodating commercial passenger movements by surface and air transportation. It is expected that the number of surface boardings at the airport will keep pace with the overall population growth in the area.

AIR TAXI AND CARGO

Air taxi and cargo activity at Salem is currently estimated at approximately 800 to 1,000 annual operations. The activity consists of the charter

activity, and daily UPS contract flights. Currently, Sport Air Travel, based in Troutdale, operates one flight per weekday under contract to UPS, with Cessna 402 aircraft; this activity totals approximately 520 operations annually.

Due to the short driving time to PDX, the express flights are limited to the most time-sensitive items. The level of air taxi and cargo operations is expected to increase at a rate comparable to general aviation activity (1-1.5% annually) during the planning period.

MILITARY FORECASTS

As noted earlier, the majority of military operations at McNary Field are related to Oregon Army National Guard aircraft. In recent years, military traffic has accounted for 9-11 percent of total airfield operations, and as high as 15 percent in some years.

Approximately 21 helicopters are based at the OANG facility on a year-round basis. The OANG also supports two fixed wing aircraft at the airport: one Shorts SD3 Sherpa-30 passenger twin engine turboprop transport and one Beechcraft C12 (KingAir 200) 8 passenger twin-engine turboprop.

In 1995, 5,610 military operations accounted for approximately 9 percent of total airfield operations. A review of historic traffic data indicates that military traffic is often equally divided between local and itinerant operations. It is estimated that helicopter traffic normally accounts for more than 90 percent of total military operations. OANG fixed wing operations are estimated at less than 500 per year, and are expected to remain relatively stable. This split between fixed wing and rotor wing activity is expected to continue. For forecasting purposes, it is estimated that military operations will account for approximately 10 percent of total airfield operations through the planning period.

INSTRUMENT APPROACHES

Forecasts of Annual Instrument Approaches (AIA's) provide guidance in determining the need for navigational aid facilities. An instrument approach, as defined by the FAA, is "an approach to an airport, with intent to land, by an aircraft in accordance with an Instrument Flight Rules (IFR) flight plan, when the visibility is less than 3 miles and/or when the ceiling is at or below the minimum initial approach altitude."

Historical data on AIA's was obtained from the FAA for the years 1976 through 1995. Separate categories are maintained for air carrier, air taxi, general aviation, and military aircraft. The number of annual IAPs ranged from 778 to 2,798 during the period. In any given year, instrument approaches total 1 to 2.5 percent of total operations. The FAA TAF projects instrument approaches to remain below 1,000 per year, through the year 2010. For forecasting purposes, instrument approaches will be estimated at 1.5 percent of total airfield activity.

Instrument operations are also recorded during periods of non-VFR weather. At McNary Field, instrument operations have typically accounted for between 10 and 15 percent of total airfield operations. Instrument operations will be projected to be 12 percent of total operations, through the planning period.

Aircraft Fleet Mix

The fleet mix of based aircraft was presented earlier in the chapter. However, itinerant activity at McNary Field includes a limited amount of transport category aircraft.

The aircraft fleet mix defines a number of key parameters in airport planning, including critical aircraft (for pavement designs and airport geometry), terminal complex layout, and maximum stage length capabilities (affecting runway length evaluations).

Based on operations, it is estimated that 97 percent of the fixed-wing air traffic activity on the airport consists of light single-engine and multi-engine aircraft. Large turboprop aircraft and business jet traffic is estimated at approximately 2.75 percent; with transport category jet traffic estimated at less than 0.25 percent. This percentage of transport jet activity is expected to remain well below 1 percent of total traffic; the percentage of business jet and large turboprop activity is expected to increase gradually through the planning period, to approximately 4 percent by the end of the period.

In 1993, the last full year Horizon Air served Salem, the large turboprop activity specifically related to commercial service, accounted for approximately 2.1 percent of total fixed-wing activity. Combined scheduled and charter commercial activity accounted for 2.4 percent of total operations, with large transport jet aircraft accounting for 0.35 percent.

PEAKING CHARACTERISTICS

Many facility needs at McNary Field are related to the levels of activity during peak periods. The periods used in demand-capacity analysis and the development of facility requirements for the study are as follows:

- Peak Month - the calendar month in which peak aircraft operations occur.
- Design Day - the average day in the peak month. This indicator is derived by dividing the peak month operations by the number of days in the month.
- Busy Day - the busy day of a typical week in the peak month. This is used primarily to determine apron space requirements.
- Design Hour - the peak hour within the design day. This is used in airfield demand/capacity analysis, as well as is determining terminal building and access road requirements.
- Busy Hour - the peak hour within the busy day. This is used in facility requirements determinations.

The peak month for operations is July or August, which has typically accounted for approximately 11 to 12 percent of overall activity in recent years. This peak month factor is expected to continue through the planning period.

A review of air traffic control tower records indicates that busy day operations averaged 5 to 6 percent of peak month activity. Busy hour is estimated at 15 percent of the busy day operations. Design hour operations are estimated to account for 15 percent of design day operations. It is expected that these factors will remain relatively steady during the planning period. A summary of forecast peaking activity is presented in **Table 2-9**. Updated forecasts are presented in **Table 2-10.**

Table 2-9
Forecast of Peak Activity

	1995	2000	2005	2010	2015
Annual Operations	62,989	66,400	69,200	73,600	80,400
Peak Month	7,244	7,630	7,950	8,450	9,240
Design Day	242	255	265	282	308
Busy Day	350	355	370	390	430
Design Hour	36	38	40	42	46
Peak Hour	50	53	56	59	64

Table 2-10
Summary of Air Traffic Forecasts

	1995	2000	2005	2010	2015
Itinerant Operations					
Air Carrier	243	100	100	100	100
Air Taxi	556	900	1,000	1,100	1,200
General Aviation	36,828	38,200	39,700	42,200	46,200
Military	3,000	4,000	4,200	4,400	4,800
Total Itinerant	40,627	43,100	45,000	47,800	52,300
Local Operations					
General Aviation	19,752	20,600	21,400	22,800	24,900
Military	2,610	2,700	2,800	3,000	3,200
Total Local	22,362	23,300	24,200	25,800	28,100
Total Operations	**62,989**	**66,400**	**69,200**	**73,600**	**80,400**
Inst. Approaches	788	1,000	1,040	1,100	1,200
Based Aircraft	186	201	214	226	245

Figure 2-2

McNary Field - Based Aircraft Forecast

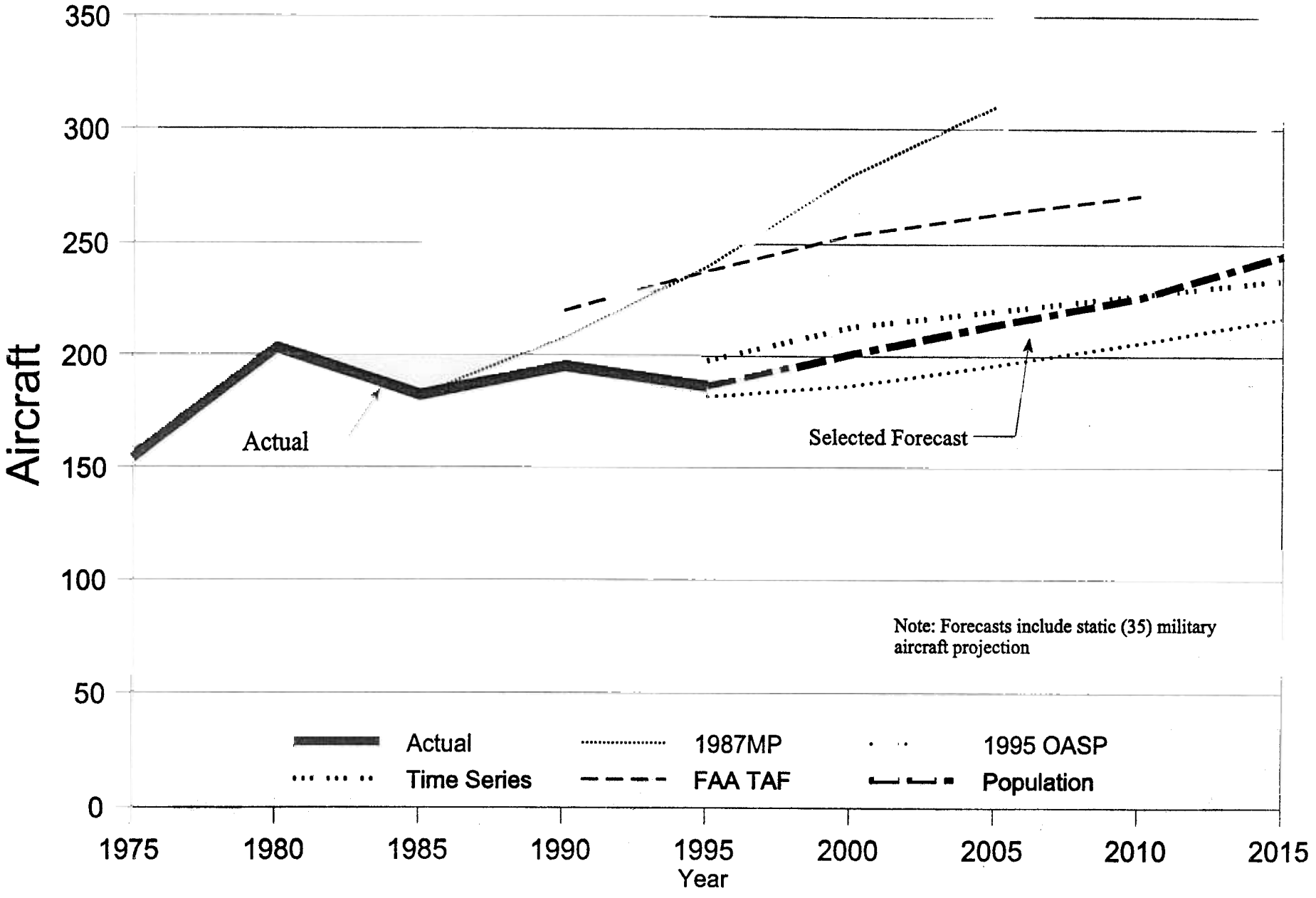
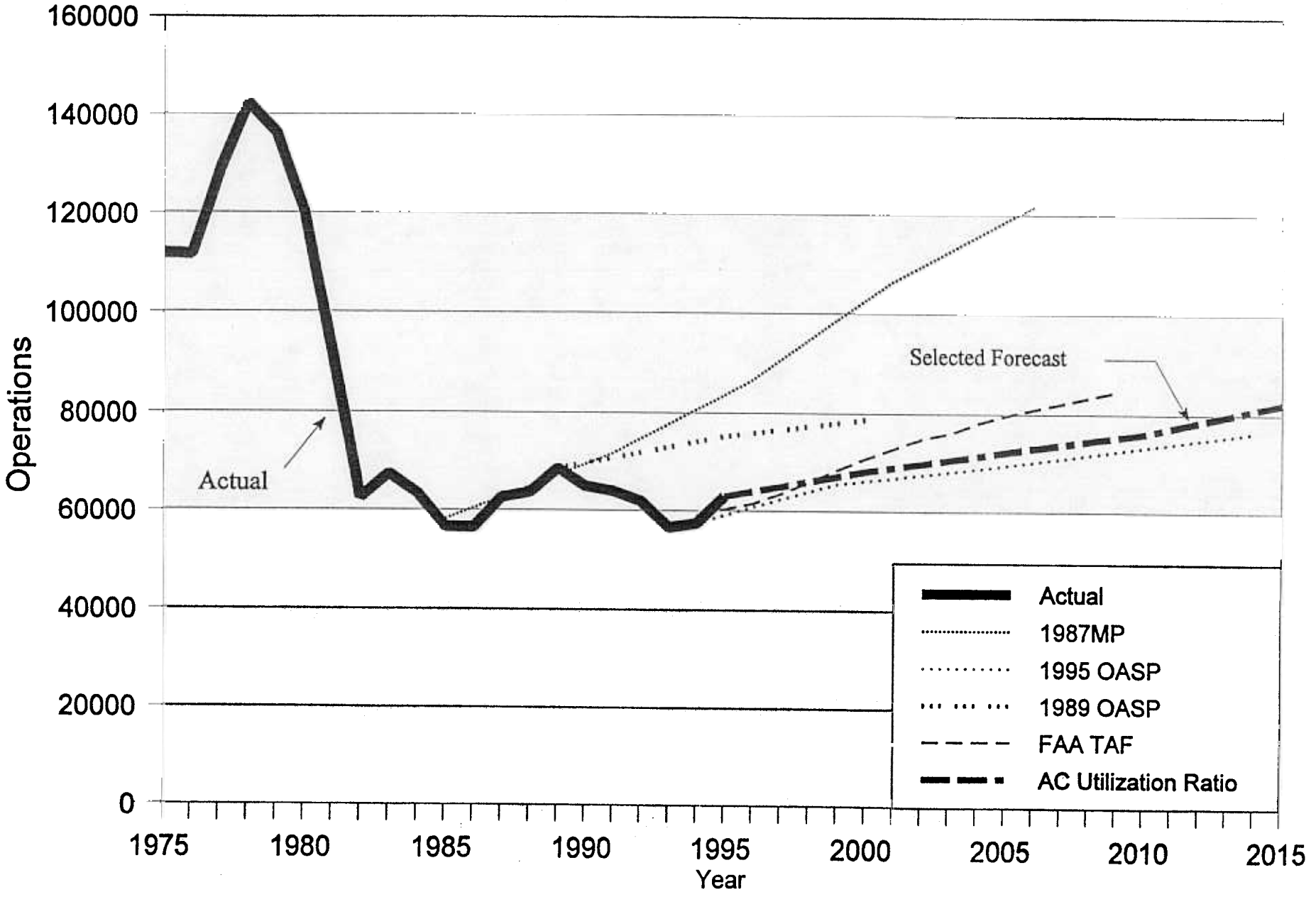


Figure 2-3

McNary Field - Aircraft Operations Forecast



Chapter Three
DEMAND-CAPACITY ANALYSIS

The previous chapter, forecasts of aviation demand were presented for McNary Field through the year 2015. These forecasts include aircraft operations, based aircraft, peaking characteristics, and aircraft fleet mix. With this information, the capabilities of the airside and landside facilities can be evaluated to determine if they are adequate to accommodate the forecast aviation demands without significant delay or deterioration of service levels.

Once existing or potential deficiencies in airport facilities are identified, a more specific determination of the approximate sizing and timing of new facilities is made. The requirements for new facilities are presented for the short-, medium- and long-range periods for the twenty-year Master Plan. Once the overall facility requirements are defined for the current planning period, preliminary airport development alternatives can be created which can address facility needs through specific development concepts. Following review of the preliminary alternatives, a preferred alternative will be selected which can provide the best overall combination of facility improvements for the airport.

AIRFIELD CAPACITY

The capacity analysis for McNary Field was conducted to determine the existing and future capacity of the airfield and to identify any present or potential deficiencies in the airfield system. A variety of techniques have been developed for the analysis of airfield capacity. The current technique recommended by the FAA, employed in this study, is described in FAA Advisory Circular (AC) 150/5060-5, **Airport Capacity and Delay**. The method presented in this chapter produces statements of airfield capacity in the major terms:

Hourly Capacity of Runways: The basic measure of capacity related to peak hour activity, is the maximum number of aircraft operations that can take place in one hour.

Annual Service Volume: The annual capacity or a maximum level of aircraft operations that may be used as a reference in planning the runway system.

Annual Aircraft Delay: Total delay incurred by all aircraft on the airfield in one year.

The capacity of an airport is affected by several factors including airfield layout, meteorological conditions, aircraft mix, runway use, percent arrivals, percent touch-and-go's, and exit taxiway locations. These items are described below.

Airfield Layout

Airfield layout refers to the location and orientation of the runways, taxiways, and terminal area. McNary's two runways are situated in an acute angle intersection configuration, with approximately 30 degrees of separation. Runways 13-31 and 16-

34 are both served by taxiway systems, which include partial-length parallel taxiways and access taxiways to/from the runway ends.

At airports with an operating air traffic control tower, arriving and departing aircraft traffic can be more efficiently managed. With multiple runways, arrivals, departures, and touch and go traffic can be assigned to specific runways. Although limitations do exist, this type of configuration can increase airfield capacity above a single runway configuration. In addition, Runway 31 is equipped with an instrument landing system (ILS). An ILS enables an efficient flow of arriving aircraft during poor weather conditions. **Figure 1-2**, contained in Chapter One depicts the existing layout of McNary Field.

Meteorology

Runway use is normally dictated by wind conditions, ceilings and visibility, with the direction of the takeoffs and landings generally determined by the prevailing winds. The type of instrumentation and the adequacy of the associated instrument approaches for each runway will also dictate runway use during inclement weather conditions.

Wind conditions are very important in determining runway use in a capacity analysis. For planning and design, a crosswind component is considered excessive at 15 miles per hour for aircraft over 12,500 pounds and at 12 miles per hour for smaller aircraft. Wind data (100,013 observations) covering a period from 1948 to 1978 have been summarized for all weather conditions at McNary Field. **Table 3-1** indicates the individual and combined coverages for the two runways at McNary. **Figure 3-1** presents the all-weather wind rose for McNary Field.

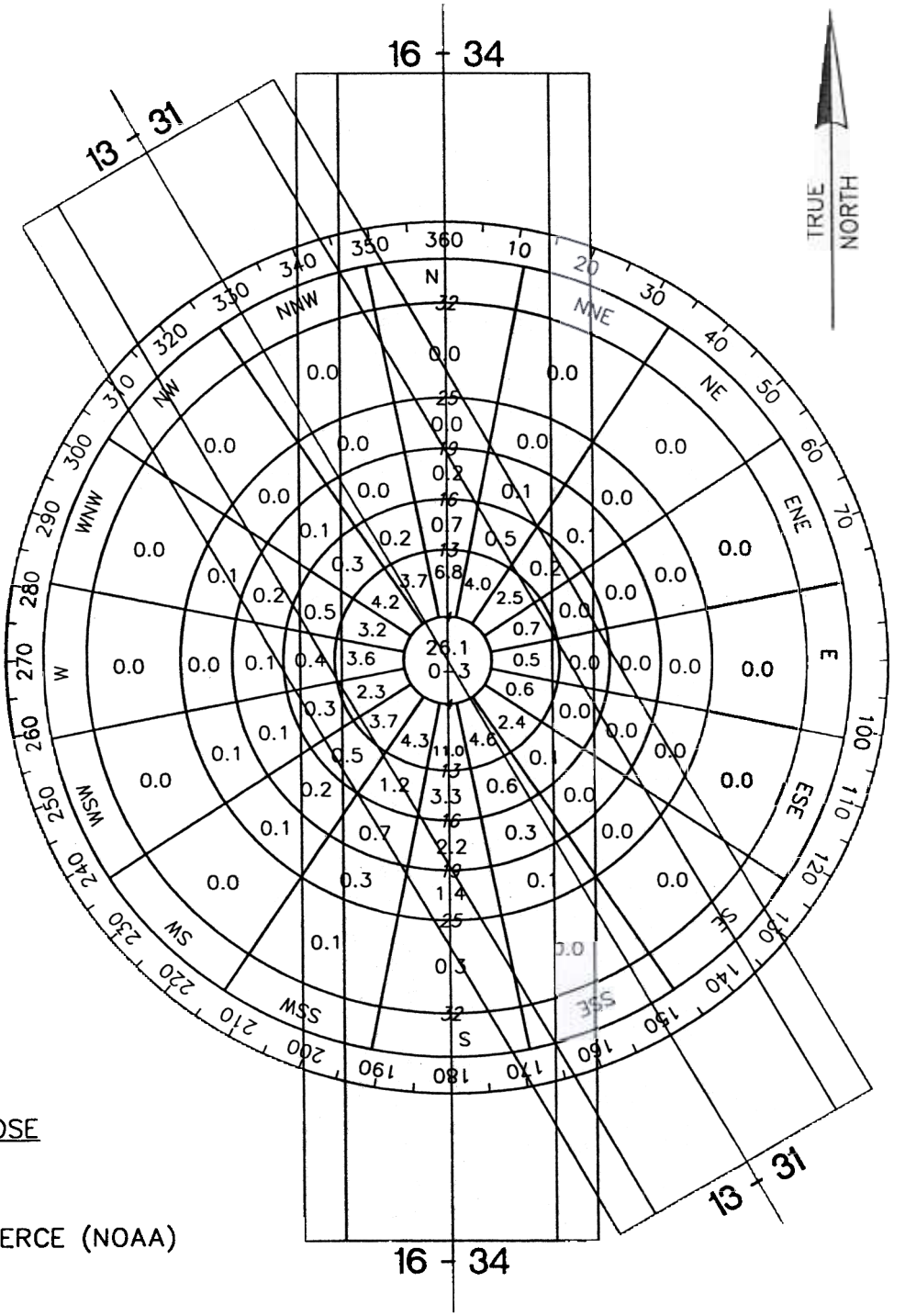
The primary effect of ceiling and visibility conditions on airport capacity is on required spacing between aircraft during IFR conditions. The FAA **Airfield Capacity and Delay** Advisory Circular (AC 150/5060-5) recognizes three categories of ceiling and visibility minimums:

Visual Flight Rule (VFR) conditions occur whenever the reported ceiling is greater than 1,000 feet and visibility is greater than three statute miles.

Instrument Flight Rule (IFR) conditions occur when the reported ceiling is less than 1,000 feet but greater than 500 feet above the ground and/or when visibility is less than three statute miles but more than one statute mile.

Poor Visibility and Ceiling (PVC) conditions occur when the ceiling is less than 500 feet and/or visibility is less than one statute mile.

For purposes of calculating capacity, the percentage of weather conditions (based on available data) at McNary Field on an annual basis are presented in **Table 3-1.**



McNARY FIELD
ALL WEATHER WIND ROSE

PERIOD 1948 – 1978
100,013 OBSERVATION
SOURCE: US DEPT. OF COMMERCE (NOAA)

RUNWAY WIND COVERAGE

RUNWAY	12 MPH	15 MPH
RUNWAY 13–31	95.1%	98.7%
RUNWAY 16–34	97.3%	99.2%
COMBINED COVERAGE	98.8%	99.7%

DESIGNED BY: DM	CHECKED BY:	RUNWAY WIND COVERAGE McNARY FIELD SALEM, OREGON	centurywest ENGINEERING CORPORATION
DRAWN BY: KSW	SCALE: 1"=1'		DATE: 8/15/97
FILE: 4030800201\4102\608_.DWG			FIGURE: 3-1

Table 3-1
McNary Field Weather Conditions & Runway Wind Coverage

Runway	12 mph	15 mph
13-31	95.1	98.7
16-34	97.3	99.2
Combined	98.8	99.7
VFR	93 %	
IFR	6 %	
Below Minimums	1 %	

Surrounding terrain limits radar coverage in the local area to approximately 200 feet above the runway. This reduces hourly capacity slightly during IFR conditions. The previous master plan estimated IFR hourly capacity at 42 aircraft operations; this appears to be reasonable based on existing procedures, radar coverage, and the ILS.

Runway Utilization

Air traffic controllers at the airport estimate that approximately 80 percent of air traffic at McNary Field occurs on Runway 16-34 with 20 percent on Runway 13-31. Seasonal wind conditions typically favor Runway 13 or 16 during the winter months, and Runway 31 or 34 during the summer. Runway 13-31 is the primary runway during poor weather conditions, with precision and nonprecision instrument approaches available. Larger aircraft also use Runway 13-31 due to its pavement strength and length. The Oregon Army National Guard uses two helipads located on Taxiway B, east of Runway 13-31 for operations; arriving and departing military helicopters are coordinated with fixed-wing traffic on the same runway.

Aircraft Mix

Aircraft mix is defined in terms of four fixed-wing aircraft classes described in **Table 3-2**. The aircraft mix at McNary consists of Classes A and B (small propeller aircraft and jets weighing 12,500 pounds or less, and Class C consisting of large multi-engine aircraft including business and transport category jets weighing more than 12,500 pounds and up to 300,000 pounds. Class C aircraft are typically associated with airline, corporate aviation, and military activity. Class D consists of large aircraft weighing more than 300,000 pounds; there are no Class D aircraft presently operating at McNary Field and none are forecast during the study period.

The fixed-wing aircraft mix is currently 96 percent Class A and B aircraft, and 4 percent Class C aircraft during VFR conditions. As noted in the Forecast Chapter, the number of air carrier charter operations, as a percentage of total operations, is not expected to increase during the study period. However, larger business jet and turboprop operations are expected to increase during the planning period.

The largest portion of helicopter traffic at the airport consists of Oregon Army National Guard activity. The majority of OANG helicopter operations utilize the runway-taxiway system of Runway 13-31. The helipads located on Taxiway Bravo provide a fixed

point for arrival and departure; these operations are coordinated with other fixed wing operations. For capacity planning purposes, each helicopter arrival or departure occupies available capacity for that runway. Therefore, rotor operations will be included when calculating runway capacity estimates.

Percent Arrivals

The percentage of aircraft arrivals as they relate to the total operations of the airport is important in determining capacity. Except in unique circumstances, the aircraft arrival-departure split is typically 50-50. At McNary Field, traffic information indicated no deviation from this pattern, and arrivals were estimated to account for 50 percent of peak period operations.

Touch-and-Go Operations

A touch-and-go operation involves an aircraft making a landing and an immediate takeoff without coming to a full stop or exiting the runway. These operations are normally associated with training are included in local operations data. Touch-and-go activity is counted as two operations since there is an arrival and a departure involved.

At McNary Field, the OANG helicopters conducted approximately 2,610 local operations in 1995; general aviation local operations were estimated at 19,752. Annually, it is estimated that 50 percent of local operations are touch-and-goes. Therefore, touch-and-go operations account for approximately 18 percent of total operations. This percentage is expected to remain relatively steady through the end of the study period.

Exit Taxiways

Exit taxiways affect airfield capacity since their locations directly determine the occupancy time of an aircraft on the runway. Based on traffic mix at McNary, the capacity analysis gives credit to exits located within a prescribed range of 2,000 to 4,000 feet from the runway thresholds. Under this criterion, both runways have three exits located within the specified range.

Hourly Runway Capacity

The first step in the analysis involves the computation of the runway hourly capacity. Wind direction, the percentage of IFR and PVC weather, and the number and locations of runway exits then become important factors in determining the weighted hourly capacity.

Based upon the existing runway system, an aircraft mix of 4.0 percent Class C operations, and 18 percent touch and go operations, and taxiway exit rating of three, the existing weighted capacity was developed. During IFR conditions, the mix of Class C aircraft is unchanged, although there is no touch and go activity.

The hourly runway capacity during VFR condition is estimated at 104 operations; the lower weighted capacity available during IFR conditions (approximately 60 operations)reduces the weighted

Table 3-2 - Aircraft Classifications

Aircraft Class	Typical Aircraft	
Class A: Small single-engine, gross weight 12,500 pounds or less	Cessna 172/206/210 Beechcraft Bonanza Cessna Caravan	Mooney 201/231/252 Piper Warrior/Cherokee TBM 700
Class B: Small twin-engine, gross weight 12,500 pounds or less	Beechcraft Baron Cessna Citation I Beech King Air 90/100/200	Cessna 310/402/421 Piper Cheyenne I/II/III Beech C99 Airliner
Class C: Large aircraft, gross weight 12,500 pounds to 300,000 pounds	Beech King Air 300/350 Boeing 727/737/757 Shorts SD 330/360 Hawker Siddley 125	Douglas DC-9 Cessna Citation II/III/X Fairchild Metro III Westwind I/II
Class D: Large aircraft, gross weight more than 300,000 pounds	Airbus A300/A340 McDonnell-Douglas MD11	Boeing 747/767/777 Lockheed L1011

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

hourly capacity.

The current weighted runway capacity is estimated to be 98 operations per hour. The weighted hourly capacities, which reflect the capacities of the runway in VFR, IFR, and below minimum conditions, are compared to forecast design hour volumes in **Table 3-3.**

Annual Service Volume

Once the weighted hourly capacity is known, the annual service volume (ASV) can be determined. The forecasts of peaking activity prepared in **Chapter Two** provide estimates of the average daily activity during the peak month (design day), and the average peak hour activity within the peak month (design hour). The daily and hourly peaking activity identify specific demand ratios which are used in calculating the ASV. The following equation is used to calculate annual service volume:

ASV = C x D x H

C = weighted hourly capacity

D = ratio of annual demand to average daily demand during the peak month

H = ratio of average daily demand to average peak hour demand during the peak month.

The current ASV for McNary Field was determined to be 172,300 operations. The ASV is not expected to change significantly during the planning period, based on projected activity levels, peaking factors, and type of aircraft use.

The weighted hourly capacity, aircraft mix, and touch and go percentages are also not projected to change significantly during the study period. Based on the capacity analysis listed in **Table 3-3** and depicted in **Figure 3-2**, it is apparent that demand can be accommodated with existing capacity through the planning period. The factors which combine to reduce annual capacity levels at McNary do not affect all operations equally. While the relationship of annual capacity and demand provides a broad-based gauge for evaluating the airport's ability to accommodate increasing traffic levels, peak hourly demands and hourly runway capacity will provide a more immediate indication of capacity problems. Increased delay for aircraft will be realized during periodic peak periods initially; the frequency of these periods of congestion will be a strong indicator of potential capacity constraints

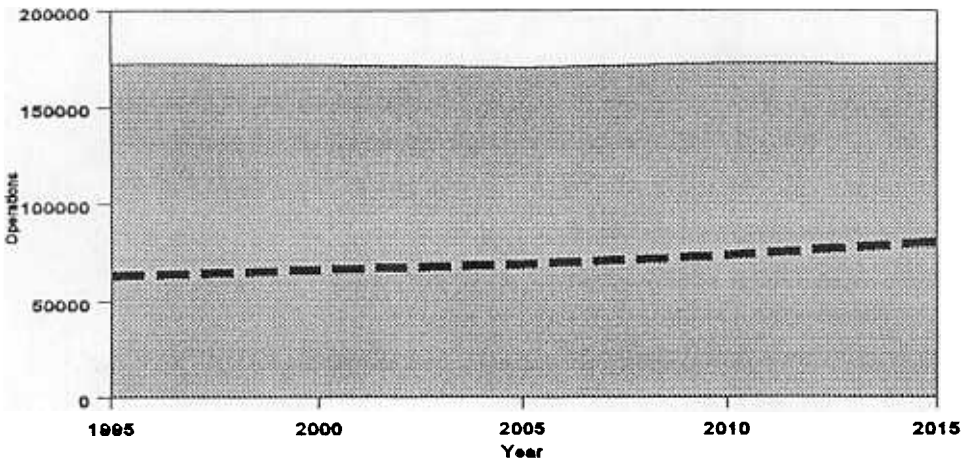
Annual Delay

As an airport approaches capacity, it begins to experience increasing amounts of delay to aircraft operations. Delays can occur to arriving and departing aircraft during both VFR and IFR conditions. As an airport's operations increase, delay increases exponentially. Based on the ratio

Table 3-3
Demand/Capacity Summary
McNary Field

Year	Annual Operations	Design Hour Operations	Weighted Hourly Capacity	Annual Service Volume	Average Delay per Operation (minutes)	Total Annual Delay (Hrs.)
1995	62,989	36	98	172,300	0.22	231
2000	66,400	38	98	171,850	0.25	277
2005	69,200	40	98	170,500	0.28	323
2010	73,600	42	98	172,600	0.29	356
2015	80,400	46	98	172,300	0.32	429

Figure 3-2
Annual Service Volume vs Demand



between annual demand and annual service volume, annual delay is currently estimated at 231 hours, with an increase to 429 hours projected by 2013. This level of delay will result in an average delay of less than one minute per aircraft through the planning period. **Table 3-3** compares the levels of delay projected for the airport during the planning period. Generally, FAA criterion recommends evaluating improvements for capacity when operations exceed 60 percent of the annual service volume. **With forecast activity at McNary Field projected to reach 47 percent of capacity at the end of the planning period, no capacity-related facility improvements are anticipated during the current planning period.**

AIRSPACE CAPACITY

A review of the McNary Field Obstruction Chart (AOC) and instrument approach plates was conducted to identify obstructions near the airport. The airspace in the immediate vicinity of McNary was depicted in **Figure 1-3**, in Chapter One Straight-in instrument approaches are available for Runway 31 and 13; circle-to-land minimums allow landings on the remaining runways when ceiling and visibility conditions permit. The airspace surrounding McNary Field is not significantly affected or constrained by other airports in the area. As noted in the Inventory Chapter, there are a number of public and private airports located in the vicinity of McNary airspace. Albany Municipal Airport (17 miles south-southwest) has a

VOR/DME or GPS-A approach which uses the Corvallis VOR/DME. The approach and missed approach procedures are designed to keep aircraft west and south of the McNary ILS. Independence State Airport, located 9 nautical miles southwest, does not currently have an instrument approach.

Other Items

In Task 4.1 of the master plan scope of work, an analysis of air carrier service requirements, relative to capacity was identified. From a runway capacity perspective, the re-introduction of air carrier service would not significantly affect airfield capacity. With an annual service volume exceeding 170,000 operations, and twenty-year baseline projections (not reflecting resumption of air service) of slightly more than 80,000 operations, the runway system has a considerable amount of unused capacity available to accommodate a number of air carrier service scenarios. The primary capacity-related considerations would be related to terminal capacity (i.e., gate capacities, enplanement capacities, etc.). These items will be discussed in the Facility Requirements section of this chapter.

The existing capacity of airport tiedowns is greater than demand. With more than 150 tiedowns available of the west-side aprons, locally-based and transient aircraft are easily accommodated. It is estimated that approximately 80 percent of based aircraft at McNary Field are stored in hangars. Aircraft hangar space is currently running with virtually no vacancy. Demand for new hangars does exist and the airport currently has space for approximately four conventional hangars with existing taxiway access. Additional hangar development areas and taxiway access have been identified by airport users as a significant existing need. The airport has adequate undeveloped land area available for hangar development. Additional discussion of apron, tiedown, and hangar requirements is contained in the Facility Requirements chapter (Chapter Four).

Chapter Four
FACILITY REQUIREMENTS ANALYSES

The previous chapter, the capacities of various McNary Field facilities were determined through the year 2015. With this information and the earlier forecasts of aviation activity, the capabilities of the airside and landside facilities can be evaluated to determine if they are adequate to accommodate aviation demands without a significant delay or deterioration of service levels.

The **Facility Requirements** analysis will outline the specific needs associated with the airside and landside areas of the airport. To plan for the future of the airport, it is necessary to translate forecast demand into the specified types and quantities of facilities that will be needed during the current planning period. This section uses the results of the forecast and demand capacity analyses, and established planning criteria, to determine the airside (i.e., runways, taxiways, navigational aids, marking and lighting) and landside (i.e., hangars, aircraft parking apron, fueling, automobile parking and access) facility requirements.

Once existing or potential deficiencies in airport facilities are identified, a more specific determination of the approximate sizing and timing of new facilities is made. Airport development alternatives are then created which can address specific facility needs. Following review of the preliminary alternatives, a preferred alternative will be selected to provide the best overall combination of facility improvements for the airport.

This chapter contains information such as existing and recommended dimensional standards, facility condition information, and other related items. The material is divided into the following sections:

Summary - Facility Requirements
***Section I** - Physical Facility Requirements*
***Section II** - Terminal Area Requirements*
***Section III** - FAR Part 77 and FAA Design Standards*

Summary - Facility Requirements

The material contained in this chapter includes information on the adequacy or condition of existing airport facilities, recommended airport design standards, FAR Part 77 Imaginary Surfaces (airspace), and the existing facility's compliance with these standards.

Due to the amount of information contained in this analysis, the chapter has been divided into three sections, with a brief summary of the overall facility requirements provided at the beginning of the chapter. Detailed summaries of the individual facility requirements categories are provided in the chapter.

The overall facility needs are summarized on the following page.

Facility Requirements Summary

Runways *- **13-31** Resurfaced in 1996; length adequate for majority of users; design aircraft (medium-size business jet) requires approximately 6,500 feet for balanced field length in hot temperatures. Runway reserve from an earlier master plan (transport category air carrier service) should be retained to protect long-term option. Dimensions and separations exceed Airplane Design Group II standards. **16-34** length is adequate for general aviation users; meets or exceeds ADG II standards. Restriction for use by aircraft over 30,000 pounds regardless of landing gear type should be reviewed. Weight bearing capacity may be increased during next pavement overlay. Runway 16-34 width exceeds standards for ADG II; however, cost-benefit analysis should be completed as part of pavement design to determine best course of action.*

Taxiways *- Access throughout airport is good; additional taxiway connections required for new hangar areas.; taxiway reserves required for potential extension of Runway 13-31. Taxiways generally meet or exceed ADG II standards.*

Aircraft Parking Aprons *- Tiedowns for small general aviation aircraft adequate; parking and loading/unloading areas for itinerant business aircraft, and helicopters require reconfiguration.*

Hangars *- High percentage of based aircraft stored in hangars; vacant lease areas with taxiway access very limited; existing and short-term demand for hangar lease area appears to be strong. Site improvements (taxiway connections, vehicle access, utilities, etc.) required to attract tenants.*

Lighting & Navaids *- Runway and taxiway lighting, approach lighting, visual guidance indicators adequate. Runway end identifier lights (REIL) may be added to Runways 16 and 34. Existing navigational aids are adequate; global positioning system (GPS) approaches will come on-line during current planning period; ground-based navigational systems are expected to be phased out over an extended period.*

Terminal *- Existing terminal generally adequate for existing use and limited air service activity. Potential introduction of scheduled air service may require an expansion or upgrade of facilities, depending on level of service and timing. Vehicle parking is adequate for existing activity. A terminal area reserve should be maintained to protect future expansion of building, parking areas, and reconfiguration of the landside access.*

Security *- Existing security is adequate for level of use. Additional fencing and controlled access points may be required for new hangar areas. Future non-aviation activities should be physically separated from aviation activities.*

Utilities *- Existing developed areas have good access to utilities. New development in the southern and eastern areas of the airport would require extension of basic utilities. Non-aviation development will have greater utility requirements.*

Roadways *- Existing roadways generally adequate; extensions to new industrial or aviation development areas will be required. Upgrade of SE 25th Street on west side of airport may be required at terminal area.*

Property *- Existing airport has adequate undeveloped land to accommodate aviation and non-aviation uses.*

Section I - Physical Airport Facility Requirements

AIRSIDE REQUIREMENTS

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

- *Runways*
- *Taxiways*
- *Airfield Marking and Lighting*
- *Navigational Aids*

The selection of the appropriate design standards for the development of the airfield facilities is based primarily upon the characteristics of the aircraft which are expected to use the airport. The most critical characteristics are the **approach speed and size of the critical design aircraft** anticipated to the serve the airport. The airport reference code (ARC), as defined in **FAA Advisory Circular 150/5300-13, Airport Design**, reflects the type of aircraft which are intended to operate at the airport. The advisory circular groups aircraft into five categories based upon their approach speed and six categories based on wingspan, as described in **Table 4-1.**

Categories A and B include small, propeller aircraft and certain smaller business aircraft. 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. Most aircraft using McNary Field fall into Category C or below and Airplane Design Groups I or II; the airport also accommodates some aircraft which are included in Design Group III.

Airport specifications are determined by analyzing the aircraft mix and determining the most demanding airplane to be accommodated. Although one aircraft may determine runway length, another may determine pavement strength or other appropriate design standards.

Design Aircraft

The 1987 Airport Master Plan identified the Fokker F27 twin-engine turboprop as the current design aircraft and the McDonnell Douglas MD80 as the future design aircraft. Both aircraft are included in Airplane Design Group III; the F27 is included in Approach Category B and the MD80 is included in Approach Category C. The selection of these aircraft was based on specific expectations of commercial air service, which have not been realized during the last nine years, nor are expected during the current planning period.

As noted in **Chapter Two**, a limited amount of charter air carrier service currently exists at McNary Field. Douglas DC-9-15, Boeing 737-200, and similar aircraft operated by charter carriers account for approximately 100 operations per year. These aircraft are included in ADG III and Approach Category C. The current level of activity is expected to remain relatively constant during the current planning period.

Table 4-1
Airplane Design Groups and Approach Categories

Approach Category	Approach Speed (knots)
A	Less than 91
B	91 - 120
C	121 - 140
D	141 - 165
E	166 or greater
Airplane Design Group	**Wingspan (feet)**
I	Less than 49
II	49 but less than 79
III	79 but less than 118
IV	118 but less than 171
V	171 but less than 197
VI	197 but less than 262

Business jet activity at McNary Field is currently estimated at approximately 1,400 operations per year; approximately 32 percent of total business jet activity is generated by locally-based aircraft, with the remaining activity associated with transient corporate aircraft. Based on data maintained by Salem Air Center, aircraft mix for transient business jet activity is estimated to be 50 percent Approach Category B aircraft types (Falcon 50, Citation III, etc.), 35 percent Approach Category C (Challenger, Hawker 125, Astra, Saberliner, Lockheed Jetstar, etc.). and 15 percent D (Gulfstream II/IV Lear 35).

Three business jets are currently based at the airport, including one Bae125-800, one Westwind I, and one Beechjet 400A. The locally-based business jet aircraft are included in ADG I; two of the aircraft are included in Approach Category C and one aircraft is included in Category B. **Table 4-2** summarizes the distribution for McNary Field's business jet activity.

Based on FAA operational criteria, the design aircraft must have a minimum of 500 itinerant operations per year. At McNary Field, no single aircraft can meet this operational threshold. However, the collective activity of comparable aircraft types, in addition to the limited transport-category activity, will meet the FAA threshold.

The most demanding aircraft, based on *runway length*, are the group of medium-size business jets, such as the Bae125 and the Westwind I, which are included in Approach Category C and Design Group I. The most demanding aircraft type based on *physical dimensions* (i.e., wingspan), is the large turboprop, represented by the OANG's Shorts Sherpa SD3. The Sherpa is a twin-engine turboprop, with a 74-foot wingspan and a maximum gross takeoff weight of 25,600 pounds. The Sherpa is included in ADG II and Approach Category B. In addition to the Sherpa, the OANG operates a C12, military version of a Beechcraft King Air B200, which is also included in design

group II and approach category B. These two aircraft combine for approximately 200 operations per year. In addition to locally-based aircraft, transient turboprop activity is estimated at approximately 400 operations per year, most of which is included in the B-II category.

Design Standard Conclusions

Based on existing and forecast activity, the current and future design aircraft for McNary Field based on runway length, is a medium-size business jet, represented by the Bae125-800 (C-I). Based on the physical dimensions of the Shorts SD3 Sherpa and other larger turboprop aircraft, Airplane Design Group II is appropriate for that standard. The approach speed and runway length requirements of the Bae125 are greater than the physically larger Shorts Sherpa; accordingly, the higher Approach Category (C) should be used as the standard for those requirements. Therefore, based on existing and projected demand, **Airport Reference Code C-II standards are considered appropriate for Runway 13-31 and ARC B-II for Runway 16-34.**

The runways at McNary Field presently meet most ADG III design standards for Category C aircraft. Where facilities exceed ADG II standards (i.e., runway or taxiway width), an economic evaluation should be made to determine whether downsizing a particular facility is more cost effective than maintaining an existing dimension. In particular, the cost of relocating or replacing edge lighting and drainage systems may make downsizing more costly than maintaining the existing configuration. Runway 16-34 has a width of 140 feet, which exceeds the ADG II standard of 75 feet. However, as noted previously, Runway 16-34 accommodates approximately 70 percent of total air traffic, including a portion of the business jet and large turboprop activity. Therefore, based on existing facilities and air traffic, maintaining a runway width of 100 feet should be considered (C-II width standard).

(Runway Length): British Aerospace 125-800A (representative larger business jet)
Airplane Design Group I, Aircraft Approach Category C
Maximum Gross Takeoff Weight: 27,400 Pounds; 6 Passengers
Runway Length: 6,500 feet*

(Physical Dimensions): Shorts SD3 Sherpa (representative larger turboprop)
Design Group II, Aircraft Approach Category B
Maximum Gross Takeoff Weight: 25,600 Pounds; 30 Passengers
Runway Length: 4,400 feet*

* Balanced Field Length required for MGTW; ISA +15 degrees Celsius, zero wind, zero runway gradient.

Table 4-2
Business Jet Activity Distribution
McNary Field (1995)

Jet Aircraft Activity (Current)	Transient Business Jet		Locally-Based Business Jet	
	Percentage	Operations	Percentage	Operations
ADG I - Approach Category A or B	10%	100	35%	150
ADG I - Approach Category C or D	25%	230	65%	300
ADG II - Approach Category A or B	40%	380	-0-	-0-
ADG II - Approach Category C or D	25%	240	-0-	-0-
Total Business Jet Operations	100%	**950**	100%	**450**

FAR Part 77 Imaginary Surfaces and FAA Airport Design Standards

A summary of applicable FAA airport design standards and FAR Part 77 Surface dimensions is presented in **Table 4-3**. A review of the standards and identification of any existing deficiencies is provided below and at the end of the chapter. Additional dimensional data for Part 77 Surfaces is provided in **Figure 4-1.**

AIRSIDE FACILITIES

Runways

The adequacy of the existing runway system at McNary Field was analyzed from several perspectives including runway orientation, airfield capacity, runway length, and pavement strength. From this information, the requirements of the runway system were determined.

Runway Orientation

As noted earlier, the existing orientation of the two runways at McNary Field provides very good wind coverage, meeting the FAA's desired 95 percent coverage standard for both individual runways and combined. A wind rose analysis is used to determine airport wind coverage. **Figure 3-1,** contained in Chapter Three, depicts the all-weather wind rose for McNary Field. The wind rose indicates that both runways have a high level of wind coverage for both small and large aircraft.

Airfield Capacity

An evaluation of airfield capacity presented earlier in the Chapter, outlined the capacity of the airport at current, intermediate-term, and long-term stages of the planning period. The capacity for individual runways is acceptable.

Runway Length

The determination of the recommended runway length is based primarily upon five factors:

Airport elevation;
Mean maximum daily temperature of the hottest month;
Runway gradient;
Critical aircraft type expected to use the runway; and
Stage length of the longest nonstop trip destination.

For calculating runway length requirements at McNary Field, the airport elevation is **210 feet above mean sea level (MSL)** and the mean maximum temperature of the hottest month is **83.2 degrees Fahrenheit**. The runway gradient on **Runway 13-31 is 0.33 percent; Runway 16-34 is 0.33 percent.**

According to manufacturers data, the representative design aircraft (HS125-800) with a maximum gross takeoff weight of 27,400 pounds, with ISA +15 Centigrade, and zero-wind, would require approximately 6,500 feet for balanced field length. The balanced field length provides an accelerated-stop distance. This is the distance in which the aircraft accelerates to V_1 (decision speed), has a failure of the critical engine, and stops using maximum braking. With an existing runway length of 5,811 feet, aircraft of this type are currently required to reduce fuel or passenger loads, or choose to depart with lower temperatures to meet the balanced field length during hot conditions.

The FAA's **Airport Design Computer Program, Version 4.2c**, provides guidance for runway length requirements, based on local conditions. The primary runway length recommendations listed in **Table 4-4** reflect dry runway conditions. Wet runways with all other conditions being the same, increase distances by approximately 10 to 15 percent for most aircraft.

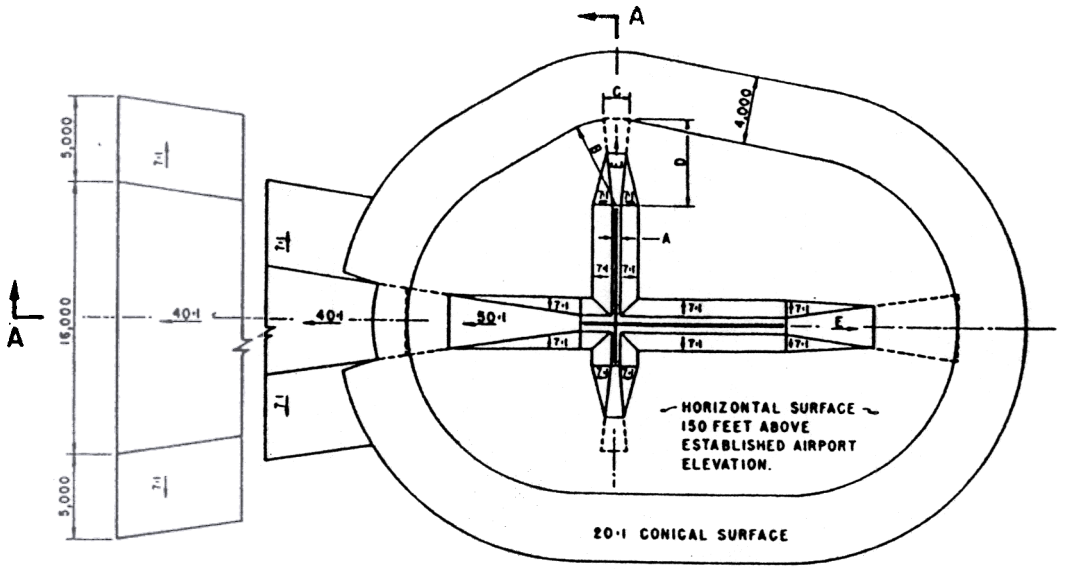
The runway lengths listed in **Table 4-4** provide an indication of the requirements for the entire general aviation fleet. Many aircraft included in the large aircraft category (up to 60,000 pounds) consist of large business jets which often require exceedingly long runways at high elevations or temperatures when operated with heavy loads. Aircraft in this category often experience fuel or payload limitations at airports where they routinely operate. This type of limitation, as experienced throughout the fleet, is reflected in the percentages referenced in the FAA model.

Table 4-3
FAA RUNWAY DIMENSIONAL STANDARDS (in feet)

Item	Runway 13-31		Runway 16-34	
	Existing Dimensions	ADG II App Cat C	Existing Dimensions	ADG II App Cat B
Runway Length	5,811	See Table 4-4	5,145	See Table 4-4
Runway Width	150	100	140	75*
Runway Shoulder Width	10	10	10	10
Runway Safety Area Width	500	500	300	150
Runway Safety Area (length beyond rwy end)	1,000+	1,000	500/700	300
Obstacle-Free Zone (width)	400+	400	400+	250
Obstacle-Free Zone (length beyond rwy end)	200	200	200	200
Object Free Area (width)	600/800+	800	400/600	500
Object Free Area (length beyond rwy end)	900/2000	1000	400/600	300
Primary Surface (width)	1,000	500/1000[2]	500	500
Primary Surface (length beyond rwy end)	200	200	200	200
Runway Centerline to:				
Parallel Taxiway/Taxilane	400	300	300-520	240
Aircraft Parking Area	700	400	580	250
Helicopter Touchdown Pad	400	400	300	400
Taxiway Width	50	35	30	35
Taxiway Shoulder Width	10	10	10	10
Taxiway Safety Area (width)	118	79	79	79
Taxiway Object Free Area (width)	93-150	131	79	131

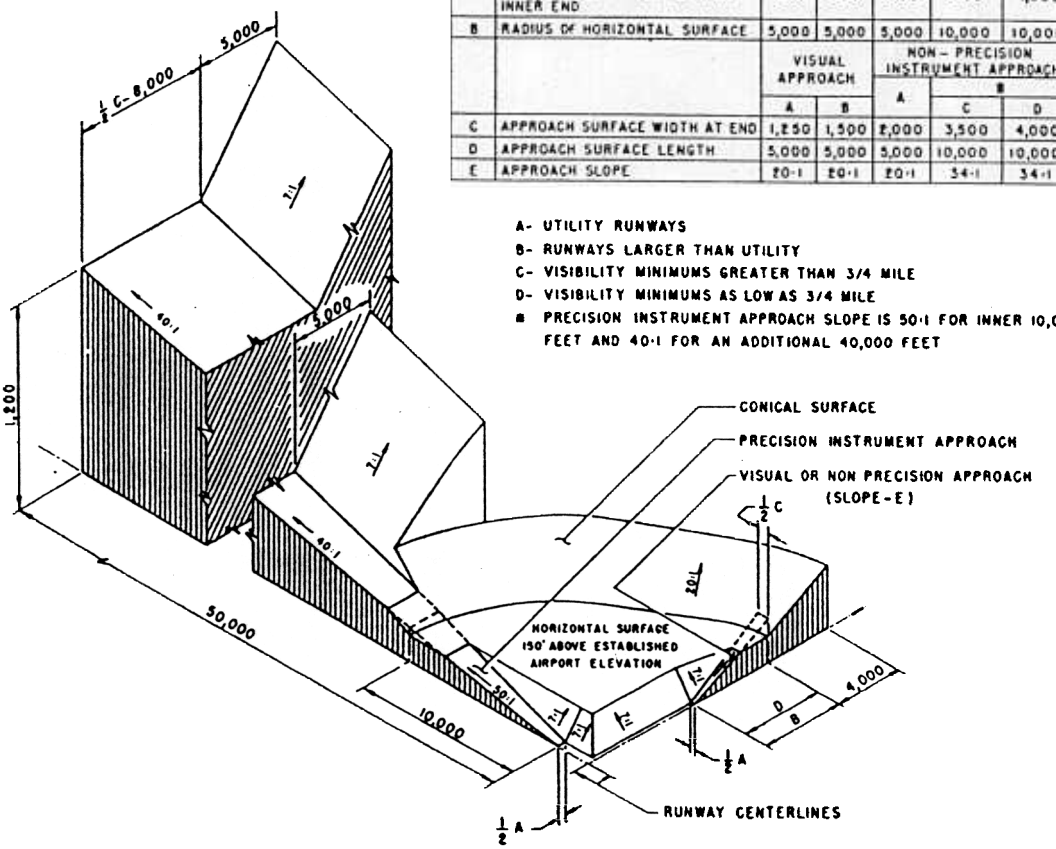
Source: FAA AC 150/5300-13, Change 5. NP/P: Non-Precision/Precision Approach Capabilities. Visibility minimums 3/4 mile or greater

* Runway 16-34 width exceeds ADG II standards for both Approach Category B and C aircraft; maintaining a width of 100 feet should be considered based on runway's use and condition of existing facilities.



DIM	ITEM	DIMENSIONAL STANDARDS (FEET)					
		VISUAL RUNWAY		NON-PRECISION INSTRUMENT RUNWAY			PRECISION INSTRUMENT RUNWAY
		A	B	A	B		
					C	D	
A	WIDTH OF PRIMARY SURFACE AND APPROACH SURFACE WIDTH AT INNER END	250	500	500	500	1,000	1,000
B	RADIUS OF HORIZONTAL SURFACE	5,000	5,000	5,000	10,000	10,000	10,000
		VISUAL APPROACH		NON-PRECISION INSTRUMENT APPROACH			PRECISION INSTRUMENT APPROACH
				A	B		
		A	B		C	D	
C	APPROACH SURFACE WIDTH AT END	1,250	1,500	2,000	3,500	4,000	16,000
D	APPROACH SURFACE LENGTH	5,000	5,000	5,000	10,000	10,000	*
E	APPROACH SLOPE	20:1	20:1	20:1	34:1	34:1	*

A- UTILITY RUNWAYS
B- RUNWAYS LARGER THAN UTILITY
C- VISIBILITY MINIMUMS GREATER THAN 3/4 MILE
D- VISIBILITY MINIMUMS AS LOW AS 3/4 MILE
* PRECISION INSTRUMENT APPROACH SLOPE IS 50:1 FOR INNER 10,000 FEET AND 40:1 FOR AN ADDITIONAL 40,000 FEET



ISOMETRIC VIEW OF SECTION A-A

§ 77.25 CIVIL AIRPORT IMAGINARY SURFACES

FIGURE 4-1

According to the FAA model, Runway 13-31 can accommodate 100 percent of larger aircraft 60,000 pounds or less, at 60 percent of useful load, and approximately 65 to 70 percent of those aircraft operating with a 90 percent useful load. The runway length required (6,440 feet) to accommodate 75 percent of the large airplane fleet (under 60,000#) is comparable to the balanced field length for the Bae 125-800.

Based on these aircraft requirements, combined with the specific needs of the mid-size business jet aircraft, the length of Runway 13-31 at 5,811 feet is adequate to accommodate forecast aircraft requirements under all but the hottest temperature conditions. As noted earlier, the typical design aircraft (HS125-800) has a balanced-field length of 6,500 feet with a full payload of fuel and passengers during periods of high temperatures.

Although not presently identified as a high priority, a runway extension to 6,500 feet may be warranted as activity increases or as operational missions of the design aircraft change.

The recommendations of the previous master plan to extend the runway to accommodate larger transport-category aircraft is not presently required. However, in order to preserve that option for a need which may extend beyond the view of this master plan, it would be appropriate to retain a reserve for that purpose. The previously-identified extension of 1,000 feet, has been reduced to 700 feet for larger business jet requirements; however, retaining an additional 300 feet in reserve would be preserve the long-term option of the full 1,000-foot extension.

As with the previous runway extension recommendation, the south end of the runway has adequate area to accommodate an extension.

Based on the existing demands of the design aircraft type, a 700-foot runway extension option should be reserved at the southern end of Runway 13-31. As noted above, the existing runway length is adequate for the design type aircraft under most conditions. However, high temperatures during the summer months effectively limit passenger and/or fuel loads for these aircraft. The potential need to accommodate larger and more demanding business jets, in addition to specific needs of potential transport category aircraft, which may appear toward the end of the current twenty-year planning period, also justifies that a runway reserve be maintained at the south end of Runway 13-31. The 1,000-foot reserve depicted on the existing airport layout plan would be adequate for this purpose.

Runway & Taxiway Pavements

Runway 13-31 is currently rated at 100,000 pounds single wheel loading (SWL); 122,000 pounds dual wheel loading (DWL); and 185,000 pounds dual tandem wheel loading (DTW). Runway 16-34 is rated at 30,000 pounds SW, DW, and DT. The pavement strength for Runway 13-31 is adequate to accommodate projected use by design aircraft and occasional use by heavier aircraft. The pavement strength listed for Runway 16-34 does not appear to recognize the weight distribution benefits of dual wheel or dual-tandem landing gear configurations.

Table 4-4
FAA Runway Length Requirements
McNary Field

Airport Elevation	210 feet
Mean Daily Maximum Temperature	83.2 F
Maximum Difference in Runway Centerline Elevation	19 feet
Length of Haul for Airplanes of more than 60,000 pounds	500 miles
Dry Runways	
Runway Lengths Recommended for Airport Design	
Small Airplanes with less than 10 seats	
100 percent of these aircraft	3,630 feet
Small Airplanes with 10 or more seats	4,180 feet
Large Airplanes of 60,000 pounds or less	
75 percent of these aircraft at 60% useful load	4,820 feet
75 percent of these aircraft at 90% useful load	**6,440 feet**
100 percent of these aircraft at 60% useful load	**5,380 feet**
100 percent of these aircraft at 90% useful load	7,960 feet
Airplanes of more than 60,000 pounds	5,090 feet

Source FAA AC 150/5325-4A Runway Length Requirements for Airport Design

Calculations of actual weight bearing capacity should be conducted prior to resurfacing; an asphalt overlay on the runway would typically provide an increase in weight bearing capacity, unless problems were known to exist in the base or sub-base. The 1987 Airport Layout Plan indicated a future Runway 16-34 weight bearing capacity of 30,000 pounds single wheel; 60,000 pounds dual wheel; and 100,000 pounds dual tandem. Pavement strengths in this range would be adequate to accommodate projected activity on the runway.

The critical aircraft based on pavement design will be the medium-size business jet, represented by the Bae125-800, which has a maximum gross takeoff weight of 27,400 pounds. As noted in the Design Aircraft section of this chapter, larger business jets account for approximately 800 to 1,000 annual operations.

Other larger aircraft such as the OANG Sherpa (22,900 pounds) also use the airport on a regular basis. The airport also accommodates approximately 100 transport-category operations (DC9-15, B737, etc.) annually, with weights ranging from 100,000 to 115,000 pounds. As noted earlier, Runway 16-34 is limited to aircraft weighing 30,000 pounds or less; the majority of larger aircraft operations occur on Runway 13-31.

The airfield pavements at McNary Field were recently evaluated as part of the Oregon Department of Transportation - Aeronautics statewide aviation system planning program. A pavement condition index (PCI) number was determined for most major sections of pavement on the airfield. With a range of 0 (Failed) to 100 (Excellent), airfield pavement conditions can be compared, and pavement needs can be prioritized. A summary of pavement condition index ratings is presented in **Table 4-5.**

The sections of pavement classified as "Failed" include the apron directly fronting the ODOT hangar (PCI: 5) and one of the South Hangar Area Taxilane 3 (third row from the north end) (PCI: 3). These pavements are not heavily used (as compared to runways, major taxiways, etc.), however, their deterioration has affected their use by tenants. Only one section of pavement was classified "Poor." That section of pavement was a portion of Taxiway F near the Runway 31 threshold. The taxiway pavements range from "Fair" to "Excellent." Runway 13-31 is rated "Excellent" (resurfaced in July 1996) and Runway 16-34 is rated "Good." The aircraft parking aprons are rated "Fair," "Excellent" and "Very Good" for the Main Apron, Mid-Apron, and South Apron, respectively.

Based on this evaluation, it appears that routine crackfilling and sealcoating on Runway 13-31 will be adequate through the planning period. The Runway 16-34 pavement is 11 years old and will require an overlay by the mid-point of the planning period. In the interim, a scheduled program of crackfilling and sealcoating will help extend the useful life of the current pavement.

A regular series of pavement maintenance is recommended for all airfield pavements. Based on the current condition of existing pavements, a general schedule for major and preventative maintenance items is presented in **Table 4-6**. The actual of project timing will depend on the availability of funding. The primary elements are listed, followed by their typical useful life.

TAXIWAYS

Taxiways are constructed primarily to facilitate aircraft movement to and from the runway system. Some taxiways are necessary simply to provide access between apron and runways, while other taxiways become necessary as activity increases and safer and more efficient use of the airfield is needed. The intersecting runway configuration at McNary Field requires a relatively complex taxiway system. Both runways have a primary parallel taxiway and numerous exit taxiways which connect to other taxiways.

Table 4-5
Pavement Condition Summary

Condition	PCI Range	Pavements
Excellent	**85-100**	**Runway 13-31 (100)**; Taxiway B (100); North Taxiway (93); Mid-Apron (87) South Hangar Area Taxilanes 1, 4, 6 (87, 89, 96); Taxiway F (100)
Very Good	**70-85**	South Apron (74); South Hangar Area Taxilane 5 (77); Taxiway H (84) and Taxiway J (73) (east of Taxiway A)
Good	**55-70**	**Runway 16-34 (69)**; Taxiway A (southern section) (67); Taxiway H (66) and Taxiway J (67,65) (east of Taxiway A); Taxiway K (67)
Fair	**40-55**	Taxiway A (north and mid sections) (50); Main Apron (46); Center Apron (48); South Hangar Taxilane 2 (48)
Poor	**25-40**	Taxiway F at Runway 31 threshold
Very Poor	**10-25**	none
Failed	**0-10**	ODOT-Hangar Apron Area (5); South Hangar Taxilane 3 (3)

Runway 13-31 is served by a partial-length parallel taxiway (Taxiway B) located east of the runway. Taxiway B is located 400 feet from runway centerline; a 300-foot separation is provided for the section parallel to the Runway 16 end. Taxiway B has four access taxiways connecting to the runway. Runway 16-34 also intersects Runway 13-31, adjacent to Taxiway N. Taxiway access to Runway 13-31 is very good, particularly with the recent additional of Taxiway B. To access the south end of Runway 13-31 from the east side of the runway, a 900-foot back-taxi on the runway is required. Limitations in this area are dictated by the localizer critical area. Extending Taxiway B to the end of Runway 31 may be possible if the existing instrument landing system (ILS) is decommissioned (replaced by differential GPS). Runway 16-34 is served by a partial-parallel taxiway (Taxiway A) on the west side of the runway. Taxiway A is located 400 feet from runway centerline (Runway 13-31), and varies in separation along Runway 16-34 as is angles toward the runway. Runway 16-34 has six taxiway connections in addition to the Runway 13-31 intersection.

The existing 50- and 60-foot taxiway widths are adequate for ADG II and III aircraft; the design group II standard is 35 feet. The existing runway

separation for the major taxiways (300 and 400 feet) meet or exceed FAA ADG II standards (300 feet) for runways with Aircraft Approach Category C, or Category B with approach visibility minimums lower than 3/4 mile.

Table 4-6
Airfield Pavement Maintenance

Recommended Maintenance Program	Approximate Life Expectancy
Pavement Overlays	15 to 20 years
Sealcoat	6 to 8 years
Cracksealing	3 years

Pavement	Overlay	Sealcoat	Cracksealing
Runway 13-31	2016	2004	3 yr. Cycle
Runway 16-34	2001	1997	3 yr. Cycle
Parallel Taxiways			
A	2005	1999, 2013	3 yr. Cycle
B	2015	2003	3 yr. Cycle
C	2005	2008	3 yr. Cycle
Other Taxiways	*	*	3 yr. Cycle
Main Apron	2006	1998	3 yr. Cycle
Center Apron**	2005**	1997	3 yr. Cycle
South Apron	2004	1998	3 Yr. Cycle

* Maintenance on exit and connecting taxiways should be done as part of related runway, parallel taxiway, or apron projects.

** Apron section in front of ODOT-Aeronautics hangar has failed and requires reconstruction as soon as possible.

AIRFIELD INSTRUMENTATION AND LIGHTING

Navigational Aid (NAVAID) requirements for the airport are based on recommendations contained in FAA Handbook 7031.2B, **Airway Planning Standard Number One**, and FAA Advisory Circular 150/5300-2C, **Airport Design Standards, Site Requirements for Terminal Navigational Facilities**.

NAVAIDS provide guidance to a specific runway or to an airport. Non-precision instrument approaches provide course guidance only; precision approaches also provide descent guidance. The existing instrumentation and lighting systems at McNary Field and those recommended during the current planning period are summarized in **Table 4-7**. NAVAIDS may be categorized as terminal area NAVAIDs, instrument approach NAVAIDS, and visual NAVAIDS.

Terminal Area NAVAIDs

A nondirectional beacon (NDB) is located approximately 3.9 miles southeast of the airport, providing a nonprecision instrument approach to Runway 31, with circle-to-land approaches also authorized for the other runways. The Turno NDB operates on a frequency of 266 Kilohertz (KHz).

The Corvallis VOR/DME, 115.4 Megahertz (MHz), is located approximately 25.6 miles southwest of McNary Field and provides radial intersections in support of other approach procedures at McNary Field.

Instrument Approach NAVAIDs

The existing instrument approach NAVAIDs at McNary Field provide precision approaches and non-precision straight-in approaches to Runways 31 and 13. Runway 31 is served by a Category I Instrument Landing System (ILS), consisting of a glide slope, localizer, middle marker, and outer marker. The approach minimums for the Runway 31 ILS are 200 feet and one-half mile visibility. A back-course localizer is available on Runway 13, and localizer approach (with distance measuring equipment) is also available on Runway 31. The localizer operates on a frequency of 110.3 MHz. Runway 31 also has LOC/DME and an NDB/GPS approach. A standard instrument departure (SID) is available from all runways at McNary Field.

The FAA plans to begin certifying Category I precision GPS approaches in 1997. The FAA is also evaluating the capability of GPS to meet the more stringent Category II and III approach requirements. Based on the success of the GPS program, the FAA recently identified a plan to decommission all ground-based navigational aid systems within the next twenty years. The ILS approach on Runway 31 provides a well-established procedure to build a comparable GPS approach. It is expected that most airports will continue to operate ILS approaches side-by-side with GPS approaches until GPS becomes the widely-used standard.

The FAA may also consider adding a precision GPS approach for Runway 13 within the planning period.

Visual NAVAIDs

Visual approach slope indicators (VASI) are located on runways to provide visual descent guidance to pilots when approaching a runway. Runways 16, 34, and 13 are equipped with VASI systems. Replacement of the existing VASI units with precision approach path indicators (PAPI) is recommended when the VASIs reach the end of their useful life. Runway end identifier lights (REIL's) provide rapid and positive identification of the approach end of the runway. REIL's should be considered for all lighted runways not equipped with an approach light system (Runways 16 and 34).

The medium intensity approach light system (MALS) with runway alignment indicator lights (RAIL) for Runway 31 is standard for runways equipped with Category I approaches. The MALS-R lighting system is configured to provide a series of center light bars, with sequenced flashing lights and runway alignment indicator lights and green threshold marking lights. The MALS-R extends 2,400 feet, including 1,000 feet of runway alignment indicator lights.

The omnidirectional approach light system (ODALS) located on Runway 31 is a series of sequenced flashing lights, which extends 1,500 feet beyond the runway threshold. The space available beyond the runway end and the instrument approach requirements for that runway, dictate the type of approach lighting system required. The approach capabilities for Runway 13 are limited in part by the location of roadways and structures within the approach surface. The ODALS is adequate for existing and projected use. A standard MALS without RAIL (1,400 feet) could also be installed on Runway 13, if an upgrade was required.

Runway & Taxiway Lighting

Runway 13-31 is equipped with high-intensity edge lighting (HIRL). The lighting is standard for precision instrument, commercial service runways. Runway 16-34 is equipped with medium-intensity runway lighting (MIRL). The MIRL system on Runway 16-34 is considered adequate based on its existing use. Medium-intensity taxiway lighting (MITL) are in place on most taxiways and should be planned for any new taxiways. The airport recently completed a major signage project which meets FAA standards for daytime and nighttime operations.

AIR CARGO

Air cargo activity at McNary Field includes express carriers such as Sports Air Travel with Cessna 402 aircraft. Sports Air is the contract carrier for United Parcel Service (UPS). Ground operations for Sports Air are accommodated in the area adjacent to II Morrow, which is a UPS company. Other cargo or express activity is accommodated on one of the west-side apron areas. The overall underutilization of the west side apron areas provides ample area in which to accommodate future air cargo operations areas. Landside areas should also be reserved for potential air cargo facility development.

Table 4-7
Navigational Aid Requirements

Runway	Existing	Future
13	HIRL, LOC (BC), NDB, VOR,ODALS, VASI	**GPS**, HIRL, (LOC-BC, NDB, VOR), ODALS, **PAPI**
31	HIRL, ILS, DME, NDB, GPS, MALS-R	HIRL, (ILS, DME, NDB), **GPS {Precision}**, MALS-R
16	MIRL, VASI	MIRL, **REIL, PAPI, GPS**
34	MIRL, VASI	MIRL, **REIL, PAPI, GPS**

note: New or upgraded items listed in **bold**; items expected to be decommissioned listed in (parenthesis).

Abbreviations

HIRL - High Intensity Runway Lights
REIL - Runway End Identifier Lights
PAPI - Precision Approach Path Indicators
GPS - Global Positioning System
VOR - Very High Frequency Omni-Directional Equipment
MALSR - Medium Intensity Approach Light System w/ Runway Alignment Indicator (RAIL)
MIRL - Medium Intensity Runway Lights
VASI - Visual Approach Slope Indicators
ILS - Instrument Landing System
NDB - Nondirectional Beacon
DME - Distance Measuring Equipment

The existing level of intermodal movement of freight at McNary Field is significant, particularly with FedEx. The airport's convenient access to Interstate 5, coupled with available land for industrial development, may be a factor in attracting other freight carriers. These operators may or may not require airside access, although some reserve areas should be retained for cargo-related development.

GENERAL AVIATION REQUIREMENTS

The purpose of this section is to determine the space requirements during the planning period for the following types of facilities normally associated with general aviation terminal areas:

- Hangars
- Local and Itinerant Ramp

HANGARS

In Summer 1996, approximately 163 general aviation aircraft were based at McNary Field. The majority (80%+) of aircraft are stored in hangars. It is anticipated that the current level of hangar utilization will continue during the planning period. With the exception of the Oregon Army National Guard facilities located on the east side of the airport, all other hangars are located on the west side of the airport. The airport has three primary hangar areas:

The **north hangar area** extends from FedEx to near the north end of Runway 13-31 and currently has 21 hangars of varying sizes, accommodating up to 40 aircraft. The northern portion of this development has seven taxilanes which access eight hangar rows. There are only four undeveloped hangar lots with existing taxiway access currently available in the north hangar area. The hangar rows located directly adjacent to the FedEx facility are fully occupied. An area located between the hangar developments is relatively undeveloped and has been previously identified as a hangar expansion area. The primary improvements required to utilize this site would be taxiway access and vehicle access/parking. The existing roadway and gate located north of the FedEx building could be used to provide access to additional hangars, although this area is increasingly used for employee vehicle parking.

The **south hangar area** is located near the south end of Runway 16-34, with approximately 42 conventional hangars and T-hangars of varying sizes. The south hangar area is filled to capacity, although several of the structures appear to be reaching the end of their design life. Future redevelopment of hangars within these rows will likely occur as building owners wish to upgrade facilities. In the event that future improvements are made, it is assumed that aircraft currently stored in hangars will be located in the new hangars with only a minor increase in capacity.

The **central hangar area** west of the main apron, accommodates several large commercial-use hangars and six conventional hangars located west of the Salem Air Center facilities. The central hangar area could currently accommodate one smaller conventional hangar immediately west of the Salem Air Center auto parking area. Future hangar construction in this area would require some reconfiguration of existing facilities in addition to providing new taxiway connections.

Some undeveloped land exists between SE 25th Avenue and existing hangars facing the central apron. The primary constraint for this site is providing airside access to the runway-taxiway system. Another factor which may affect development of this area, is the long-term status of the airport restaurant building. Based on the building's apparent deficiencies, the City of Salem will need to make a decision regarding the cost-benefit of upgrading the structure. Potential redevelopment of that site could significantly affect hangar development options for the area.

It appears the forecast increase in based aircraft will require hangar development areas which exceed those currently available on the west side of the

airfield. Adequate land areas will need to be identified and reserved for future construction of aircraft hangars, when they are required. It is assumed that the overall percentage of aircraft being stored in hangars will remain at current levels.

Following a determination of the number of based aircraft which would utilize hangars, it is necessary to estimate the preference for conventional hangars or T-hangars. Larger conventional hangars often accommodate more than one aircraft. In addition to aircraft storage, conventional hangars are also used by fixed based operation maintenance, speciality shops, and aircraft manufacturing shops. T-hangars are popular with many aircraft owners based on the ability to rent hangar space, and to maintain some privacy and security for individual aircraft and equipment.

For planning purposes, it is assumed that all rotor, turboprop, and jet aircraft based at the airport will be stored in conventional hangars, while approximately 70 percent of the new based single-engine aircraft to be hangared will use conventional hangars, with 30 percent preferring T-hangar space. An aircraft owner's choice of hangar type is often driven by market factors such as availability and price. Most of the hangars constructed at McNary Field during the last ten years have been conventional hangars.

The final step in the process of determining hangar requirements involves estimating the area necessary to accommodate the required hangar space. A planning standard of 1,050 square feet per based aircraft stored in T-Hangars was used. For conventional hangars, a standard of 1,000 square feet for single-engine, multi-engine, and rotor aircraft was used; 2,000 square feet was used for turboprop and jet aircraft. These figures are applied to the projected number aircraft to be hangared to determine the area to be devoted to hangar facility requirements during the planning period. Table 4-9 indicates that more T-hangar and conventional hangar space will be required during the planning period. Although individual tenants may desire to construct private conventional hangars, the potential relocation of aircraft to new T-hangar facilities should provide some additional capacity for larger aircraft storage in existing facilities.

LOCAL AND ITINERANT APRON

Aircraft parking apron should be provided for locally-based aircraft which are not stored in hangars, and transient aircraft visiting the airport. Currently, more than 80 percent of locally-based aircraft at McNary Field are stored in hangars; the percentage of non-hangared based aircraft is not expected to increase significantly during the planning period.

Table 4-9
Airport Hangar Requirements

Based Aircraft	Existing	2000	2005	2010	2015
Single-Engine	141	153	160	169	180
Multi-Engine	17	18	19	22	27
Business Jet	3	4	6	6	9
Rotorcraft	1	2	4	4	4
Other	1	1	2	2	2
Total	163	178	191	203	222
Aircraft To Be Hangared					
Single-Engine	n/a	117	122	128	136
Multi-Engine	n/a	18	19	22	27
Business Jet	n/a	4	6	6	9
Rotorcraft	n/a	2	4	4	4
Other	n/a	1	2	2	2
Total Hangar Positions	100-130	142	153	162	178

The general aviation aircraft parking apron is located south of the terminal apron. The paved apron is located adjacent to the airport restaurant and Salem Air Center, and is used by based and transient aircraft. The apron has approximately 150 designated aircraft tiedowns.

FAA Advisory Circular 150/5300-13 suggests a methodology by which itinerant parking requirements can be determined from knowledge of busy-day operations. At McNary Field, the number of itinerant spaces was determined to be approximately 15 percent of busy day itinerant operations. FAA planning criterion of 360 square yards per peak itinerant aircraft was applied to the number of itinerant spaces to determine future itinerant ramp requirements. Based aircraft tiedowns were planned at 300 square yards per aircraft. The results of this analysis are presented in **Table 4-10.** As noted, the existing apron area exceeds long-term aircraft parking requirements.

Table 4-10
General Aviation Apron/Tiedown Requirements

Aircraft Tiedowns	Existing	2000	2005	2010	2015
Itinerant @ 360sy	n/a	53	56	59	65
Based @ 300 sy	n/a	35	37	41	44
Corporate @ 1000 sy	n/a	2	4	5	6
Rotorcraft at 700 sy	n/a	2	2	4	4
Total	150+	92	99	109	119
Apron Area (sq.yds)	80,000+-	32,980	36,560	41,340	45,400

Based on the overall availability of apron area, reconfiguration options may be considered to provide more efficient corporate aircraft loading/unloading and parking, and itinerant helicopter parking positions. Some interest also exists to have a common-use general aviation terminal for business aviation users.

SUPPORT FACILITIES

Various facilities that do not fall within airfield, terminal, or general aviation requirements include:

- *Airport Rescue and Firefighting (ARFF)*
- *Fuel Storage*
- *Utilities*
- *Fencing*

AIRPORT RESCUE AND FIRE FIGHTING (ARFF)

Requirements for Airport Rescue and Firefighting (ARFF) services at the airport are established under **Code of Federal Regulations 14, Part 139**. FAR Part 139.315 establishes an ARFF index based on the frequency of scheduled air carrier flights with specific types of aircraft. McNary Field currently has an "Index A" certificate based on passenger service being provided with aircraft having more than 30 seats, but less than **90 feet long.** The existing equipment at the airport is capable of meeting Index A standards. The index requires the use and maintenance of specific types of equipment and qualified personnel to operate the equipment.

The ARFF facilities at McNary Field meet FAA equipment and response requirements under FAR Part 139. No significant upgrading or expansion of

the airport's ARFF equipment is required under current regulations.

FUEL STORAGE

Fuel storage facilities at McNary Field maintained by the fixed base operator (FBO) include 15,000 gallons of Jet A-50 and 23,300 gallons of AVGAS. The fuel storage facilities on the airport are privately owned. Fuel storage requirements vary based on individual supplies and distributor policies. The fuel distributor for Salem Air Center is Valley Oil, based in Salem. By providing same-day service, it is not necessary for the FBO to maintain large storage capacity. In the event that a second FBO/fuel retailer operated at the airport, they would have similar storage requirements. However, it is unlikely that a second fuel sales operation would be serviced by the local fuel distributor, requiring more time between deliveries.

Fuel sales at McNary Field in 1995 totaled approximately 300,000 gallons of Aviation Gasoline (AVGAS) and Jet Fuel. An analysis of fuel sales indicated that an average of 5.2 gallons of aviation fuel was sold per operation. The Oregon Army National Guard maintains its own fueling facilities and does not pay airport fuel flowage fees. In addition, several corporate users maintain their own fuel storage on the field.

Over the course of the planning period fuel consumption will fluctuate as operations increase in frequency, and as changes in aircraft mix occur. **Table 4-11** depicts the fuel storage requirements needed to maintain a two-week supply at McNary Field during the planning period. As noted earlier, fuel concessionaires that are able to operate with less inventory, will require smaller storage capacities

AIRPORT UTILITIES

The existing utilities serving the west and east side of the airport are generally considered to have adequate capacity to accommodate facility expansion. However, potential development of new facilities on the airport may require extension of electric, water and possibly sewer connections to new facilities. The southern end of the airport has been previously identified for potential industrial development; utilities in this area are limited and extensions of service would be required. Actual utility needs will be determined by the location and type of development on the airport. At a minimum, water and electrical line extensions are desired for hangar areas; full industrial facilities typically require greater capacity, in addition to natural gas, sewer, and telecommunication fiber-optic links.

AIRPORT FENCING

The existing fencing on the airport consists of chain link perimeter fencing located around the active airfield areas. Controlled access security fencing is also located in the terminal area. Development of new aviation and/or non-aviation related facilities on the eastern and southern sides of the airport may require additional fencing in order to maintain adequate overall security. It will also be important to physically separate aviation and non-aviation operational areas on the airport.

Table 4-11
Fuel Storage Requirements

Fuel Grade	Current Storage	Storage Requirements 2005	Storage Requirements 2015
AVGAS	23,300 gal.	14,600 gal.	17,000 gal.
Jet A	15,000 gal.	9,700 gal.	11,400 gal.
Total	38,300 gal.	24,300 gal.	28,400 gal.

Two Week - Peak Month Supply (Gallons)

ACCESS ROADWAYS

As described in the Inventory Chapter, the majority of aviation related development at McNary Field is located on the west side of the runways. The Oregon Army National Guard (OANG) and II Morrow are currently the only aircraft-related tenants located on the east side of the airport.

Vehicle access to the west side of the airport, including the terminal area, is provided by SE 25th Street, which runs along the entire western edge of the airport. SE 25th Street is currently configured with two lanes in each direction from Mission Street/Highway 22 to the airport entrance roadway.

The existing right-of- way along 25th appears to be 50 to 60 feet wide, until reaching the airport access roadway and Madrona Street, where the road narrows. In order to accommodate two travel lanes and a center turn lane, the right of way would require expansion. An 80-foot right-of-way would accommodate one traffic lane (12 feet each) in each direction and a center turn lane (14 feet), with a bicycle lane (6 feet), landscape strip (6 feet), a sidewalk (8 feet), and one-foot setback on each side of the roadway. Providing two travel lanes in each direction combined with a center turn lane would increase the roadway section from 38 feet to 62 feet. Space constraints may dictate whether sidewalks, bicycle lanes and landscaping can be accommodated on the roadway.

SE 25th Street, Madrona, and Airport Road meet in a three-way unsignalized intersection, with a three-way stop at the airport entrance. The southbound right lane on 25th is a turn-only lane on to Madrona, without a stop. All traffic at the intersection except the right turning southbound traffic on 25th Street must stop. However, during heavy traffic levels, it is difficult to see approaching vehicles without entering the intersection when exiting the airport on Madrona.

As traffic volumes increase in the area, this intersection may require signalization. In the event that commercial air service resumes at Salem, or retail-related development occurred on the airport, the movement of vehicles in the area would also increase.

The hourly capacities of SE 25th Street and Turner Road are expected to be adequate to accommodate projected passenger increases and other airport-related activity during the planning period. However, as activity increases, improvements in roadway efficiency and signage may be warranted.

Note: The City of Salem has indicated that the Madrona-SE 25th Avenue intersection may be reconfigured during the current twenty year planning period. As part of the reconfiguration, the existing access to the terminal area from the intersection would be eliminated and all access provided from roadway which passes in front of FedEx.

AIRPORT PROPERTY

The existing airport property appears to be adequate to accommodate existing, short-term, and long-term aviation needs. In addition to accommodating long-term aviation facility requirements, McNary Field also has adequate land area remaining to accommodate aviation-related and non-aviation land uses. As part of this study, undeveloped airport land areas have been evaluated for their potential development and revenue generation for the airport. A detailed description of these analyses will be provided in a supplemental document, however, it appears that adequate land area within airport property boundaries has the ability to accommodate project aviation and non-aviation demands. The suitability of existing zoning will also be evaluated based on proposed development alternatives. Currently, a large portion of the south end of the airport is zoned IP - Industrial Park.

Scope of work item 4.2, identified a need to examine the feasibility of acquiring property immediately northeast of the airport. The parcel is bordered by Mission Street to the north and Turner Road to the west. The 69 acre parcel is currently listed for sale at $6.99 million. The site consists of approximately 34 buildable acres and a lake/gravel pit, which is approximately 35 acres. The land is zoned IC - Industrial Commercial. From an airport development perspective, the property has limited potential because of its physical separation from the airport by Turner Road. Because the lake/gravel pit provides habitat for migratory waterfowl, a significant bird attraction hazard exists.

It is not known whether draining the lake is feasible, although potential developers apparently do not plan to do so. Aside from possibly eliminating or reducing the bird attraction, the most likely use of the property by the airport would be revenue generation through some non-aviation activities. However, the market value of the property appears to make acquisition unfeasible.

Section II - TERMINAL AREA REQUIREMENTS

Terminal area facility requirements include terminal apron areas, terminal building, curbside areas, circulation roadways, vehicle parking, and terminal area access roads.

As noted in the Forecast Chapter, McNary Field accommodates a limited amount of commercial charter activity, which presently accounts for less than 3,000 enplanements per year. In addition, Hut Airport Shuttle, located in the terminal, presently handles between 15,000 and 18,000 boardings per year. For facility planning purposes, it is appropriate to consider all passengers, regardless of the transportation mode used.

It is estimated that peak month passenger levels occur during the summer season and during the holidays. Peak month is estimated at 15 to 18 percent of total passengers. With current annual passenger "enplanements" estimated at 20,000, peak month activity would be 3,600. Design day enplanements would be 120; Busy day enplanements are estimated at 250. This peak reflects the scheduling of two gaming charter flights on the same day, coupled with a peak level of shuttle passengers.

As noted earlier, a true evaluation of terminal building needs at McNary Field cannot be limited to air carrier passengers only. The single largest share of passenger activity at the airport is currently associated with Hut Shuttle. Although these passengers are not included in official FAA enplanements counts, they do represent the level of activity for which terminal planning should be based. Under current FAA funding guidelines, improvements made to the terminal to accommodate non-aviation passengers would not be eligible for FAA participation. However, due to the building's role as an intermodal facility, alternative federal, state, or local transportation funding should be pursued, as needed.

With annual "enplanements" in the 15,000 to 20,000 range, the needs of the terminal building are basic. The existing building has adequate capacity in most areas to accommodate current and increased activity. Based on total passenger levels, McNary Field would be included in the nonhub category; therefore, the standards and area requirements for nonhub airports will be used. It is also recognized that demand for several of the aviation-related facilities (i.e., gate positions, security areas, etc.) will not be based on non-aviation passenger totals.

FAA Design Standards

Four classifications are used to determine the designation of hub and nonhub airports. By definition, a **nonhub** airport is served by scheduled airlines and provides service to a geographic area which produces less than 0.05 percent of the U.S. annual enplanement levels. Based on 1995 traffic data, nonhub airports had less than 292,822 enplanements.

The requirements for various terminal components were evaluated based on planning guidelines presented in AC 150/5360-9, **Planning and Design**

of Airport Terminal Facilities at Nonhub Locations. The methodology used in the analysis involves the existing and forecast peak hour and annual passenger demands and a comparison with existing facilities. This analysis provided general guidance in determining space requirements and any specific deficiencies in the existing terminal building. The purpose of this section is to determine the landside facility requirements for the following types of facilities:

- *Gate and Ramp Positions*
- *Departure Lounges*
- *Security*
- *Airline Ticket Counters/Support*
- *Ticket and Waiting Lobby*
- *Baggage Claim*
- *Terminal Services*

Based on existing and forecast passenger activity, requirements for these facilities were determined. It should be noted, however, that the advisory circular (AC) provides general guidelines for sizing building areas and facilities. When evaluating space requirements, the primary activity indicators are annual enplanements, total peak hour passengers (combined enplaning and deplaning passengers), and peak hour enplaned or deplaned passengers. In most cases, the existing and projected levels of these activities at McNary Field fall at the low end of the planning graphs contained in the AC. For example, annual enplanements are measured from 0 to 250,000; however, the portion of the graph providing sizing guidance begins at approximately 25,000.

The general terminal facilities sizing criteria may understate the needs of McNary Field in certain areas. This analysis will review the recommended minimums, and where appropriate, identify specific areas where additional space may be warranted. General space requirements based on annual enplanement thresholds of 25,000 and 50,000 are also included for purposes of comparison. It is evident that the guidelines differ within various functional areas. Therefore, by estimating the total building size, the area needed for individual areas can be determined.

Existing Terminal Building

The existing terminal building has basic layouts for passenger waiting, ticketing, security, baggage claim, and circulation. Rest rooms, vending areas, telephones, and office space are also provided. Total building area is approximately 4,000 square feet. Based on the existing level of passenger activity, it is estimated that the existing building will be adequate through the majority of the planning period. In the event that air carrier service was resumed at the airport, the building may require expansion or renovation, depending on the level of non-aviation activity.

Recent improvements in building and restroom access have been completed in accordance to the requirements contained in the Americans with Disabilities Act (ADA).

GATES AND RAMP POSITIONS

The terminal has one gate position available for passenger enplaning and deplaning. Outbound passengers enter the secured gate area after passing through a single security station. A secured entrance and passage area (approximately 100 square feet) segregates arriving and departing passengers. The arriving passengers are routed through doors which bypass the security gate. The airline gate is at ground level and with passengers boarding from the secured area in the terminal. Passengers arriving or departing from the terminal walk across the apron between the aircraft and terminal; for the outer parking positions, the walking distance varies from 50 to 300 feet. No protection is provided against weather for enplaning and deplaning passengers.

The terminal apron is approximately 300 feet by 700 feet (23,300 sy), with four air carrier parking positions. The area can accommodate four B737 or DC9 type aircraft or numerous small aircraft. The ramp positions have adequate space between parked aircraft for maneuvering, clearance, and ground service vehicles. The taxi lead-in lines for the ramps positions are spaced at 175 feet.

The current distribution of scheduled passenger service provides adequate separation between arriving and departing passengers. Generally, this results in only one or two aircraft on the ramp at any time.

DEPARTURE LOUNGES

Departure lounge requirements depend on the number, seating capacity, and boarding load factor of the aircraft to be served during peak periods. In addition, provisions for ticket agent positions and their associated queuing areas at the gates must also be factored into overall area requirements. The current terminal building configuration provides a single secured airport terminal departure lounge (approximately 900 square feet). A single security checkpoint and exit to the baggage claim area is provided.

Future area requirements for departure lounges will be dictated by growth in activity during peak periods. The current area will be adequate during the short-term, although expansion of seating area would be needed later in the planning period if annual passenger levels exceed 30,000.

TICKET AND WAITING LOBBY

Public lobby areas include ticket and waiting lobbies. Passenger queuing areas for ticketing should be planned to be 15 to 20 feet deep with additional room for lateral circulation. The existing configuration of the terminal building provides 8-12 feet of area for ticket counter queuing and circulation. The location of the ticket counter in relation to the front entrance and passenger circulation paths, could create some congestion as passenger volumes increase.

AIRLINE TICKET COUNTER/SUPPORT

Airline support space includes area for airline offices, outbound baggage facilities, and operations and maintenance. In addition, the most visible space for an airline is the ticket counter area. Space requirements are based on the number of airlines, the size of the aircraft utilized by each airline, and peak hour operations. At McNary Field, the existing ticket counter space is leased to Hut Shuttle.

Based on general planning standards, the available ticket counter is adequate to accommodate existing and short-term activity levels. The requirement to expand ticket counter is anticipated later in the planning period, or if a scheduled air carrier serves McNary Field. The airline operations area would also require some expansion/reconfiguration later in the planning period.

SECURITY

Security requirements were examined based on current screening procedures: one screening point with one magnetometer at the entrance to the departure lounge. The capacity for a single unit or station is adequate to accommodate forecast peak period passenger demand through the planning period. The existing passenger screening equipment is owned by the airport. If scheduled service was resumed, arrangements would need to be made by the carrier to provide screening equipment or share existing equipment. A reconfiguration of the security area may be required, unless a common-use screening area is provided.

While a single security check point will be adequate to accommodate projected demand levels, the configuration of the security area and passenger waiting areas may require some changes if congestion begins to occur. The close proximity of the screening area, arriving passenger gate, and baggage claim area will contribute to congestion as passenger volumes increase.

BAGGAGE CLAIM

The terminal has one 8-foot baggage claim shelf located adjacent to the arriving passenger gate. This type of device is adequate for smaller aircraft flights, however, it can quickly become overloaded as passenger levels increase. The location of the shelf will not allow for significant expansion or installation of a conveyer device.

TERMINAL SERVICES

Terminal services include passenger and visitor-oriented amenities, concessions, and services other than those provided by carriers. The lobby supports vending areas, public telephones, and visitor displays.

Planning for rental car concessions would accompany a resumption of scheduled air service. Rental car operational area and counter space would be incorporated into expansion or reconfiguration of the air carrier ticket counter and baggage claim area.

Public restrooms (approximately 330 sf) in the terminal area appear to be adequate for current needs. The recommended space for public

restrooms varies considerably; expansion of the restrooms may be needed as passenger volumes increase during the planning period.

GROUND ACCESS REQUIREMENTS

Access system facility requirements, based upon demand/capacity relationships, were developed for the access roadway, terminal curb frontage, and vehicle parking components. The specific requirements of each component are described in the following sections.

TERMINAL ACCESS ROADWAY

The demand-capacity analysis conducted in the last chapter indicated that access roadway capacity would be adequate for the planning period. Airport Way has adequate capacity to accommodate the airport's future demands. The installation of dedicated turn lanes and/or signalization leading into the terminal entrance would improve safety and convenience. The potential development of commercial/retail businesses along SE 25th/Airport Way (west of the terminal access roadway) would also increase the need to provide a median or turn lanes for turns against the on-coming traffic.

The existing terminal access features two-lane traffic on Airport Way, which connects to SE 25th Street. At the terminal curbside, there is one lane for vehicle loading and unloading and one thru lane with a circular turnaround.

TERMINAL CURB FRONTAGE

The curb element is the interface between the terminal building and the surface transportation system. The length of the curb required for loading and unloading of passengers and baggage is determined by the type and volume ground vehicles anticipated during the peak period of the design day. The curb sidewalk area should be a minimum of 8 to 10 feet wide to allow for passenger loading/unloading from automobiles without blocking passenger flow.

The existing terminal curbside area is presently used for loading/unloading of Hut passengers and charter flight passengers. The circular loop provides approximately 70 feet of curbside frontage.

The length of the curbside area is generally adequate to accommodate existing and projected activity during the planning period. However, providing additional length and depth to the existing curbside area and additional traffic lanes as part of a terminal building expansion or reconfiguration would accommodate additional long term needs.

The primary entrance to the terminal is located at the ticket counter lobby. The area has doorways entering the lobby from the curb. Arriving passengers also use the central entry for exiting to the curbside and parking areas.

TERMINAL AREA VEHICLE PARKING

Vehicle parking in the airport terminal area includes public short/long-term parking, employee parking, and space for rental car parking. The north parking area has approximately 90 paved spaces available for passenger parking. The south parking area accommodates employee and terminal building tenant parking with approximately 30 spaces; Hut Shuttle uses several spaces on the southern-most row for van parking.

A gravel-surfaced area located directly opposite the terminal building is used for overflow parking with space for approximately 80 vehicles. The three primary vehicle parking areas have a combined capacity of approximately 210 vehicles.

Parking needs can be estimated in variety of ways. According to the planning guidelines contained in AC 150/5360-9, an airport with 25,000 enplanements would require 50 spaces, with an additional 10 to 15 for rental car and employee parking. At current activity levels (less than 20,000 enplanements), the existing public parking area (80 paved spaces) often nears capacity and the overflow parking area is used.

A planning standard of 350 square feet per parking space provides adequate parking and circulation area. Based on existing parking availability and anticipated growth in passenger levels, 100 to 150 parking spaces would be required during the planning period. Existing parking capacity is approximately 130 paved and 80+ gravel surfaced in the immediate terminal area. Existing capacity appears to be adequate for current and foreseeable demands. As parking demands increase, paving the overflow parking area may be desired. Additional parking development reserves should also be identified in the event that parking demands exceed expectations. The FAA planning guidelines indicate that at 50,000 annual enplanements, 130 to 150 spaces would be adequate to accommodate public, rental car, and terminal area employee requirements.

Summary (Terminal Area)

The existing terminal building has approximately 4,800 square feet. The FAA-recommended standards for building area, based on enplanement thresholds of 25,000 and 50,000, are approximately 6,500 and 10,000 square feet respectively. Based on current activity levels, the existing building will be adequate. It is also noted that the terminal accommodated more than 15,000 annual passenger enplanements during the late 1970's. Current Hut Shuttle passenger activity is comparable, although some terminal facilities such as security and boarding areas do not experience the same level of use.

A terminal area reserve should be established which would permit an initial expansion of the building to 8,000-12,000 square feet, with additional area for long-term expansion. The terminal reserve should also accommodate increased vehicle parking, access roadway, and curbside requirements, which would be associated with a re-introduction of scheduled commercial air service.

Section III - FAR Part 77 and FAA Design Standards Evaluation

The 1987 Approach and Clear Zone Plan (Devco) depicts FAR Part 77 Imaginary Surfaces, including detailed plan and profile views of the runway approach surfaces. The drawing depicts no obstructions within the approaches, but shows terrain penetrations south and west of the airport.

For purposes of evaluating airspace obstructions, the *Airport Obstruction Chart* (AOC), prepared by the U.S. National Ocean Survey (NOS) in February 1993, reflects the current airfield configuration and an updated listing of obstructions. The AOC identifies obstructions in the vicinity of the airport, with additional detail provided for the approach surfaces for each runway. The area surrounding the airport, which would comprise the outer portions of the FAR Part 77 Imaginary Surfaces (i.e. Horizontal Surface, Conical Surface), have a large number of penetrations noted. The majority of the penetrations are trees; other penetrations to the outer surfaces include obstruction lights of nearby towers, antennae, other poles, and terrain. Areas of terrain penetration are identified south and west of the airport, particularly the southwest quadrant.

FAR Part 77 - Imaginary Surfaces

Federal Air Regulation (FAR) Part 77, Objects Affecting Navigable Airspace, serves as the primary guide in establishing the boundaries of protected airspace in the immediate vicinity of runways. These "imaginary surfaces" represent three-dimensional planes which beginning from the ground surface, form an area of clear, unobstructed airspace. The primary objective of clearing the immediate airspace is to provide for the safe flight of aircraft near the surface, during arrival and departure, and when circling in the vicinity of a runway, such as in the traffic pattern. The criteria described in Part 77 provide standards for all civil and military airports. Specific criteria are determined by the category of runway (utility, other than utility) and type of approach (visual, non-precision, precision) for each runway or runway end. **Runways 13-31 and 16-34 are categorized as "other than utility" runways based on their ability to accommodate aircraft weighing over 12,500 pounds. Runway 13-31 has precision and nonprecision approaches; Runway 16-34 has visual approaches.**

FAR Part 77.25 - Civil Airport Imaginary Surfaces, provides definitions of the applicable airspace imaginary surfaces used at civil airports. The imaginary surfaces include the following:

- ***Runway Approach Surface***
- ***Transitional Surface***
- ***Horizontal Surface***
- ***Conical Surface***
- ***Primary Surface***

Each airspace surface has prescribed dimensions and slopes which correspond to the category of runway and the most demanding approach (i.e., precision, non-precision, visual) existing or planned for the runway. An oblique view of standard Part 77 airport imaginary surfaces was depicted earlier in **Figure 4-1.**

Runway Approach Surfaces

FAR 77.25 defines Approach Surface as: *"A surface longitudinally centered on the extended runway centerline and extending outward and upward from each end of the primary surface. An approach surface is applied to each end of a runway based on the type of approach available or planned for that runway end. The inner edge of the approach surface is the same width as the primary surface and it expands uniformly to the prescribed outer width and length of the surface...The outer width of an approach surface to an end of a runway will be that width prescribed in this subsection for the most precise approach existing or planned for that runway end."*

The runway protection zone (RPZ) boundaries generally coincide with the inner portions of the approach surface boundaries. The approach surfaces continue with the same taper angle until reaching the horizontal surface elevation or intercepting the outer radius for the horizontal surface. The approach surface begins at the end of the primary surface, which extends 200 feet beyond the end of a hard surfaced runway. The approach transitional surface extends from the FAR Part 77 approach surface. The dimensions and recommended slope for RPZ's are defined in FAA Advisory Circular 150/5300-13.

***Runway 13-31*:**

The precision approach surface (50:1/40:1) for Runway 31 has twelve (12) obstructions noted, ten of which are trees. Four of the obstructions are located between I-5 and the runway end, while three of the obstructions are located more than 14,000 feet from the runway end. Among the four closest obstructions, three are identified as trees, with elevations ranging from 252 to 319 feet mean sea level (MSL); the fourth close-in obstruction is identified as a rod/obstruction light on glideslope building. Beyond I-5, five trees are identified with elevations ranging from 310 to 329 feet at a distance of 4,000 to 5,000 feet from the runway end.

Runway 13 has a nonprecision approach surface with one tree (205-foot MSL elevation) located on the east side of 25th Street SE.

***Runway 16-34*:**

The existing approach surfaces are depicted as visual approaches, with a 20:1 slope. 13 obstructions are identified for the Runway 34 approach, and 2 obstructions are identified for the Runway 16 approach. Runway 16-34 is used primarily during VFR conditions, although aircraft may circle-to-land on the runway at the end of an instrument approach procedure when visual contact with the airport environment is established. The minimum visibility requirements for this type of procedure are typically one to two statute miles The majority of obstructions to the Runway 16-34 approaches consist of trees. Vehicles passing on Turner Road, north of Runway 16, penetrate the 20:1 approach surface for the runway.

Primary Surface

FAR 77.25 defines the Primary Surface as: *"A surface longitudinally centered on a runway. When the runway has a specially prepared hard surface, the primary surface extends 200 feet beyond each end of that runway...The elevation of any point on the primary surface is the same as the elevation of the nearest point on the runway centerline. The width of the primary surface of a runway with that width prescribed in this section for the most precise approach existing or planned for either end of that runway."*

Runway 13-31

The AOC identifies three obstructions (transmissometer, lighted wind sock, glide slope antennae) within the primary surface for Runway 13-31. The location of these items are fixed by function and are lighted.

Runway 16-34.

No obstructions are identified within the primary surface for Runway 16-34.

Transitional Surface

FAR 77.25 defines the Horizontal Surface as: *"These surfaces extend outward and upward at right angles to the runway centerline and the runway centerline extended at a slope of 7 to 1 from the sides of the primary surface and from the sides of the approach surfaces."*

Runway 13-31:

The transitional surface appears to be free of obstructions.

Runway 16-34:

The transitional surface appears to be free of obstructions.

Horizontal Surface

FAR 77.25 defines the Horizontal Surface as: *"A horizontal plane 150 feet above the established airport elevation, the perimeter of which is constructed by swinging arcs of specified radii from the center of each end of the primary surface of each runway of each airport and connecting the adjacent arcs by lines tangent to those arcs. The radius of the arc specified for each end of a runway will have the same arithmetical value. That value will be the highest determined for either end of the runway...."*

The horizontal surface created by the runways at McNary is established at an elevation of 361 feet mean sea level. The surface has numerous tree and terrain penetrations on the south and west side of the runways.

Conical Surface

FAR 77.25 defines the Conical Surface as: *"A surface extending outward and upward from the periphery of the horizontal surface at a slope of 20 to 1 for a horizontal distance of 4,000 feet."*

Areas of the conical surface are penetrated by terrain southwest of the airport. Based on the existing airport elevation of 214 feet, mean sea level (MSL), the conical surface begins at 364 feet MSL, and extends upward to a top elevation of 564 feet MSL. Terrain and trees located within the conical surface extend above 600 feet in these areas.

FAA Airport Design Standards

FAA Advisory Circular (AC) 150/5300-13, Airport Design, Change 5, provides the dimensional standards used in planning, design, and construction of airport facilities. As noted previously, Airplane Design Group II standards are recommended for Runways 13-31 and 16-34 in the planning and design of airfield improvements. Aircraft Approach Category C, is appropriate for Runway 13-31; Aircraft Approach Category B is appropriate for Runway 16-34. A listing of dimensions is presented in **Table 4-3**, on page 8.

Object Free Area

AC 150/5300-13, Change 5, defines the object free area (OFA) as *"A two dimensional ground area centered on a runway, taxiway, or taxilane centerline which is clear of objects, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes....The runway OFA clearing standard precludes parked airplanes, agricultural operations, and objects, except for objects that need to be located for air navigation or aircraft ground maneuvering purposes...Extension of the OFA beyond the standard length to the maximum extent feasible is encouraged."*

Runway 13-31

Runway 13-31 has approximately 760 feet of extended object free area at the Runway 13 end. The FAA-recommended dimensional standards for ADG II (C) is 1000 feet.

Runway 16-34:

Runway 16-34 meets the FAA-recommended dimensional standards for ADG II. There is approximately 500 feet of extended object free area provided beyond Runway 34.

Taxiway OFA

AC 150/5300-13 also provides recommended dimensions for taxiway object free areas (width only). For ADG II, the FAA-recommended taxiway OFA is 186 feet. This dimension also corresponds with the taxiway centerline to fixed or moveable object dimension of 93 feet. The parallel taxiways (A, B, and C) meet the FAA-recommended taxiway OFA standards.

Obstacle Free Zone (OFZ)

The OFZ is defined in FAA Advisory Circular (AC) 150/5300-13, Change 5 as *"A three dimensional volume of airspace which supports the transition of ground to airborne aircraft operations (and vice versa). The OFZ clearing standard precludes taxiing and parked aircraft and object*

penetrations, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function. The runway OFZ and, when applicable, the inner-approach OFZ and the inner-transitional OFZ, comprise the obstacle free zone (OFZ)."

The **Runway OFZ** is *"a defined volume of airspace above a surface centered on the runway centerline. The runway OFZ is the airspace above a surface whose elevation is the same as the elevation of the nearest point on the runway centerline".* The **Inner-approach OFZ** is *"a defined volume of airspace centered on approach area. It applies only to runways with an approach lighting system The inner-approach OFZ begins 200 feet from the runway threshold at the same elevation as the runway threshold and extends 200 feet beyond the last light unit...Its width is the same as the runway OFZ and rises at a slope of 50 to 1".* **The Inner-transitional OFZ** is *"a defined volume of airspace along the sides of the runway and inner-approach OFZ. It applies only to precision instrument runways. The inner-transitional OFZ slopes 3 to 1 out from the edges of the runway OFZ and inner-approach OFZ to a height of 150 feet above the established airport elevation."*

Runway 13-31

Runway OFZ

The Runway 13-31 OFZ meets FAA-recommended dimensional standards for large and small airplanes.

Inner Approach OFZ

The clear area required to accommodate the inner-approach OFZ is located at the end of Runway 13.

Inner Transitional OFZ

The Runway 13-31 inner-transitional OFZ meets FAA-recommended dimensional standards.

Runway 16-34:

The Runway 16-34 OFZ meets FAA-recommended dimensional standards for large and small airplanes.

Runway/Taxiway Safety Area

Runway Safety Areas are located along the sides and beyond the ends of a runway. AC 150/5300-13, Change 5, indicates that runway safety area (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) to the lowest practical height with the frangible point no higher than 3 inches above grade. Other objects, such as manholes, should be constructed at grade. In no case should their height exceed 3 inches above grade."

Runway 13-31:

Existing lateral and extended safety for Runway 13-31 meets FAA-recommended ADG III standards for approach category A, B, or C aircraft. Minor penetrations within the runway primary surface also affect the safety area.

Runway 16-34:

Existing lateral and extended safety for Runway 16-34 meets FAA-recommended standards for ADG II aircraft.

Taxiway Safety Area

AC 150/5300-13 provides the same design criteria for Taxiway Safety Area (TSA) as described above, in items 1 through 4 for the RSA. The FAA-recommended dimensions for taxiway safety areas at McNary are also based on Airplane Design Group II and III standards, as appropriate. All taxiways at McNary Field meet FAA dimensional standards.

Parallel Taxiway Separations

The FAA-recommended runway/parallel taxiway separation is 300 feet for runways using Approach Category C and Airplane Design Group II design standards. Both runways meet this standard; Runway 13-31 has a 400-foot taxiway separation from runway centerline (the ADG III standard). Runway 16-34 has varying separations ranging from 300 to 520 feet.

FACILITY REQUIREMENTS SUMMARY

The evaluation of airfield capacity and facility requirements has identified several key areas of the airport that will need to be upgraded or enhanced to adequately accommodate future levels of activity. A number of facility requirements for McNary Field have been identified for the current twenty-year planning period. Some facilities will be capable of accommodating forecast demands through the planning period; other facilities will require minor to significant upgrading during the planning period. A summary of facility requirements is provided in **Table 4-12.**

The next step in the planning process is to analyze alternatives that can accommodate these requirements. The next chapter will provide this analysis and recommend specific development alternatives for which are capable of accommodating projected demands through the twenty-year planning period and beyond.

Table 4-12
Airport Facility Requirements Summary

Facility	Initial	Short-Term	Long-Term
Runways			
13-31	None	Pavement Mgt.	Extension/Reserve
16-34	Pavement Mgt.	Pavement Mgt.	Overlay
Taxiways			
Rwy 13-31	None	Pavement Mgt.	Bravo Extension
Rwy 16-34	None	Pavement Mgt.	Pavement Mgt.
Other	North Hngr Area Txy	Hangar Access	Hangar Access
Apron Tiedowns			
Air Carrier	None (150+ existing)	Reconfigure for Corporate	None
Positions	None (2 required)	Itin. A/C	Reserve Terminal
		None	Apron
Aircraft Hangars	Access to North Area	New Hangar Development Area	Hangar Development; FBO Expansion Reserve
Navigational Aids	GPS Overlay Approaches	Differential GPS Category I Precision Approach	Same
Lighting	None	REIL - Rwy 16&34	None
Security	None	Extend fencing to new hangar and industrial areas	Same
Utilities	Extend to Industrial and Hangar Areas	Extend to Industrial and Hangar Areas	Same
Access Roads	25th Ave. SE & West Airport Access Roads	Airport Road (to South Airport Areas)	Turner Road (serving East Airport Areas)

Chapter Five
AIRPORT ALTERNATIVES

Preliminary alternative concepts were prepared for McNary Field to identify in very general terms, the development options available for the airport. The preliminary concepts identified three areas of the airfield--the west, east and the southern areas--as areas that could accommodate future development. Each area has specific advantages and disadvantages, in addition to unique features which make some types of development more appropriate than others.

The overall goal of this process is to provide adequate development areas for aviation needs over a twenty-year master planning time frame. In addition, adequate development reserves for aviation uses are recommended to protect the long-term viability of the site. Once the combined aviation needs have been addressed, potential non-aviation land uses may be considered. As with any potential aviation-related uses, non-aviation land uses must conform to airport development guidelines and create no conflicts with airport function.

The preliminary concepts presented in the initial discussion paper provided the basis for a preliminary assessment of development options. Based on comments received and additional analysis, the three concepts have been expanded into several specific alternatives. The alternatives focus on separate areas of the airport. Upon further refinement, a combination of alternatives may be formed into the preferred alternative.

The initial concepts, as originally presented, will not be revised, but are used to provide the basis for the specific alternatives. The preliminary alternatives are also in the draft stage, but they reflect the comments received on the original concepts. The process will continue with the review and refinement of the preliminary alternatives, which ultimately will result in a "preferred alternative."

Preliminary Alternative Concepts

The facility requirements analyses identified the airport's primary facility needs for the next twenty years. Improvements to the runways, taxiways, hangar areas, lighting and instrument approaches were among the most significant airfield-related items identified. Also identified through separate analyses, was the opportunity to develop and market portions of undeveloped airport land for non-aviation uses. Besides the opportunity that exists (due to available undeveloped lands, market interest, etc.) there is also a financial need to increase airport-generated revenues to maintain an effective program of facility maintenance and improvement.

Adequate land areas exist within current airport boundaries to accommodate the projected twenty-year demands for airside and landside facilities, and a reserve for demands that would be realized in the 20 to 50-year period. The airport has approximately 50 to 100 acres of land that is available to accommodate non-aviation development without constraining its ability to accommodate aviation facility needs.

To begin the process of evaluating alternatives for airport development, preliminary alternatives have been prepared which provide a very conceptual view of potential improvements. These concepts are intended only as a means to facilitate discussion of priorities, and ultimately the highest and best use of all airport lands. A more detailed analysis of alternatives will be provided based on the input received on the concepts. The evaluation of alternatives is a progressive process with refinements made at each stage of evaluation, ultimately culminating in the final layout depicted on the airport layout plan. Accordingly, the preliminary alternative figures will not be modified (see preferred alternatives figures).

South Airport Development Alternative (Figure 5-1)

This alternative utilizes the southern portion of the airport for both aviation and non-aviation development. Most of the area located outside the Runway 31 and 34 RPZs is zoned "IP" Industrial Park. The area immediately south of the Runway 31 protection zone is PS - Public Service, which is the zoning used for the overall airport area.

This alternative shows a split development concept that includes lease areas for large hangars in the areas closest to airside access. Aviation-related or non-aviation development is located on both sides of SE 25th Street. Portions of the airport currently zoned IP, but identified for hangar development in this alternative, would need to be re-zoned for aviation use unless hangars can be accommodated in the IP zone without any greater restrictions than in the PS zone.

The aircraft hangar area is located south of Taxiway F, with access taxiways at the east and west ends of the development and between the hangar rows. When fully developed, the area would require approximately 3,500 feet of taxilanes, in addition to aircraft holding areas at each end of the internal taxilanes. As depicted, this area would accommodate 28 hangar lots ranging from 12,000 square feet to 40,000 square feet, with a total leased area of approximately 450,000 square feet. Because demand for hangar lease lots is expected to be spread out over several years, the site preparation and taxiway construction would be done in phases.

Vehicle access to the hangar area would be provided by improving existing connections to SE 25th Avenue/Airway Drive. A secured vehicle parking area is located at the east end of the hangar area. This alternative would require changes to existing fencing to separate aviation and non-aviation uses. Extension of water and electrical service would be required; larger hangars may also require sewer service.

The non-aviation development in this area is located immediately south of the hangars, on the north and south sides of 25th Street. The northern section is approximately 30 acres; the southern area is approximately 29 acres (within the IP zone). The area located south of the Runway 31 RPZ that is zoned PS (approximately 10 acres), could also accommodate non-aviation development, although due to the approach surface, strict height restrictions would be required. The runway extension options and reserves, if developed, would extend the outer portion of the Runway 31 RPZ toward Interstate 5; the FAA will limit the type of development located within runway protection zones, although roadways and vehicle parking are considered acceptable uses. Most of the wetlands found on the airport are found in this southern area. As part of the overall development, a wetland plan will be required to determine precise acreage in wetlands and the portion of those that would be affected by construction. The configuration of the industrial area provides an internal roadway to access the lease areas.

West Side Airport Development Alternative (Figure 5-2)

This alternative focuses on the development and redevelopment of areas on the west side of the airport. A major part of this option is the continued development of the North Hangar Area, located between FedEx and the existing hangar rows near the end of Runway 13. Taxilane access to this area is required before additional hangars can be accommodated. The existing rows with taxiway access have only two or three undeveloped sites remaining. Providing aircraft access to the hangar area will be required before development to insure direct access to an existing taxiway. As depicted in this alternative, a 700-foot by 25-foot access taxilane would extend from Taxiway A. The taxilane and clearances between the two hangar rows (131 feet) are sized to accommodate typical business aircraft included in Airplane Design Group II. An additional 250-foot extension is located near the west end of the area, which would provide access to four smaller conventional hangars (50 to 60 feet wide). As depicted, eight larger and five smaller conventional hangars could be accommodated in this area, with typical sizes ranging from 60 x 60 feet to 80 x 80 feet. Total leasable area is approximately 120,000 square feet.

Vehicle access and parking for the North Hangar Area would be improved by expanding parking along the southern row, directly opposite the FedEx building. Additional vehicle access and parking would be provided through a frontage road running along the western end of the hangar area; the parking area is located on the north side of the development. One existing building currently used by Marion County in support of non-aviation pesticide spraying would need to be relocated or removed in this alternative.

Another element of the West Side Alternative is related to the area located north of Salem Air Center and west of the restaurant and the large hangars located on the main apron. Part of this area is currently occupied by the restaurant, access road, and parking. The area located immediately west of the large hangars is undeveloped. The development

or redevelopment of this area will depend largely on the long-term plans for the restaurant building. The overall land area could be redeveloped to accommodate aviation and non-aviation uses. Possible options include expanded fixed base operator facilities, a general aviation common-use terminal, aircraft hangars, a new restaurant, and other commercial or industrial uses.

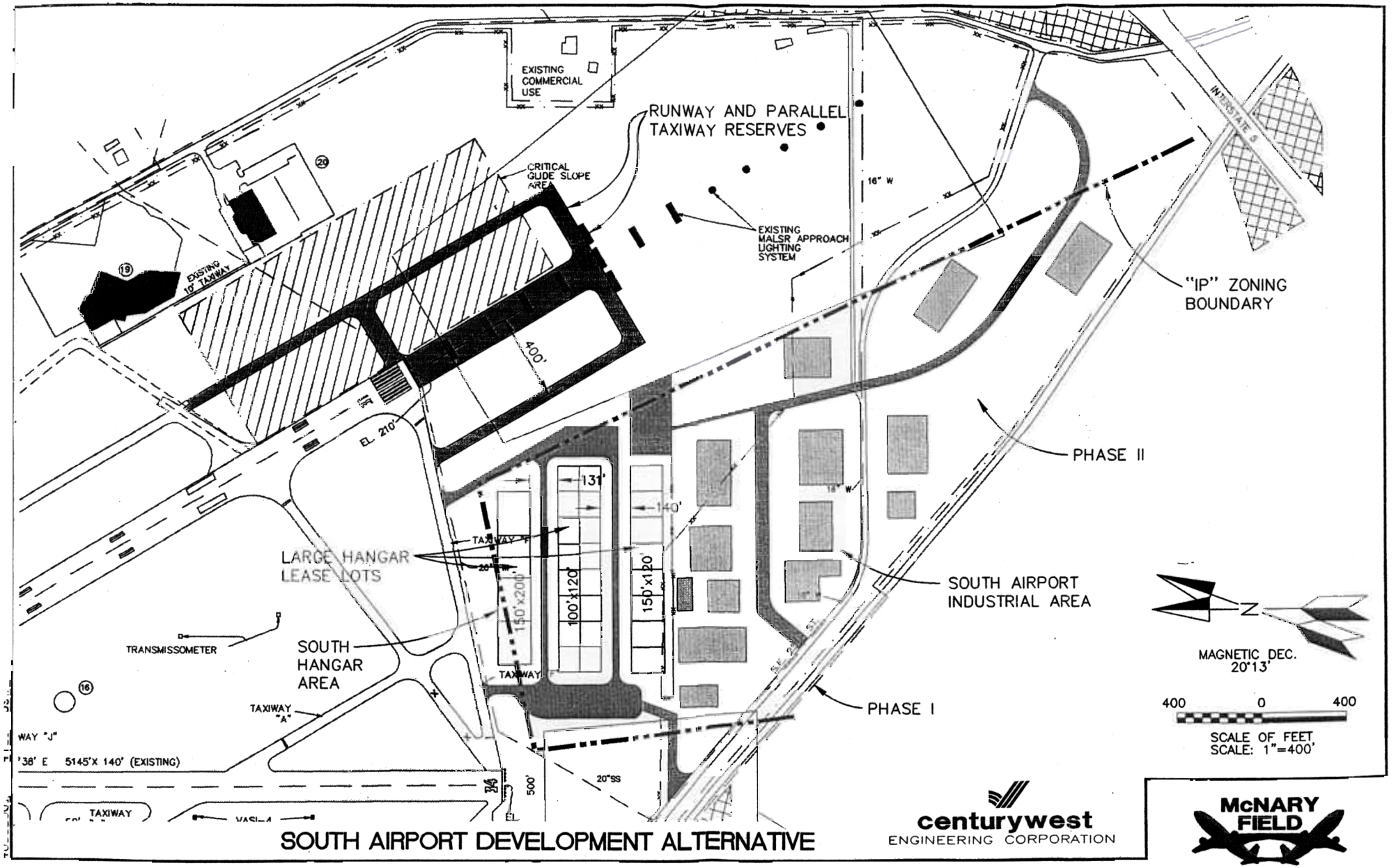
An area on the south end of the main apron could be reserved for future T-hangar development. Normally, constructing hangars on existing parking apron is not desirable. However, the available parking apron and tiedowns exceed projected long-term needs by a wide margin. An important consideration is whether FAA funding was used in the initial apron construction or subsequent upgrading of the apron. If the most recent grant was issued less than 20 years ago, the City of Salem would be required to reimburse the FAA for the unamortized portion of the grant.

The pavement area located inside the building footprints would be converted from common-use to exclusive use, thereby triggering the reimbursement. Two of the three hangars depicted are located on the apron with a total footprint of approximately 25,000 square feet (2,800 sq. yds.). The third hangar is located south of the apron, in an area that would likely require some fill material. As with the North Hangar Area, construction of new T-hangars would be privately funded, with the timing based on market demand.

East Side Airport Development Alternative (Figure 5-3)

This alternative concept identifies aviation and non-aviation development on the east side of the airport. The southern portion of this area is currently zoned IP - Industrial Park. The land area to the north is zoned PS - Public Service, which is the common aviation-use zoning on the airport. The northern area has a split development configuration which has non-aviation uses with frontage on Turner Road, and aviation-related uses fronting Taxiway B. Access to the aviation-use area is routed to the north of the development. The aviation-use area would also require access to the runway-taxiway system; a 200-foot connecting taxiway (to Taxiway B) would lead to a frontage taxiway which could be constructed in phases as demand requires.

The reserve area for a runway/taxiway extension is identified for the south end of Runway 13-31. As noted in the Facility Requirements analysis, the existing runway is adequate to accommodate the design aircraft with full loads on all but the hottest days. A 700-foot extension, to 6,500 feet would enable the runway to accommodate those aircraft under most conditions. The runway reserve also is intended to protect the option of extending the runway to meet future air carrier aircraft requirements. Extension of the east-side parallel taxiway may become viable when the ground-based ILS system is phased out with GPS. Without ground-based system clearance requirements, a taxiway could be extended through the area.


EXISTING COMMERCIAL USE
RUNWAY AND PARALLEL TAXIWAY RESERVES
CRITICAL GLIDE SLOPE AREA
EXISTING MALSR APPROACH LIGHTING SYSTEM
INTERSTATE 5
"IP" ZONING BOUNDARY
EXISTING 10' TAXIWAY
400'
EL 210'
PHASE II
131'
140'
TAXIWAY 'F'
LARGE HANGAR LEASE LOTS
100'x120'
150'x120'
150'x200'
SOUTH AIRPORT INDUSTRIAL AREA
TRANSMISSOMETER
SOUTH HANGAR AREA
TAXIWAY
TAXIWAY "A"
PHASE I
WAY "J"
'38' E 5145'X 140' (EXISTING)
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SOUTH AIRPORT DEVELOPMENT ALTERNATIVE
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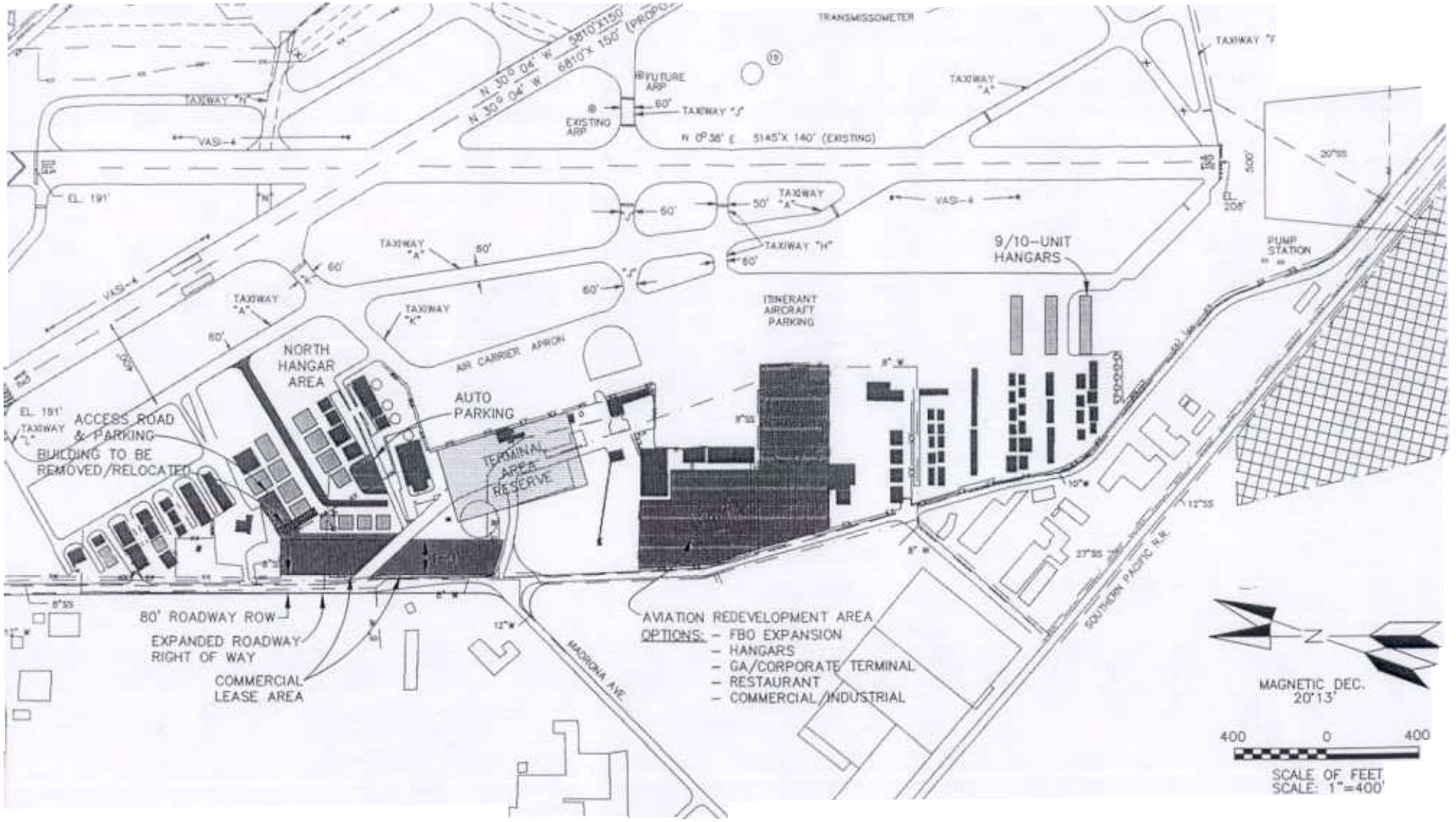
Fiqure 5-1



WEST SIDE AIRPORT DEVELOPMENT ALTERNATIVE

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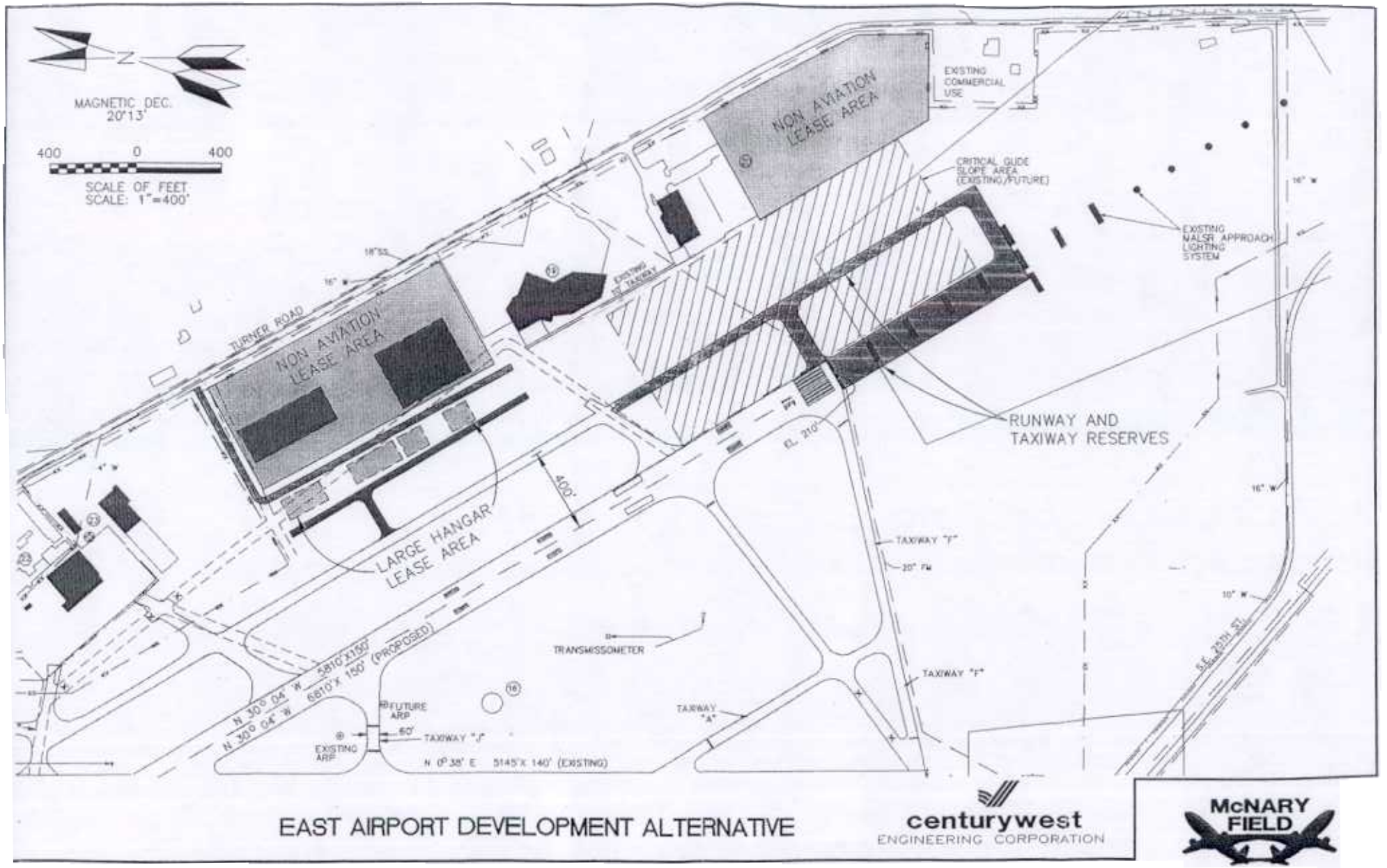
McNARY FIELD

Figure 5-2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SCALE OF FEET
SCALE: 1"=400'
NON AVIATION LEASE AREA
EXISTING COMMERCIAL USE
CRITICAL GLIDE SLOPE AREA (EXISTING/FUTURE)
EXISTING MALSR APPROACH LIGHTING SYSTEM
TURNER ROAD
NON AVIATION LEASE AREA
EXISTING T/W
RUNWAY AND TAXIWAY RESERVES
EL. 210'
400'
LARGE HANGAR LEASE AREA
TAXIWAY "F"
20' FW
TRANSMISSOMETER
TAXIWAY "F"
TAXIWAY "A"
FUTURE ARP
EXISTING ARP
60'
TAXIWAY "A"
N 0° 38' E 5145' X 140' (EXISTING)
N 30° 04' W 5810' X 150'
N 30° 04' W 6810' X 150' (PROPOSED)
EAST AIRPORT DEVELOPMENT ALTERNATIVE
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McNARY FIELD

Figure 5-3

Preliminary Alternatives

West Side #1 (North Hangar Area) (Figure 5-4)

This alternative involves hangar development in the area immediately north of the Federal Express facility. The preliminary concept for this area addressed the majority of facility needs; several comments from the Master Plan Advisory Committee have been incorporated into the concept to produce West Side Alternative #1.

The primary feature of this alternative is the construction of a taxilane from the existing runway-taxiway system to the new hangar area. As depicted, a 25-foot taxilane would extend 700 feet from a connection at Taxiway "A." The taxilane would provide access to a row of conventional hangars on each side. Although designated as a taxilane, this alternative uses a 131-foot taxiway object free area setback. The additional clearance will permit larger business aircraft to move through the area.

Depending on the actual building sizes, this area would accommodate 8 to 10 hangars. Two additional hangar lots would are also in areas with existing taxiway access. The hangar area is relatively level and will require only minor site preparation. Total hangar lease area in this alternative is approximately 120,000 square feet, plus an additional 18,000 square feet for the two spaces with existing taxiway access.

This alternative would require the relocation of an existing building that is leased to Marion County. The building was moved to its present location in the past; relocation elsewhere on or off the airport appears to be feasible.

Additional vehicle access and parking are required for this alternative. A new parking area would be located adjacent to the FedEx facility on the south side of the development. This new parking area could be used to accommodate both hangar users and FedEx employees.

Access to the northern row of hangars would be provided by a new roadway which would travel approximately 500 feet along the western edge of the development. Additional vehicle parking would be provided between the northern hangar row and the fire station.

The original commercial/retail lease area located east of 25th Street SE has been reduced to the area immediately adjacent to the hangar area (north of the northern terminal access road). One concern identified with the original concept was a need to avoid congestion in and around the entrance to the terminal area. With the area immediately west of the terminal area now reserved as open space, the long-term utilization of the terminal area can be ensured.

The commercial/retail lease area is approximately 150 feet wide and has a setback that would

accommodate an 80-foot wide right-of-way for a reconfigured 25th Street SE. This area has approximately 60,000 square feet available for lease and 300 feet of frontage on 25th Street SE. As noted earlier, the existing zoning in this area is "PS" (Public Service), which is the category applied to most aviation-related lands on the airport. It would be appropriate to change the zoning to reflect commercial/retail uses.

The option of accommodating future T-hangar demand on the southern portion of the main apron was favorably received when presented. A review of past FAA grants will be conducted to identify if any portions remain outstanding. The reimbursement, if any, will be identified in the detailed cost estimate for the project.

Development options for the southern section of the west side of the airfield are presented in the following alternatives:

West Side Alternative #2 - South Apron (Figure 5-5)

In this alternative, the existing restaurant building and/or site, would remain in place. Continued use of the existing building or redevelopment of the site are options.

The primary changes to the area include a reconfigured access roadway, with development of the non-aviation land located between 25th Street SE and the existing facilities. Improvements in access, parking and utilities would also be required.

The existing divided access road would be closed and a new two-lane roadway would be located approximately 80 to 100 feet south. The new roadway would be approximately 400 feet long and connect the southwest corner of the existing vehicle parking area. Existing access to Salem Air Center and the private hangars located to the south would not be changed.

The land immediately north of the new access road would be converted into leasable area for aviation-related and non-aviation uses. The area would provide approximately 60,000 square feet for development. Access to the lease area would be provided from a frontage road that connects to the new access roadway. The frontage roadway would be located in approximately the same location as the southern (entry) lane of the existing restaurant access road.

Additional lease area is located north of the redeveloped restaurant access corridor (behind the existing commercial hangars). This area does not have adequate access to airside facilities, therefore, aviation-related or non-aviation uses that do not require airfield access, would be well suited for the site. The existing gravel-surfaced-access road now used to access the commercial hangars, would be upgraded to provide access to the entire lease area. Additional vehicle parking would be provided immediately west of the existing commercial hangars. A 500-foot long spur road, connecting to the main access road, would serve the interior building sites.

The area would provide approximately 120,000 square feet of leasable land. An existing drainage channel would require culverting or realignment. A landscape buffer would be located along the eastern edge of 25th Street and the relocated access road to the restaurant.

West Side Alternative #3 South Apron (Figure 5-6)

This alternative involves redeveloping the restaurant site and the divided lane access road. The restaurant building would be removed and the overall area--the building site, parking lot, etc.--would be lowered to more closely match the elevation of the apron and other buildings.

As with West Side Alternative #2, the access road would be relocated approximately 80 to 100 feet south to utilize the land within the existing roadway corridor better. The existing vehicle parking area would be reconfigured to approximately one-half its current size.

The redevelopment of the site in this alternative would provide nearly 4,000 square yards of additional apron. The apron would be used to support one or two large commercial hangars. This area could accommodate an expanded full-service FBO operation, a common-use general/corporate aviation terminal, or other commercial aviation users. Possible hangar sites are depicted, including the area immediately north of Salem Air Center, which is now aircraft apron. The reconfigured access roadway and parking area would provide efficient curbside access and parking to the new hangar site. The area located immediately west of the expanded apron and reconfigured parking lot, would provide approximately 25,000 square feet of leasable land for aviation-related or non-aviation uses.

The frontage road described in the previous alternative will also be used for access to the lease area contained within the existing restaurant access road corridor.

In addition to the primary access roads that connect to 25th Street SE, an internal vehicle access road is provided between the two development areas. The road would extend from the relocated main access road, north into the non-aviation development area.

The configuration of the non-aviation lease area is slightly different from West Side Alternative #2, although the total area available for development and vehicle parking are comparable.

West Side Alternative #4 South Apron (Figure 5-7)

This alternative is similar to West Side Alternative #3, with the exception of an expanded aircraft apron and reconfigured hangar, roadway, and vehicle parking layout.

The expanded apron is approximately 5,500 square yards in area. Depending on the type of development, the apron could be used as a corporate ramp or a designated passenger loading/unloading area for transient aircraft.

Two or three large hangars could be accommodated along the south and west sides of the expanded apron. The entire existing vehicle parking area would be redeveloped to accommodate the hangars and apron. Additional vehicle parking would be provided adjacent to the hangars and the access road. This alternative is also compatible with the common-use general aviation terminal concept.

The cross-connecting access roadway described in the previous alternative is retained to provide internal circulation in the non-aviation area. The amount of non-aviation lease area is comparable to the other alternatives. The addition of auto parking on the west side of the existing commercial hangars is intended to replace the parking spaces lost in the main parking area reconfiguration.

West Side Alternative #5 South Apron (Figure 5-8)

This alternative is similar to West Side Alternative #4, although the expanded apron area is significantly larger (approximately 10,600 square yards).

This alternative provides area for large hangars which could be associated with FBO maintenance facilities or a common-use terminal. The apron would be configured to accommodate larger corporate aircraft parking, fueling, or passenger loading/unloading. The expanded apron could accommodate a significant amount of business aviation activity.

The relocated main access road would serve both hangars. The southwest corner of the expanded apron was removed to provide better access to the Salem Air Center hangars.

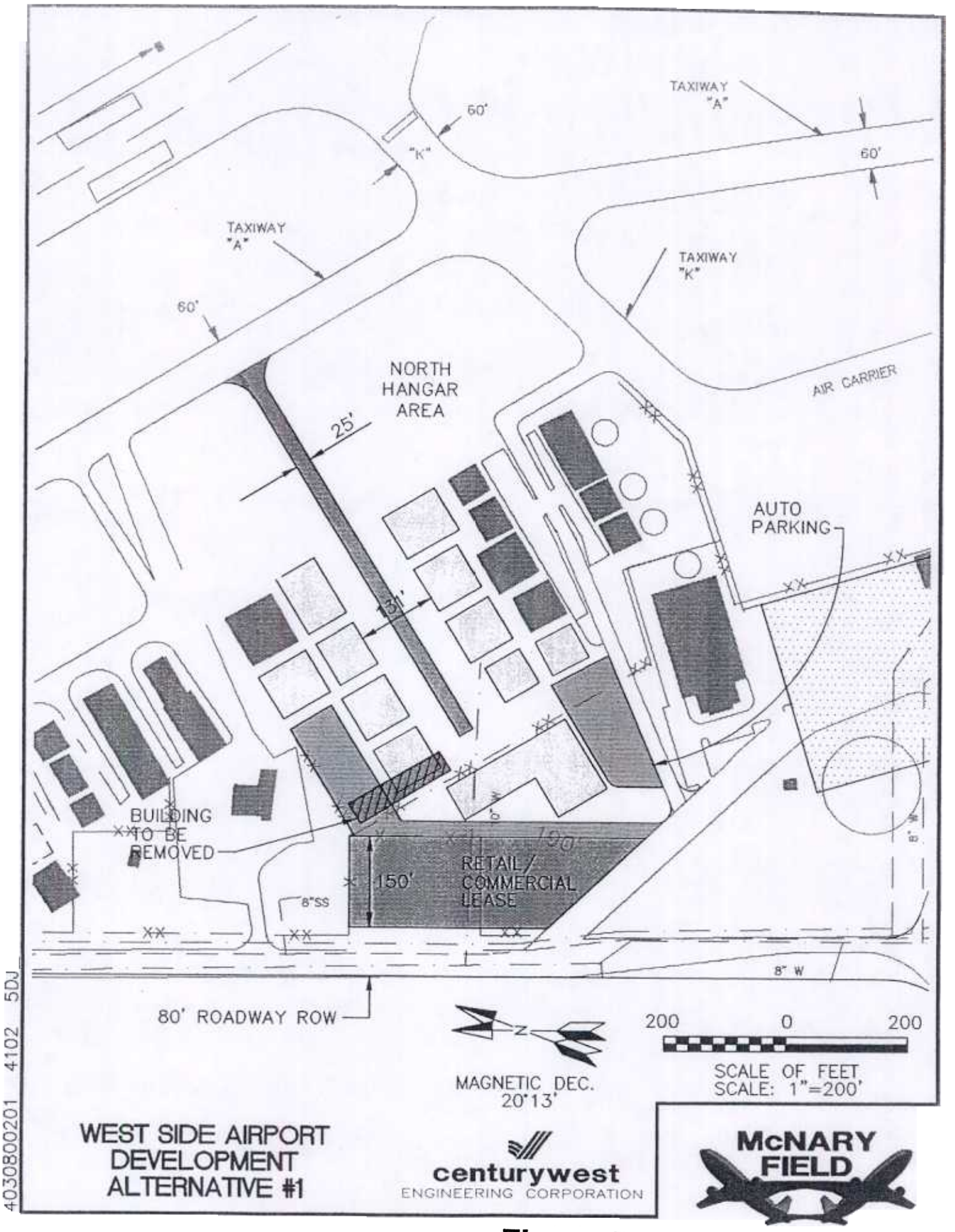
Vehicle parking areas are moved to the west and behind the existing commercial hangars. The landside portion of the development, as depicted, is nearly identical to West Side Alternative #4.

South Alternative #1 (Figure 5-9)

This alternative was slightly modified from the original conceptual layout. The primary concept is that aviation-related development is located in the areas with prime airside access and non-aviation development is located in the remaining areas. Building height limitations (40- and 50-foot elevation lines) have been added in this area.

According to the City of Salem Zoning Ordinance (Section 160.200), structures on PS-zoned land may be a maximum of 70 feet high, although on lots of less than 10,000 square feet, a maximum structure height of 35 feet is permitted. As noted earlier, the specific limitations of the FAR Part 77 Imaginary Surfaces will dictate the maximum allowable heights of structures near the runways, while complying with the height limitations associated with the zoning.

Within the "IP" (Industrial Park) zoning category, no structures shall exceed 45 feet in height (Section 157.070).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"K"
60'
TAXIWAY "A"
TAXIWAY "K"
60'
NORTH HANGAR AREA
25'
AIR CARRIER
AUTO PARKING
BUILDING TO BE REMOVED
150'
RETAIL/ COMMERCIAL LEASE
8"SS
8" W
80' ROADWAY ROW
MAGNETIC DEC. 20°13'
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WEST SIDE AIRPORT DEVELOPMENT ALTERNATIVE #1
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Figure 5-4

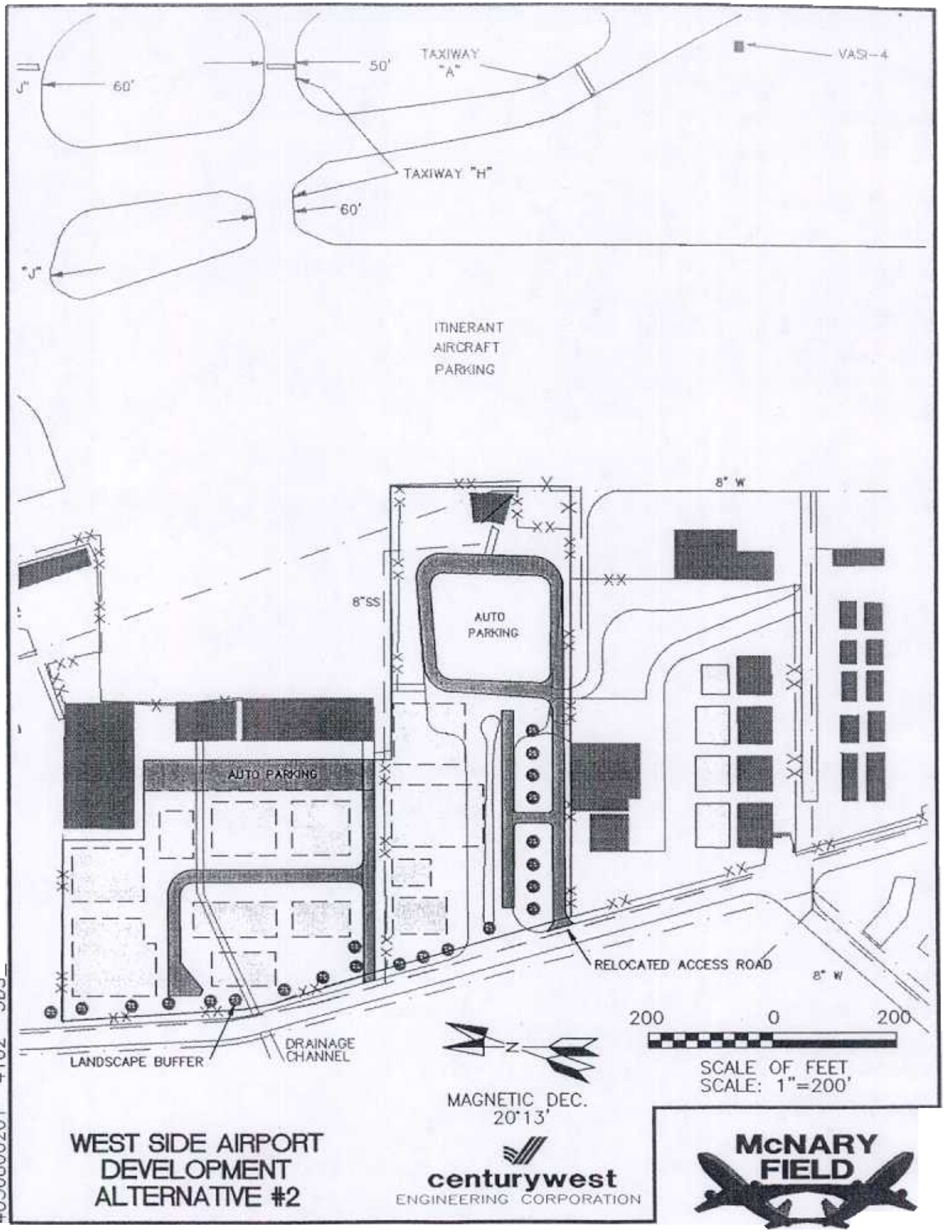

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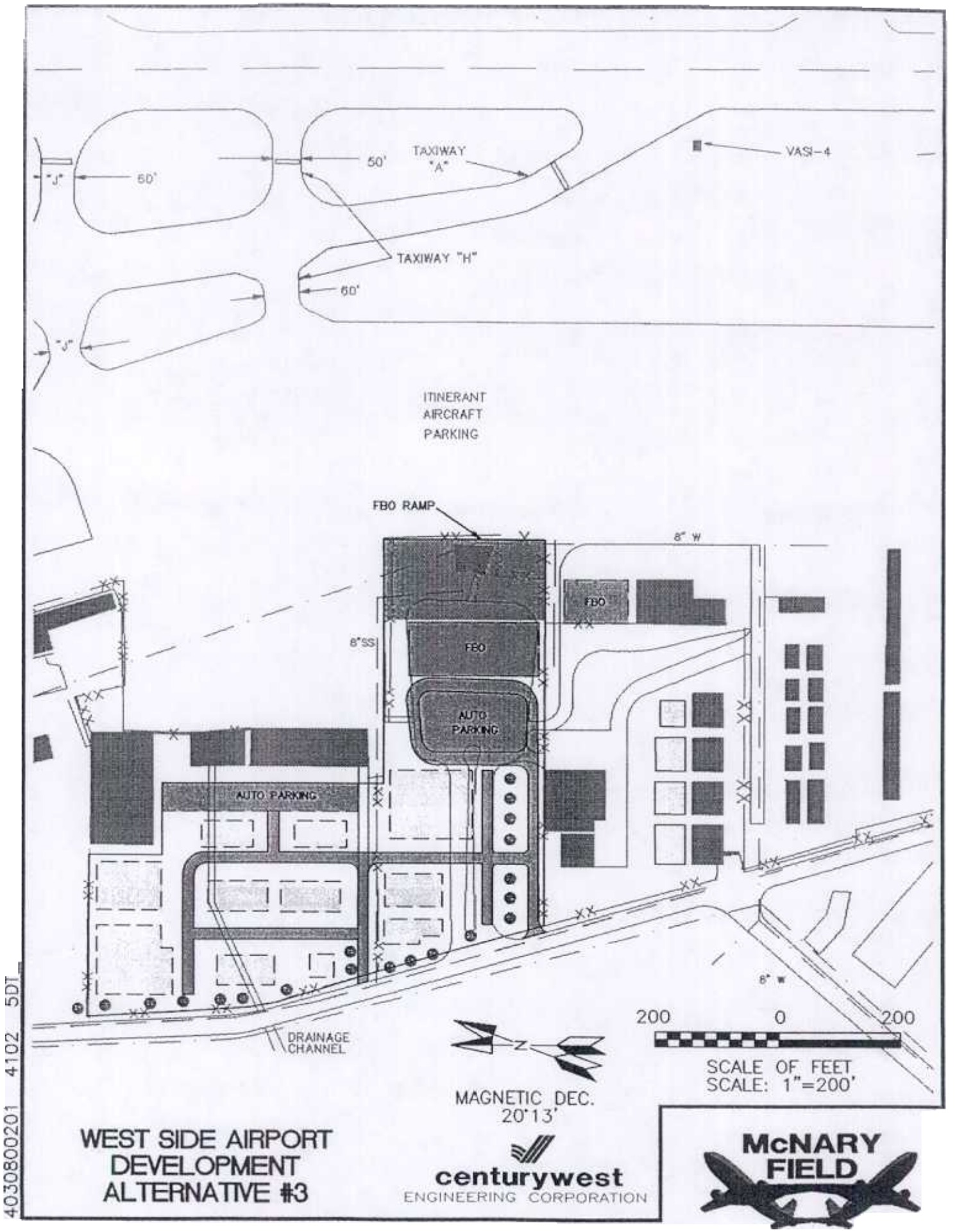
Figure 5-5


50'
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VASI-4
60'
TAXIWAY "H"
60'
ITINERANT AIRCRAFT PARKING
FBO RAMP
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FBO
8"SS
FBO
AUTO PARKING
AUTO PARKING
8" W
DRAINAGE CHANNEL
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SCALE OF FEET
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WEST SIDE AIRPORT DEVELOPMENT ALTERNATIVE #3
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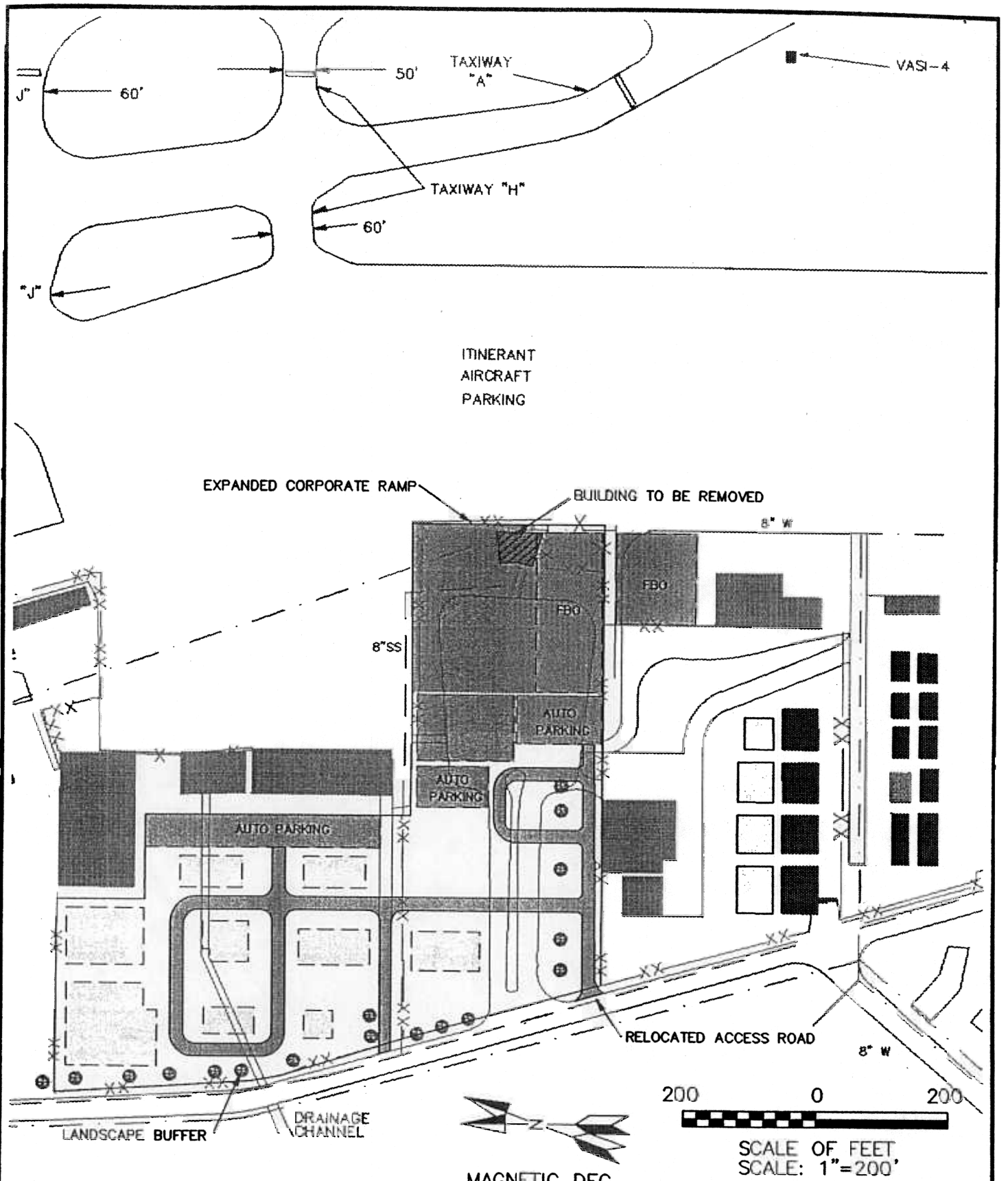
Figure 5-6



WEST SIDE AIRPORT DEVELOPMENT ALTERNATIVE #4

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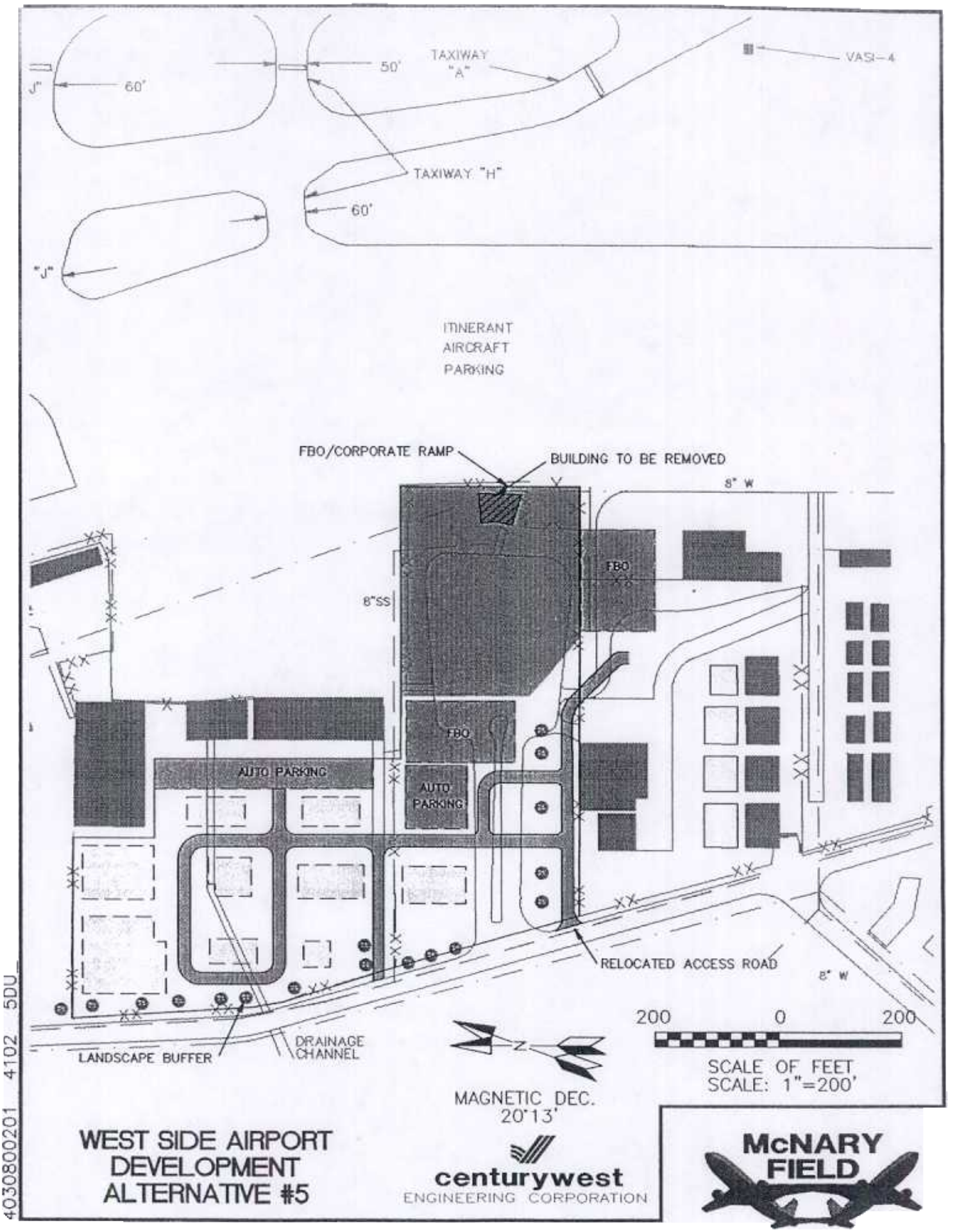
Figure 57


J"
60'
50'
TAXIWAY "A"
VASI-4
TAXIWAY "H"
60'
"J"
ITINERANT AIRCRAFT PARKING
FBO/CORPORATE RAMP
BUILDING TO BE REMOVED
8" W
FBO
8"SS
FBO
AUTO PARKING
AUTO PARKING
RELOCATED ACCESS ROAD
8" W
LANDSCAPE BUFFER
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SCALE: 1"=200'
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WEST SIDE AIRPORT DEVELOPMENT ALTERNATIVE #5
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McNARY FIELD
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Figure 5-8

The locations of wetlands in the south area have also been added to the figures. It appears that most of the wetlands can be avoided with this layout. In some cases, small wetland areas located adjacent to roadways may need to be filled; enhancement of the more valuable on-site wetlands may be a mitigation option for any required fill. The existing drainage ditch that runs from near the south end of the runway to 25th Street SE may also be categorized as a wetland. This drainage would likely be realigned and culverted to accommodate new buildings, taxiways, and roadways.

A review of existing floodplain mapping indicates that the majority of the southern portion of the airport is located within this area. The City of Salem is currently reevaluating the accuracy of existing floodplain mapping in light of recent flood events. Development in this area will require fill to raise structures above the potential flood level. Specific floodplain elevations in this area may change because of the mapping updates.

The basic layout of the hangar lease lots and the non-aviation development area has not changed significantly from the original development concept. The three rows of hangar lease lots combine for approximately 480,000 square feet. The non-aviation land area available on both sides of 25th Street SE is approximately 60 to 70 acres. Wetlands account for approximately 5 to 8 acres in the southern airport area; two larger wetlands located south of 25th Street SE account for the majority of the total acreage.

A runway/taxiway extension and long-term reserve, have been identified for the Runway 31 end.

South Alternative #2 (Figure 5-10)

This alternative retains the same division between aviation and non-aviation development as South Alternative #1, but shifts the hangar rows into a north-south alignment. Three hangar access taxiways ranging from 800 to 1,000 feet long connect to Taxiway "F." The three taxiways could also be connected at the southern end to provide improved circulation and access.

The outside hangar rows are configured to accommodate very large hangars, while the inner rows would accommodate smaller conventional hangars on typical lots of 150 by 100 feet. The height limitations in this area are depicted in the 40- and 50-foot lines. Some outside lease lots would be limited to building heights of between 40 and 50 feet, while other lots could accommodate higher buildings. The total developable hangar lease area is approximately 570,000 square feet.

The hangar development would be phased in based on demand. One advantage of this configuration is that a single 800-foot hangar access taxiway could be initially constructed to serve eight to ten hangar sites. The second and third taxiways would be added as demand occurred.

Vehicle access to the hangar areas would be provided at the east and west ends. Changes in the existing fencing to include controlled gates would be required.

Refined East Side Alternative (Figure 5-11)

This alternative is a refined version of the original concept for the east side of the airport. A large undeveloped area located between II-Morrow and the Oregon Army National Guard is available for development. This area is unique in its ability to accommodate relatively large aviation-related users. The east side area consists of approximately one million square feet (23 acres+-), not including the parcel located south of West Coast Washers (10-12 acres).

With other options available to accommodate corporate and general aviation development and non-aviation development, it would be appropriate to reserve the east side of the airfield for tenants with larger land area requirements and aviation-related use.

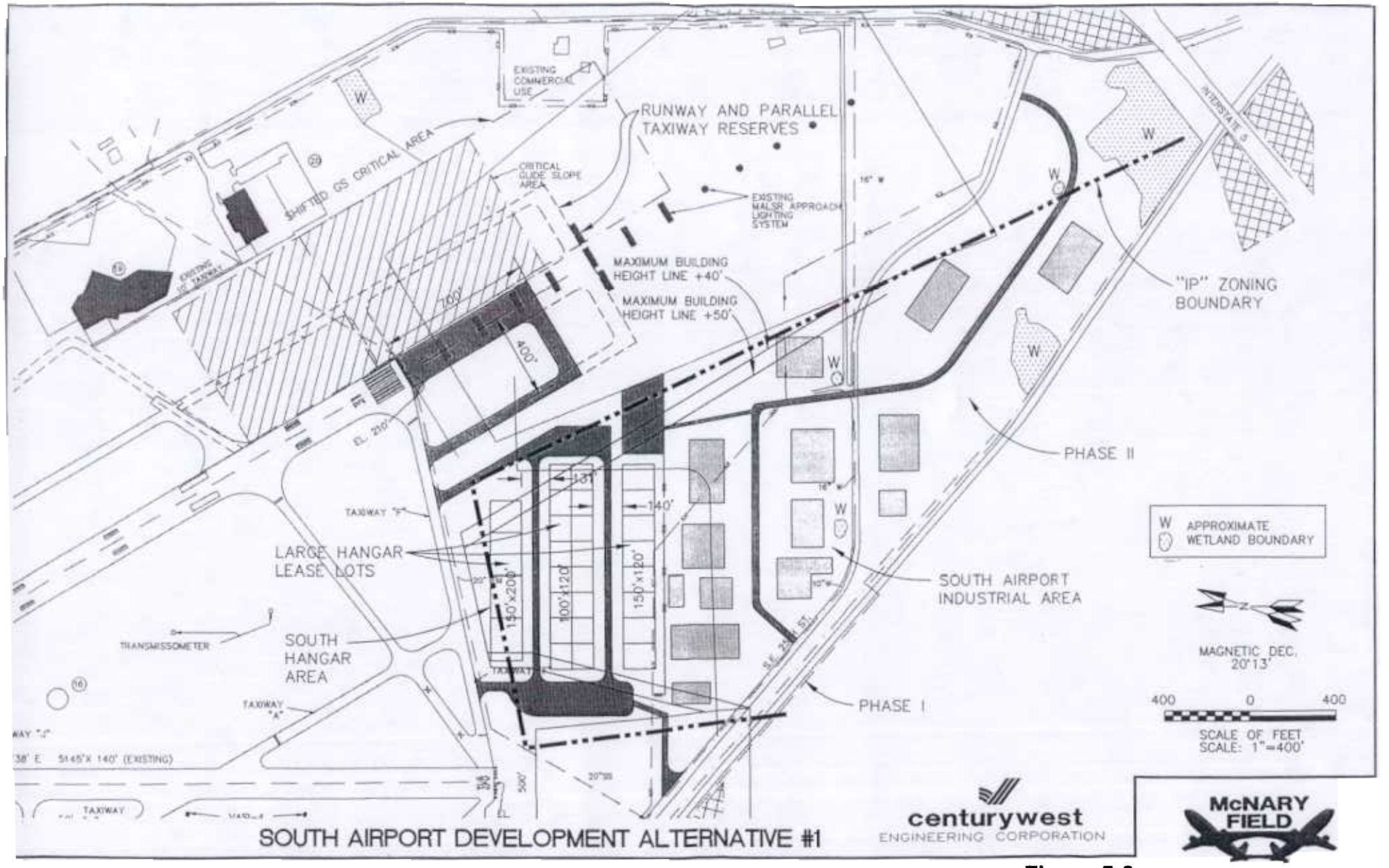
As depicted, the area could support a split development concept with aviation facilities occupying the prime airside access area and non-aircraft uses located further to the east. Alternatively, the area could be developed with considerably larger aviation facility components such as aircraft parking apron or hangars.

Potential uses for this area include aviation-related military operations; air cargo lease area; aircraft maintenance facilities. The primary criterion associated with developing this area should be a need for a large land area. A minimum lease area should be defined to avoid splitting the area into small parcels. If demand from larger users does not materialize, the area should be reserved until other areas of the airport are fully developed. The eastern portion of the airfield is unique in its ability to accommodate large scale aviation-related development. Accordingly, it should be preserved for its highest and best use.

A portion of the land area located adjacent to Turner Road is identified on existing flood plain mapping as a designated floodway. No buildings are permitted within the floodway, although access roads and vehicle parking areas are permitted. The existing non-aviation land available for lease south of West Coast Washers is zoned IP. This area does not currently have airside access, although potential runway extensions and modification of the glide slope critical area would allow access to the runway-taxiway system.

Preliminary Alternatives Summary

The alternatives for the west, south, and east portions of the airport can be implemented independently. However, to accommodate all airport facility requirements, it may be necessary to combine the components of several alternatives into a single "preferred alternative." The review of preliminary alternatives will provide specific information which can be used to refine these alternatives or create new options for the airport.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SHIFTED GS CRITICAL AREA
CRITICAL GLIDE SLOPE AREA
EXISTING MALSR APPROACH LIGHTING SYSTEM
INTERSTATE 5
MAXIMUM BUILDING HEIGHT LINE +40'
MAXIMUM BUILDING HEIGHT LINE +50'
"IP" ZONING BOUNDARY
700'
400'
EL. 210'
PHASE II
131'
140'
TAXIWAY "F"
LARGE HANGAR LEASE LOTS
150'x200'
100'x120'
150'x120'
SOUTH AIRPORT INDUSTRIAL AREA
TRANSMISSOMETER
SOUTH HANGAR AREA
TAXIWAY "A"
PHASE I
S.E. 25TH ST.
5145'X 140' (EXISTING)
TAXIWAY
500'
W APPROXIMATE WETLAND BOUNDARY
MAGNETIC DEC. 20°13'
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SCALE OF FEET
SCALE: 1"=400'
centurywest
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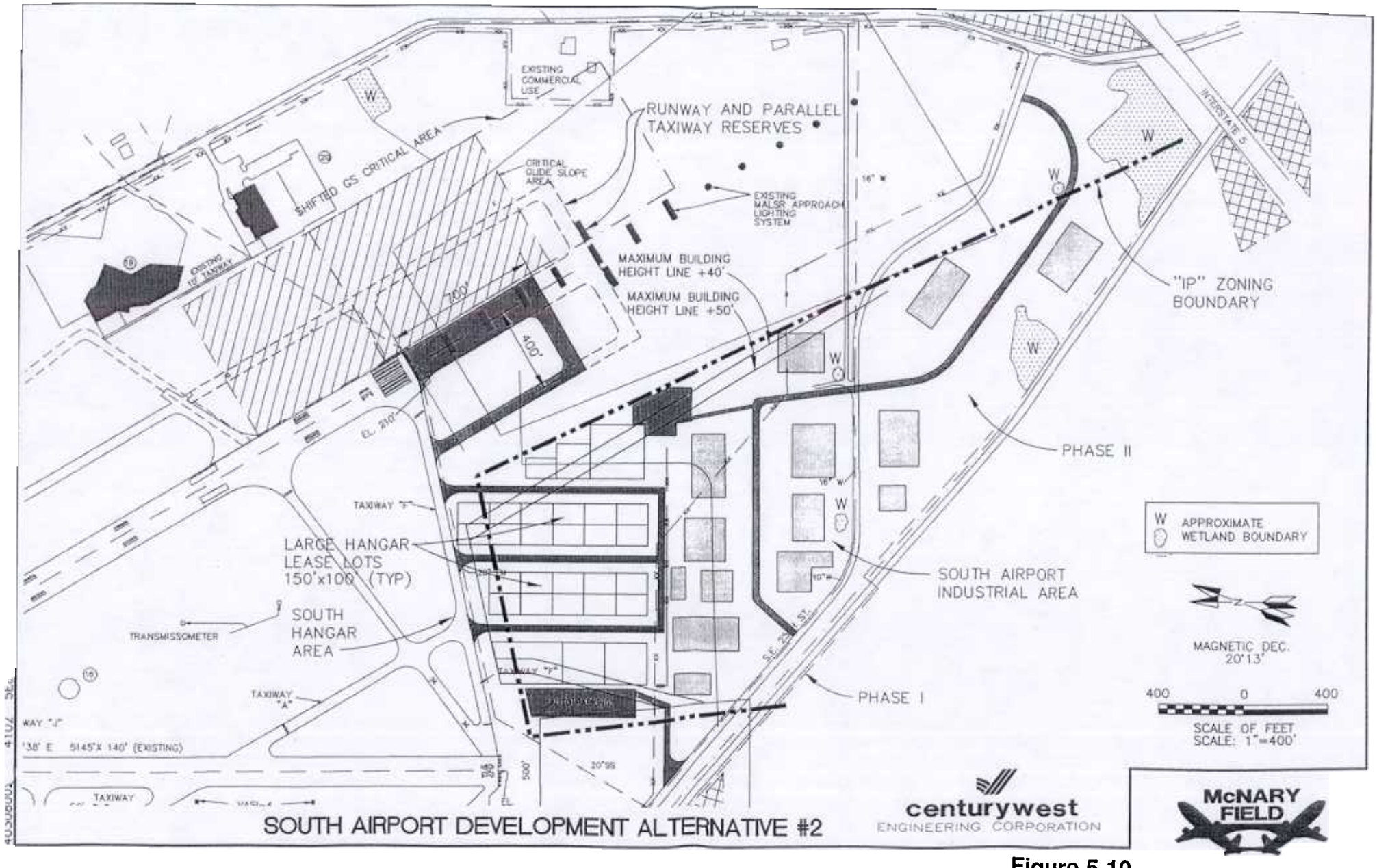
McNARY FIELD
SOUTH AIRPORT DEVELOPMENT ALTERNATIVE #1

Figure 5-9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INTERSTATE 5
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CRITICAL GLIDE SLOPE AREA
EXISTING MALSR APPROACH LIGHTING SYSTEM
MAXIMUM BUILDING HEIGHT LINE +40'
MAXIMUM BUILDING HEIGHT LINE +50'
"IP" ZONING BOUNDARY
700'
400'
EL. 210'
PHASE II
TAXIWAY "F"
LARGE HANGAR LEASE LOTS 150'x100' (TYP)
SOUTH AIRPORT INDUSTRIAL AREA
TRANSMISSOMETER
SOUTH HANGAR AREA
TAXIWAY "A"
PHASE I
W APPROXIMATE WETLAND BOUNDARY
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SOUTH AIRPORT DEVELOPMENT ALTERNATIVE #2
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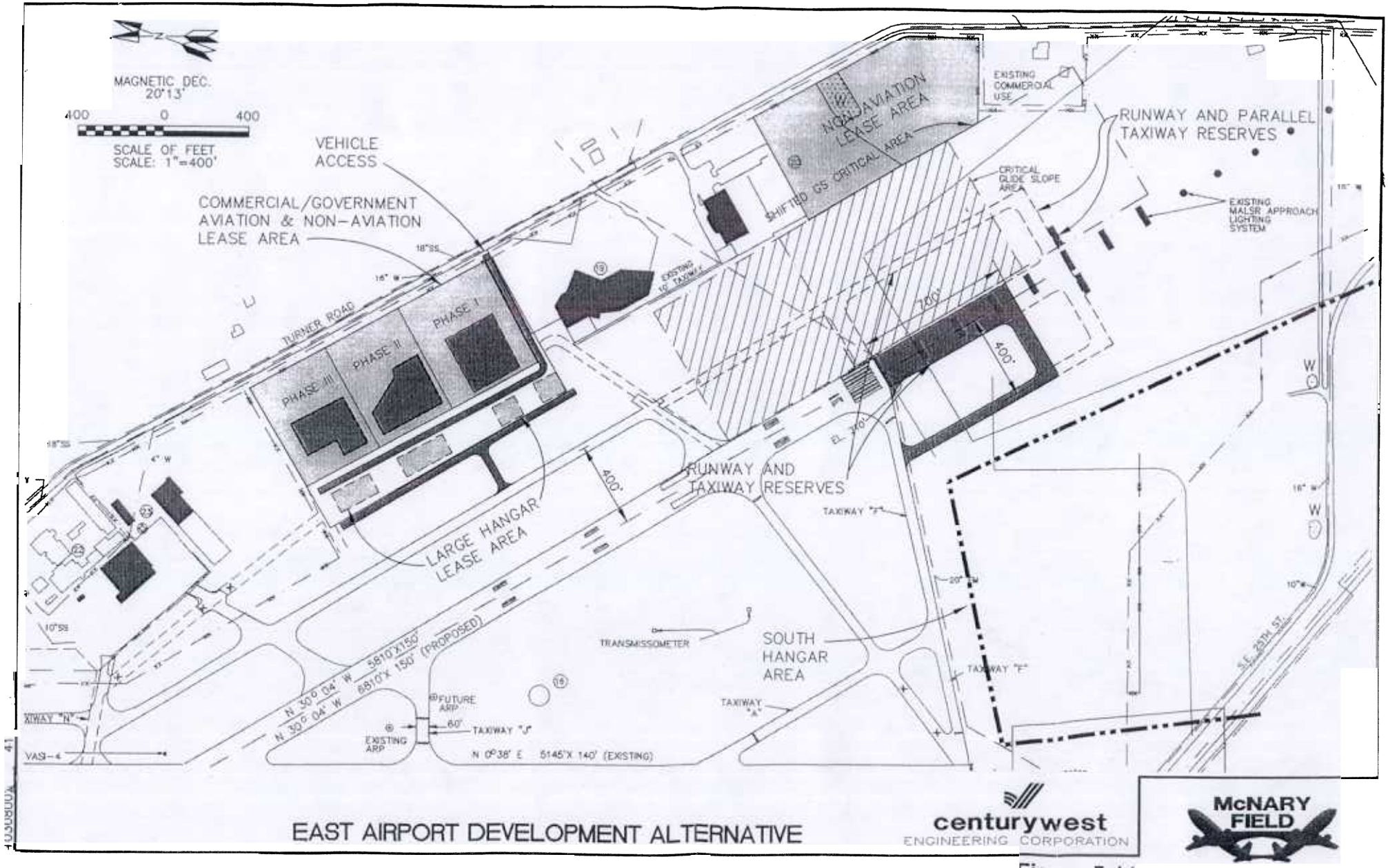
Figure 5-10



EAST AIRPORT DEVELOPMENT ALTERNATIVE

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Figure 5-11

Preferred Alternatives

A preferred alternative has been identified which includes several elements from the preliminary alternatives. The preferred alternative includes development in the west, south, and eastern areas of the airport. The primary focus of the alternative is to provide adequate development area for aircraft hangars, industrial land development, and other airport related facilities. The preferred alternatives can also accommodate future intermodal transportation facility development needs. The preferred alternative will be depicted on the airport layout plan and terminal area plan.

Figures 5-12, 5-13, and 5-14 depict the primary refinements associated with the preferred alternative.

West Side Development

The preferred alternative includes hangar-related improvements in the North Hangar Area and in the south apron/restaurant/FBO area. These areas already accommodate aviation-related development, but require expansion, reconfiguration, or improvements to meet current and projected needs. Development in these areas will provide new taxilane access, hangar lease areas, and vehicle parking/access improvements.

The hangar area located behind Salem Air Center will have reconfigured taxilane access, which would coincide with the development of a new FBO building on the current restaurant site.

The existing divided roadway access to this area would be reconfigured into a single two-lane roadway. The existing parking lot adjacent to the airport restaurant would also be reconfigured in conjunction with the redevelopment.

Other west-side improvements are provided in the terminal area. A terminal development reserve, terminal loop roadway, and bypass roadway would enable this portion of the airport to be redeveloped as demand warrants. The City of Salem indicates that the existing airport access at the Madrona intersection will be eliminated at some point in the future. As part of that project or independently, the internal airport access roadways may be modified to improve vehicle flow and provide access to additional lease areas. The internal roadway may also be configured to connect with the northern and southern access roads on the west side of the airport.

South Airport Development

The facility layout included in Airport Development Alternative #2 was selected as the preferred alternative for that part of the airfield. The preferred alternative provides development areas for conventional hangar leases, aviation-related, and non-aviation industrial development. Portions of this area will require fill to raise buildings above the flood plain; some of the smaller wetland areas would be filled, although the largest wetlands located near the southern end of the airport would not be affected. Roadway access and utility extensions to these areas will be required before significant development can occur. The southern portion of the airport has approximately 61 acres of

developable land located north of Airway Drive. An additional 49 acres located south of Airway Drive contains two larger wetland areas in addition to a designated floodway. The final layout of this area will depend on further wetland studies and a flood management plan for the airport. However, based on general floodway and wetland considerations, it is anticipated that 40 to 50 percent of the southern 49 acres will remain undeveloped.

As noted earlier, a 700-foot runway extension is identified at the end of Runway 31. The need for this improvement is expected to be long-term and may be related to increased activity by larger business jet or transport category aircraft. A parallel taxiway section would extend from Taxiway F to the runway end. Taxiway development on the east side of the runway is limited by the glide slope critical area. The runway extension would require relocation of the existing approach light system and the glide slope. Relocation of the glide slope critical area would also permit an extension of Taxiway B.

East Side Development

The preferred development for the east side of the airport involves the 25- and 13-acre areas located adjacent to Turner Road. The 13-acre parcel located between West Coast Washers and the animal kennel is zoned "IP." The area has limited airside access via a narrow taxilane located immediately east of the glide slope critical area and a small wetland (located in the floodway). As with the II-Morrow and West Coast facilities, future developments in this area will need to be compatible with the floodway (i.e., locating vehicle parking within these designated areas, etc.).

The 25-acre parcel located between II-Morrow and the Oregon Army National Guard area is zoned "PS." The eastern edge of this area is also located within the designated floodway. Specific design enhancements for the floodway will be needed as development expands in the area. This area has been identified as a prime location for aviation-related developments requiring larger acreage. For this reason, developments requiring less acreage should be accommodated in the western or southern sections of the airport. The configuration of this development will be flexible. Vehicle access and aircraft access needs will be dependent on the specific type of development which is implemented.

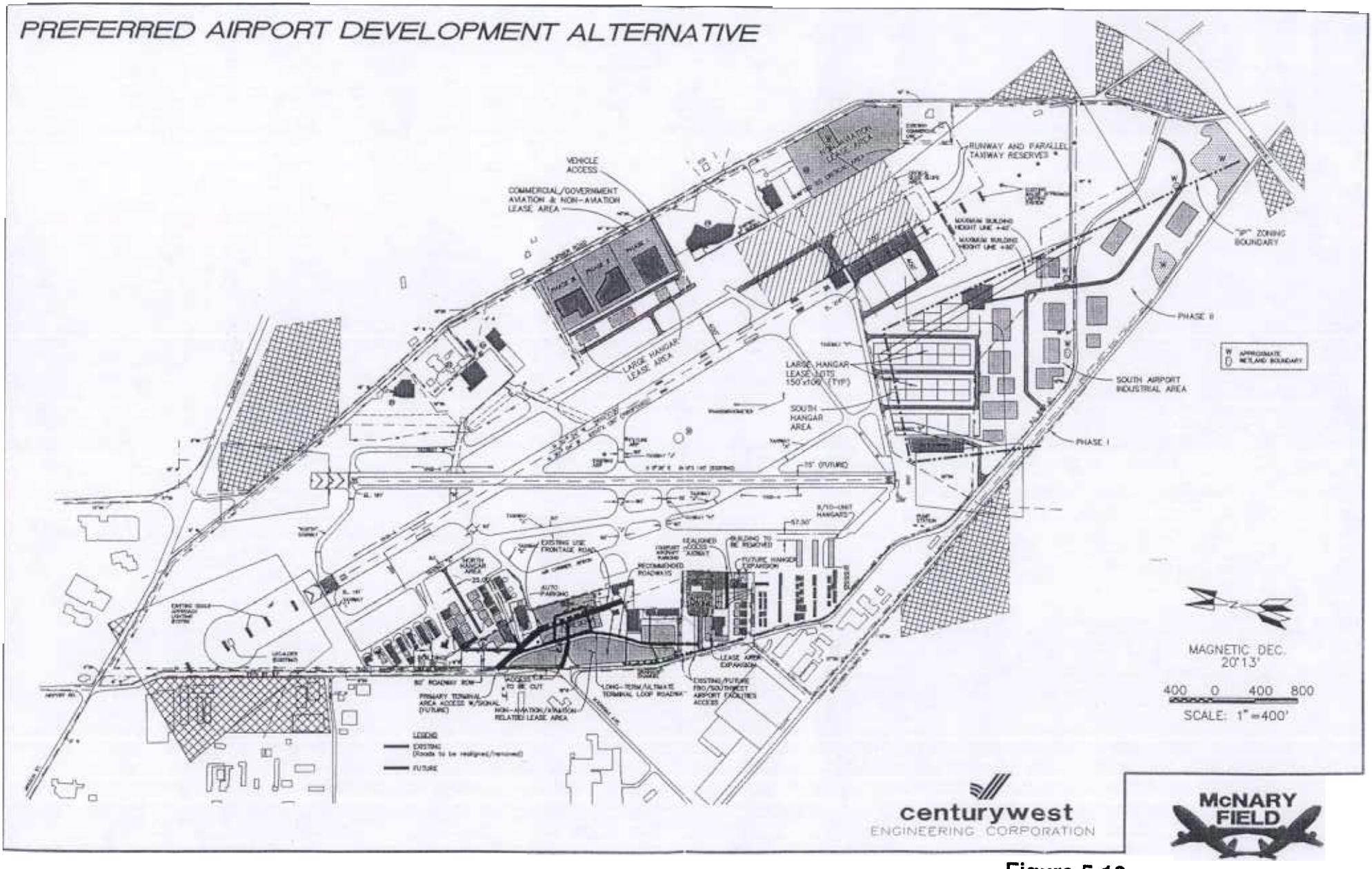

PREFERRED AIRPORT DEVELOPMENT ALTERNATIVE
VEHICLE ACCESS
COMMERCIAL/GOVERNMENT AVIATION & NON-AVIATION LEASE AREA
RUNWAY AND PARALLEL TAXIWAY RESERVES
"P" ZONING BOUNDARY
PHASE II
PHASE I
LARGE HANGAR LEASE AREA
LARGE HANGAR LEASE LOTS 150'x100' (TYP.)
SOUTH HANGAR AREA
SOUTH AIRPORT INDUSTRIAL AREA
APPROXIMATE WETLAND BOUNDARY
MAGNETIC DEC. 20°13'
400 0 400 800
SCALE: 1" = 400'
LEGEND
EXISTING
FUTURE
centurywest
ENGINEERING CORPORATION
McNARY FIELD

Figure 5-12

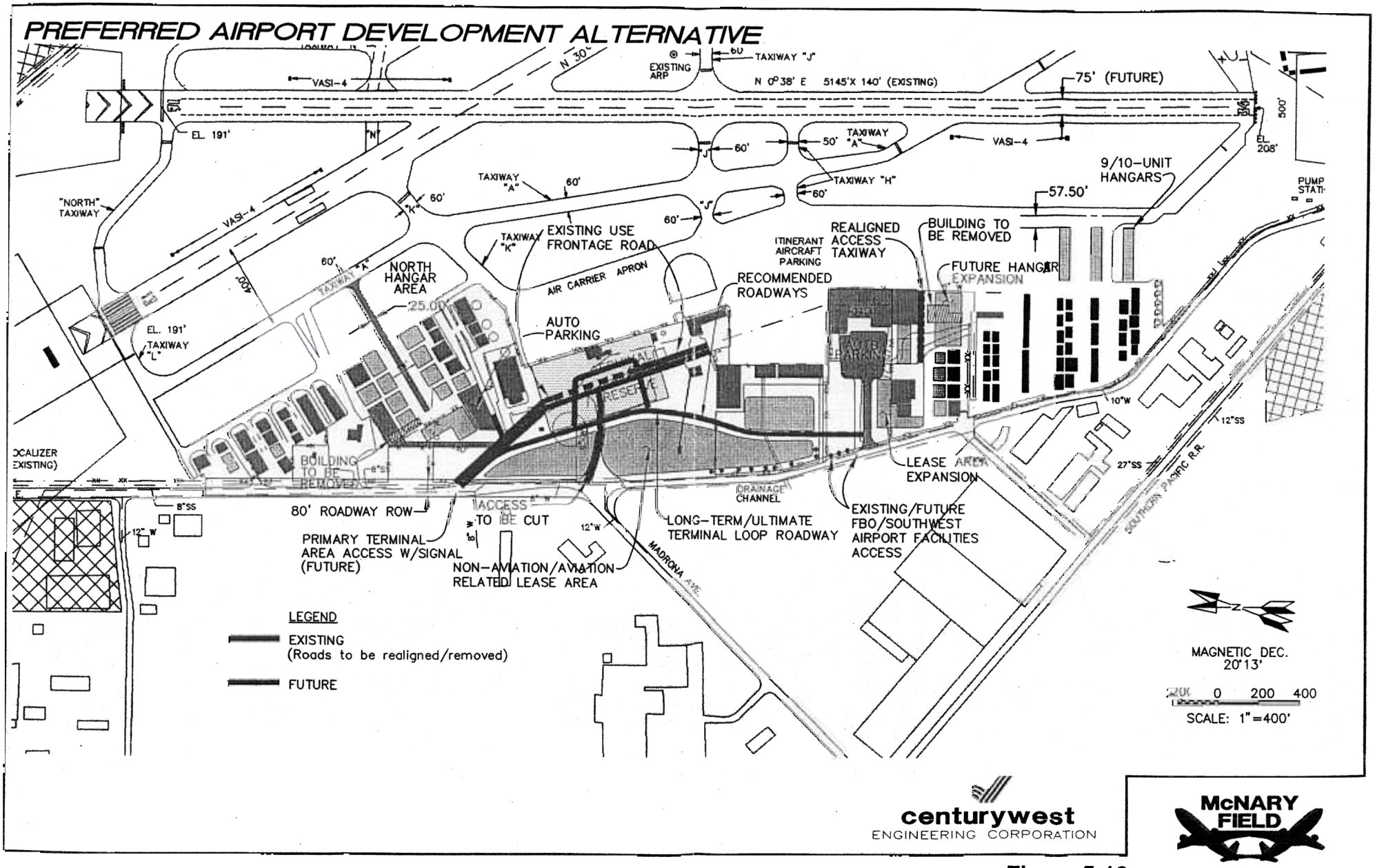

PREFERRED AIRPORT DEVELOPMENT ALTERNATIVE
VASI-4
N 30°
EXISTING ARP
TAXIWAY "J"
N 0°38' E 5145'X 140' (EXISTING)
75' (FUTURE)
EL. 191'
"N"
TAXIWAY "A"
50'
60'
TAXIWAY "H"
VASI-4
9/10-UNIT HANGARS
57.50'
EL. 208'
"NORTH" TAXIWAY
"K"
TAXIWAY "K"
EXISTING USE FRONTAGE ROAD
AIR CARRIER APRON
ITINERANT AIRCRAFT PARKING
REALIGNED ACCESS TAXIWAY
BUILDING TO BE REMOVED
FUTURE HANGAR EXPANSION
NORTH HANGAR AREA
25.00
RECOMMENDED ROADWAYS
AUTO PARKING
EL. 191'
TAXIWAY "L"
BUILDING TO BE REMOVED
LEASE AREA EXPANSION
DRAINAGE CHANNEL
80' ROADWAY ROW
ACCESS TO BE CUT
LONG-TERM/ULTIMATE TERMINAL LOOP ROADWAY
EXISTING/FUTURE FBO/SOUTHWEST AIRPORT FACILITIES ACCESS
PRIMARY TERMINAL AREA ACCESS W/SIGNAL (FUTURE)
NON-AVIATION/AVIATION RELATED LEASE AREA
MADRONA AVE.
SOUTHERN PACIFIC R.R.
LEGEND
EXISTING
(Roads to be realigned/removed)
FUTURE
MAGNETIC DEC. 20°13'
0 200 400
SCALE: 1"=400'
centurywest
ENGINEERING CORPORATION
McNARY FIELD

Figure 5-13

PREFERRED AIRPORT DEVELOPMENT ALTERNATIVE

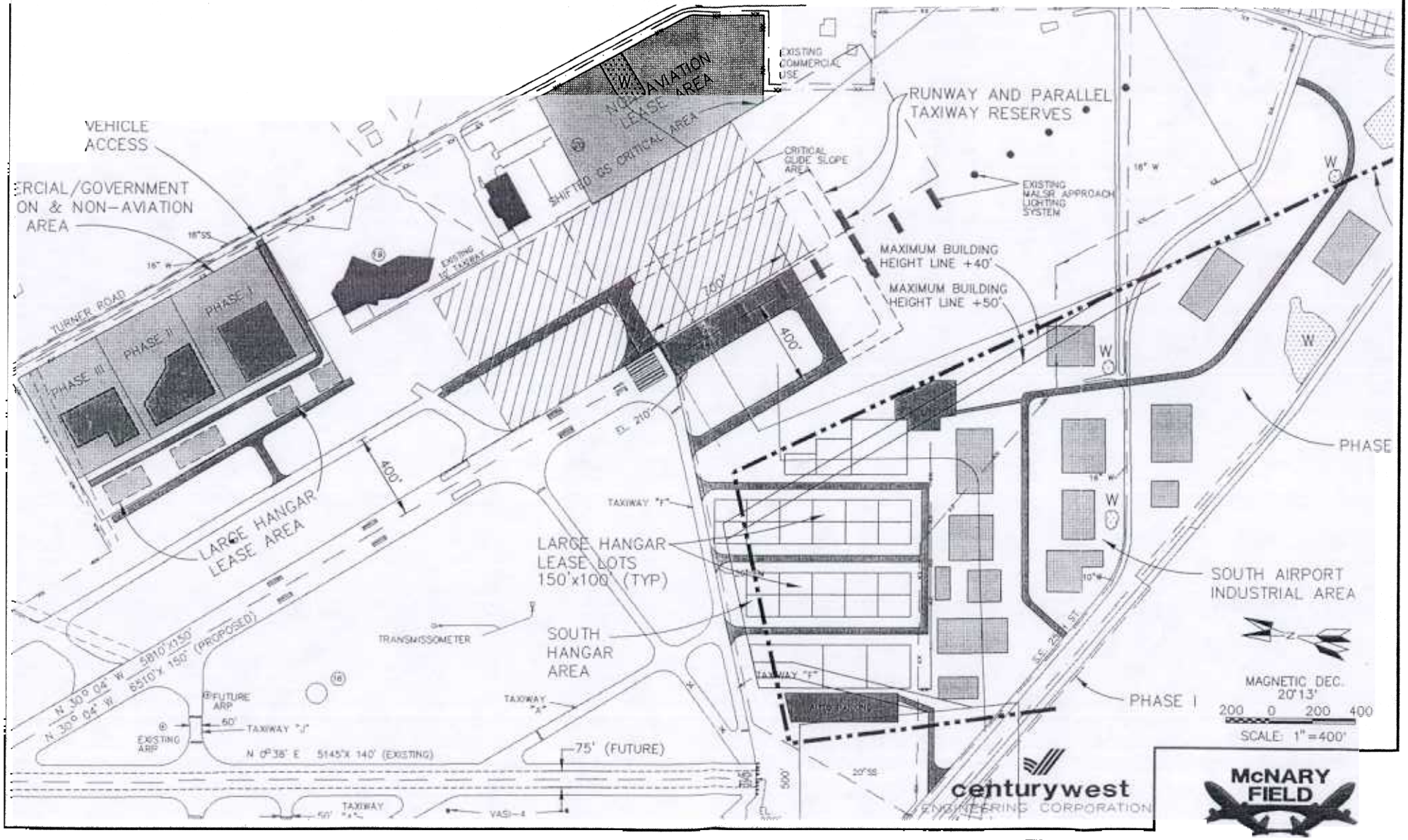


Figure 5-14

Chapter Six
NOISE AND LAND USE COMPATIBILITY

Summary: As part of the master plan update for McNary Field, updated noise contours were generated for current, 5- and 20-year forecast activity. Upon review of the contours, it has been determined that no residences are located within the current 55, 60, or 65 DNL noise contours for the airport. It is understood that occasional noise complaints occur from residential areas that are located outside these noise contours. Efforts by air traffic controllers and pilots to avoid the areas whenever possible when arriving or departing, should be continued. A review of the 20-year contours indicate that no (existing) residences are located within the 60 or 65 DNL contours.

Note: The master plan scope of work (Task 6.3) requires a determination of whether more detailed noise analysis (i.e., FAR Part 150 Noise Compatibility Plan) will be required based on the finding of this evaluation. With no incompatible land uses located within the 65 DNL (or 60 or 55 DNL) noise contours, more detailed analyses do not appear to be required at this time.

INTRODUCTION

Noise is most often 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 developed to relate sound to the sensitivity of the human ear. The A-weighted decibel scale (dBA) is calibrated to the faintest sound audible to the average young human ear. The human ear often judges an increase of 10 decibels as a doubling of sound.

The difficulty 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, research has shown that individual responses to noise are difficult to predict. Some people are annoyed by each perceivable noise event, while others show little concern over the most disruptive of events. However, predicting the responses of groups of people is possible. As a result, community response, not individual response, has emerged as the prime index of aircraft noise measurement.

DNL METHODOLOGY

A methodology has been devised to relate measurable sound from a variety of sources to community response. Termed "Day-Night Average Sound Level" (DNL), this metric has been adopted by the U.S. Environmental Protection Agency, Department of Housing and Urban Development, Oregon Department of Environmental Quality (DEQ), and the Federal Aviation Administration to use in evaluating noise impacts.

The basic unit in the computation of DNL is the sound exposure level (SEL). A SEL is computed by adding the dBA level for each second of a noise event above a certain threshold. For example, a noise monitor located in a residential area with a background noise level of 45 dBA receives the sound impulses of an approaching aircraft and records the dBA reading for each second of the event as the aircraft approaches and departs the site. Each of these one-second readings is then added logarithmically to compute the SEL. Because of the logarithmic calculation, noise levels below 10 dBA of the maximum level are significant in terms of DNL value. A comparison between individual aircraft takeoff noise levels and common noise levels is presented in **Figure 6-1**.

The computation of an airport DNL involves the addition, weighting, and averaging of each SEL to achieve a DNL level at particular location. The SEL of each noise event occurring between the hours of 10:00 p.m. and 7:00 a.m. is automatically weighted by adding 10 dBA to the SEL to account for the assumed additional irritation perceived during that period. All SELs are then averaged over a given time period (day, week, year) to achieve a level characteristic of the total noise environment.

Stated simply, a DNL is approximately equal to the average dBA level during an entire time period, with a weighting 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 both an area with very few high-noise events and an area with many low level events.

The noise contours depicted begin at 55 DNL, and in 5 DNL increments, extend to 65 DNL. Noise impacts upon adjacent land uses are discussed in the "Compatible Land Use" section of this chapter. As described below, the existing and future noise levels projected for McNary Field will not create significant impacts on the surrounding community.

The aircraft noise contours were generated using the FAA's Integrated Noise Model (INM) (Version 5.1); helicopter noise modeling was conducted using the Helicopter Noise Model (HNM).

Noise Contours

Figure 6-2 depicts the general location of aircraft flight tracks for McNary Field. These tracks represent the most common arrival, departure and touch & go paths for aircraft operating at the airport. The location of these tracks were determined by direct observation, with additional information provided by air traffic control tower personnel and local aircraft operators. While some aircraft may deviate from these tracks, most of the aircraft use these paths in and out of the immediate airport area.

Figures 6-3, 6-4, and 6-5 depict the current, five-year and twenty-year noise contours for McNary Field. The contours were generated using the FAA's Integrated Noise Model and Helicopter Noise Model, and reflect current and forecast air traffic levels. The twenty-year contours will also be depicted on the Airport Land Use Plan, which will be included in the official Airport Layout Plan drawing set.

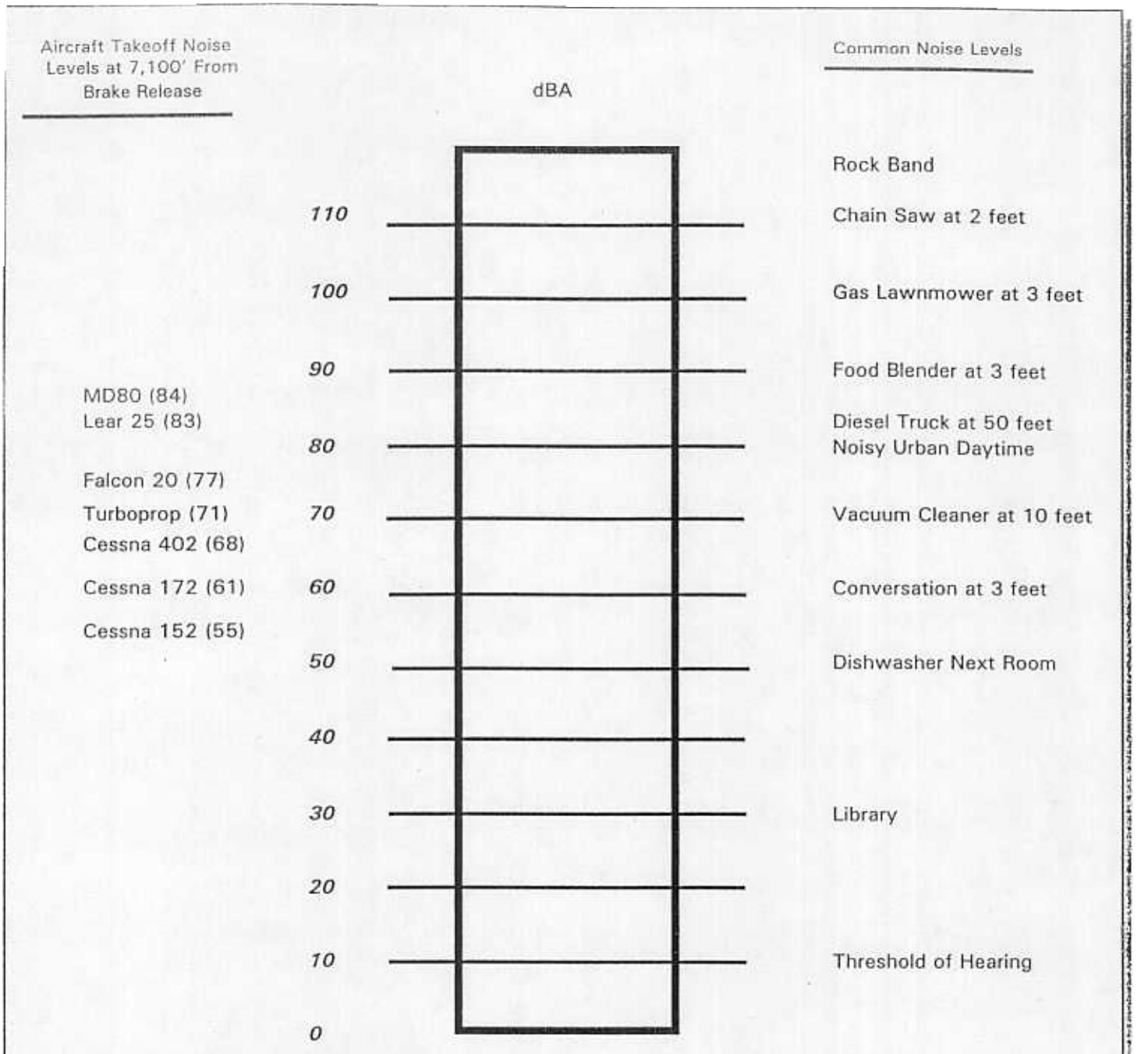


FIGURE 6–1

Typical Noise Levels on dBA Scale

A comparison with the 1985 Airport Master Plan reveals two major factors affecting aircraft noise. The 1985 plan projected traffic levels were 40 to 50 percent higher than current activity and the recently updated forecasts. The 1985 plan also projected much higher air carrier activity through the planning period. These two factors combined to create significantly larger noise contours in the earlier plan.

1995 Contours

The 65 DNL contour is contained almost entirely within airport property boundaries. A small portion of the 65 DNL contour extends beyond the northeast corner of the airport over the large gravel pit located near the end of Runway 16 and Turner Road.

The 60 DNL contour is also contained almost entirely on airport property, with small areas extending beyond the northeast corner and southwest corners of the airport (near Runway 16-34 ends) and near the end of Runway 13 along SE 25th Avenue (north of the large gravel pit/lake). These adjacent land areas have industrial zoning (Industrial Commercial, Industrial Business Complex and General Industrial).

The 55 DNL contour follows the extended centerline of both runways and the primary military helicopter arrival/departure route. Portions of the 55 DNL contour extend approximately 2,500 to 2,800 feet beyond the north and south ends of the airport (beyond Runway 16-34); approximately 1,000 feet east of the airport along its northeast corner; and approximately 400 to 600 feet west of SE 25th Avenue near the north and south ends of the airport. Based on available mapping, no residences are located within the 55, 60, or 65 DNL contours. The nearest residential areas to the 55 DNL contour are located in the mobile home park along Turner Road and a block of houses located immediately west of the Kmart store at SE 25th and Mission Street.

2000 Noise Contours

The 65 DNL contour is contained almost entirely within airport property boundaries. A small portion of the 65 DNL contour extends beyond the northeast corner of the airport over the large gravel pit located near the end of Runway 16 and Turner Road.

The 60 DNL contour is contained almost entirely on airport property, with small areas extending approximately 500 feet beyond the northeast corner and 100 feet beyond the southwest corner of the airport (near Runway 16-34 ends). These adjacent land areas have industrial zoning (Industrial Commercial, Industrial Business Complex and General Industrial).

The 55 DNL contour follows the extended centerline of both runways and the primary military helicopter arrival/departure route. Portions of the 55 DNL contour extend approximately 2,000 to 2,500 feet beyond the north and south ends of the airport (beyond Runway 16-34); approximately 2,200 feet east of the airport (near the OANG helicopter area); and approximately 300 to 500 feet west of SE 25th Avenue near the north and south ends of the airport. Based on available mapping, no residences are located within the 55, 60 or 65 DNL contours. The

nearest residential areas to the 55 DNL contour are located in the mobile home park along Turner Road. The most significant difference between the 1995 and 2000 contours is the reduction in transport category jet operations associated with gaming charter flights. The level of transport aircraft activity such as the Boeing 737, is projected at approximately 100 operations per year, less than half of recent years activity.

2015 Noise Contours

As with earlier forecast years, the 65 DNL contour is contained almost entirely within airport property boundaries, with only a small portion extending beyond the northeast corner of the airport over the large gravel pit.

The 60 DNL contour has areas extending approximately 600 to 700 feet beyond the northeast corner and 400 feet beyond the southwest corner of the airport (near Runway 16-34 ends). The adjacent land areas have industrial zoning (Industrial Commercial, Industrial Business Complex and General Industrial).

The 55 DNL contour follows the extended centerline of both runways and the primary military helicopter arrival/departure route. Portions of the 55 DNL contour extend approximately 3,000 to 3,500 feet beyond the north and south ends of the airport (beyond Runway 16-34); approximately 3,000 to 3,500 feet east of the airport (near the OANG helicopter area); and approximately 300 feet west of SE 25th Avenue near the north end of the airport and 800 feet west at the south end of the airport. No residences are located within the 60 or 65 DNL contours, although an estimated three or four residences are located within the year 2015 55 DNL contour (located at the south tip of contour near 27th Avenue SE). The mobile home park along Turner Road is just outside the 55 DNL contour for the year 2015.

COMPATIBLE LAND USE

The compatibility of existing and planned uses in the vicinity of an airport is generally associated with the level of noise and safety impacts related to the airport. Compatibility or incompatibility of land use is determined by comparing the DNL noise contour with existing and potential land uses. The FAA has developed guidelines for land-use compatibility based on noise levels and the nature of the land use being impacted. Commercial, industrial, and most public uses are considered compatible with airport operations, as long as they are consistent with performance standards of Federal Aviation Regulation (FAR) **Part 77** relative to height and safety. Residential use is compatible in areas below the 65 DNL noise contour. **Table 6-1** provides the federal land-use compatibility guidelines.

In addition to federal guidelines, the State of Oregon DEQ has corresponding guidelines for noise compatibility and requires that an "Airport Noise Impact Boundary" be included in Airport Master Plans, with contours depicted down to 55 DNL. While 55 DNL establishes the parameters of the study area, federal guidelines provide that noise-sensitive land uses located in areas with impacts

below 65 DNL are considered compatible with aviation activity. Like the FAA, DEQ recommends mitigation measures for noise-sensitive land uses lying in areas with impacts exceeding 65 DNL.

Noise Compatibility and Land Use

The airport is located within the Salem city limits and Urban Growth Boundary (UGB). The southern edge of the city limits is located within two miles of the airfield's south side. Noise impacts of the Preferred Alternative are not expected to be significant, due largely to the existing two-runway configuration and the forecast aircraft operations levels and fleet mix.

Airport overlay zoning exists for this facility, although a review will be conducted to insure that the full length of the Runway 31 precision instrument approach surface is contained within the overlay zone. Overlay zoning does not affect existing surface zoning, but is designed to protect the airspace surrounding an airport, by providing height and hazard guidance for lands located beneath FAR **Part 77** imaginary airspace surfaces.

The aviation-use areas of the airport are zoned **PS** (Public Service); other portions of the airport are zoned **IP** (Industrial Park) and **PA** (Public Amusement). The airport is surrounded primarily by industrial and commercial zoning, with some residential zoning located between the southeast corner of the airport and U.S. Interstate 5. Large areas of residential zoning are located within one to two miles of the airport in all directions.

As noted in **Table 6-1**, all land uses are compatible with noise levels at or below 65 DNL. Based on FAA noise compatibility planning standards and existing zoning, no conflicts exist between airport noise and existing land use. No residences or structures are identified within the 55 DNL contour or higher. As a result, the airport does not create a significant noise impact on the surrounding community.

AIRPORT OVERLAY ZONING

The **City of Salem Zoning Code** includes an **Airport Overlay Zone (Chapter 125)**. As described in section 125.040, *"the following zones [airport overlay zone]...include all of the land lying beneath the approach surfaces, transitional surfaces, horizontal surfaces, and conical surfaces as they apply to McNary Field Airport."*

The existing overlay zone provides specific guidelines for structure height limitations, marking and lighting, and other related items. With the adoption of the 1997 Airport Master Plan Update, local land use planning officials should ensure that the Airport Overlay Zone boundaries reflect the FAR Part 77 surfaces depicted on the updated Airspace Plan (Drawing 3).

The definition of the overlay zone does not require revision; however, references to the updated airport master plan should be incorporated into the ordinance.

Table 6-1
LAND-USE COMPATIBILITY
WITH YEARLY DAY-NIGHT AVERAGE SOUND LEVELS

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

Table 6-1 (Continued)

Land Use	Below 65	65-70	70-75	75-80	80-85	Over 85
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.

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.

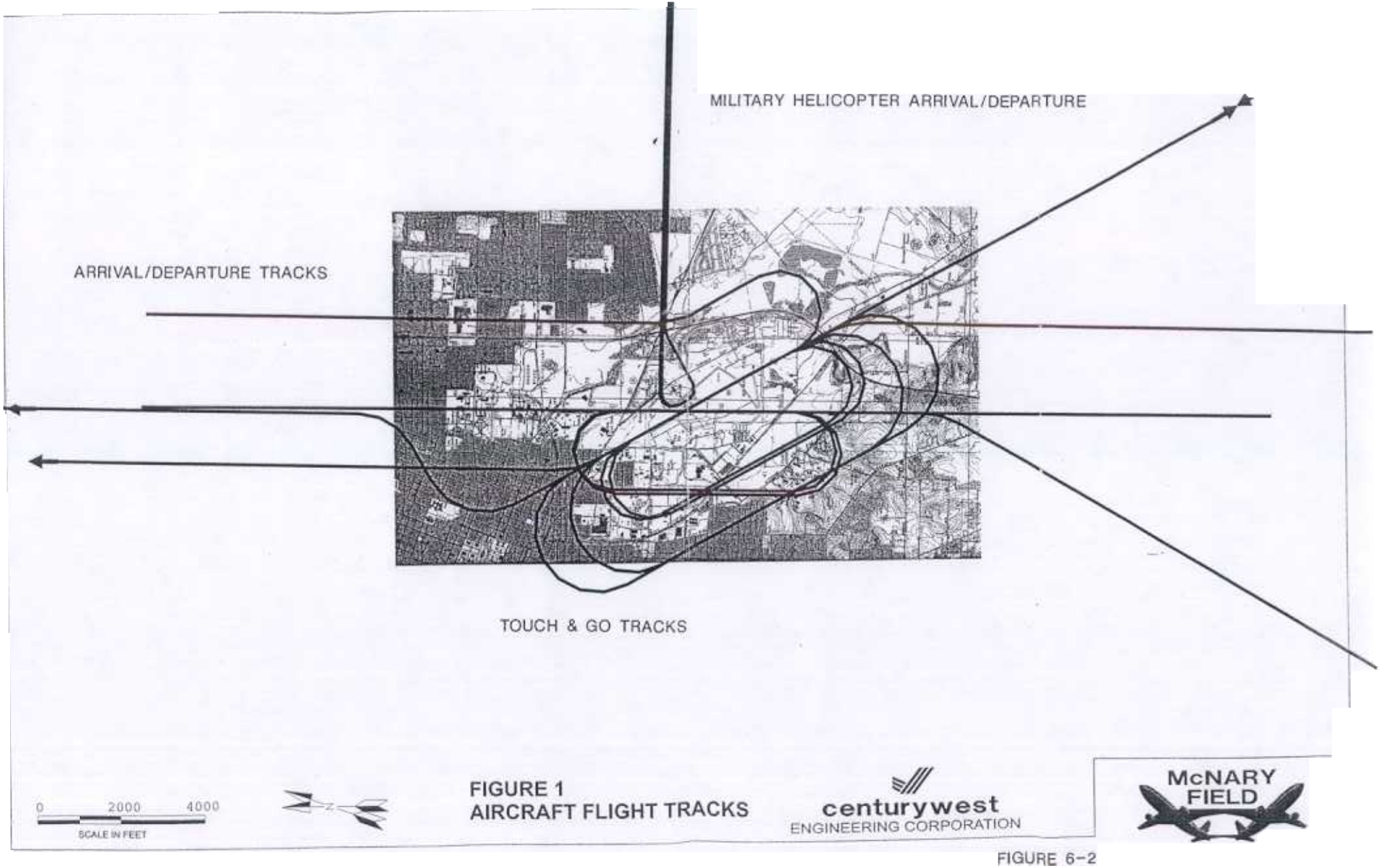
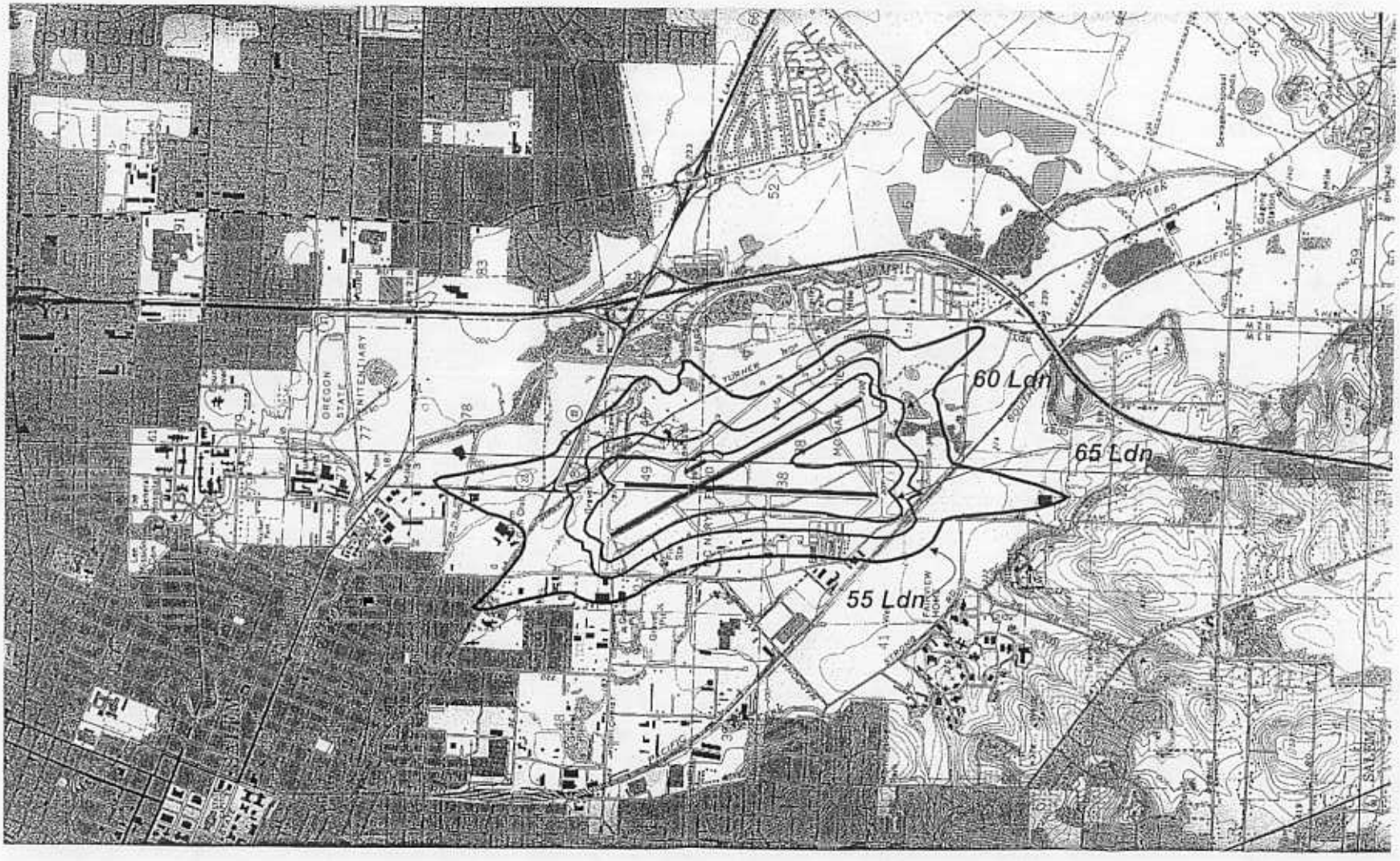


FIGURE 1
AIRCRAFT FLIGHT TRACKS

centurywest
ENGINEERING CORPORATION

McNARY FIELD

FIGURE 6-2



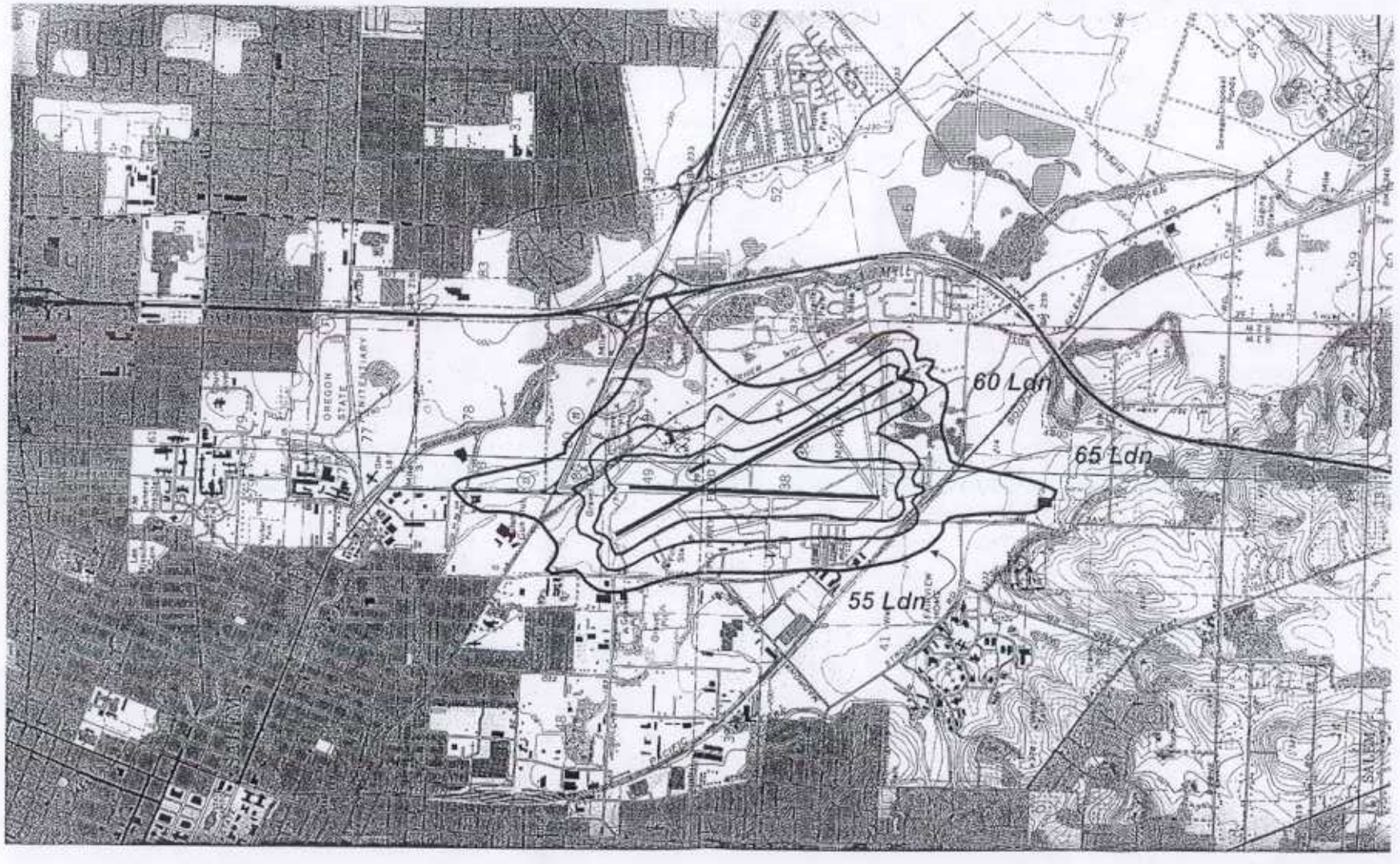
0 2000 4000
SCALE IN FEET

FIGURE 2
1995 NOISE CONTOURS

centurywest
ENGINEERING CORPORATION

McNARY FIELD

GU



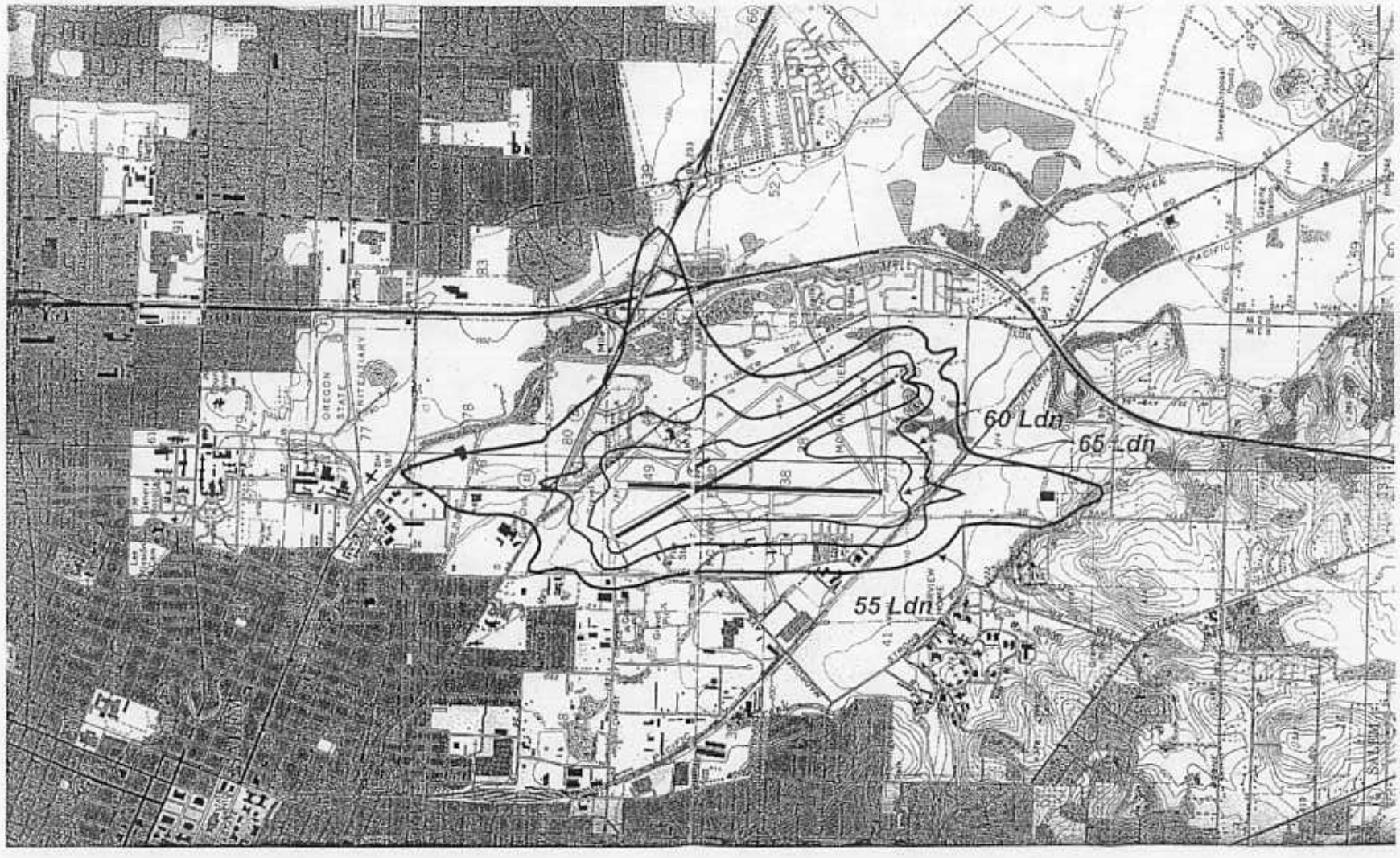
0 2000 4000
SCALE IN FEET

FIGURE 3
2000 NOISE CONTOURS

centurywest
ENGINEERING CORPORATION

McNARY FIELD

FIGURE



0 2000 4000
SCALE IN FEET

FIGURE 4
2015 NOISE CONTOURS

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McNARY FIELD

FIGURE

Chapter Seven
AIRPORT LAYOUT PLANS

In Chapter Five, Airport Development Alternatives, an evaluation was made of future options for airside and landside development at McNary Field. This effort has resulted in the selection of airport development alternatives that will accommodate the facility requirements projected through the current twenty-year planning period, and beyond. The purpose of this chapter is to describe in narrative and graphic form, the recommended airport development contained in the twenty-year master plan. Reduced-size copies of the drawings are included at the end of this chapter.

A set of plans, referred to as the Airport Layout Plans have been prepared to graphically depict recommendations for airport layout, land use, and possible disposition of obstructions located within the runway protection zones, approaches, or other airfield imaginary surfaces. The set of plans includes:

Drawing 1 - Airport Layout Plan
Drawing 2 - Terminal Area Plan
Drawing 3 - Airport Airspace Drawing
Drawing 4 - Runway Approach Profiles
Drawing 5 -Runway Protection Zone Plans and Profiles
Drawing 6 - Airport Land Use Plan with 2015 Noise Contours
Drawing 7 - On Airport Land Use Plan

Federal Aviation Administration **Advisory Circular (AC) 150/5300-13, Change 5 Airport Design,** provides criteria for runways, taxiways, and other airside facilities, in addition to recommended format and content of airport layout plan drawing sets. **Federal Air Regulation (FAR) Part 77 - Objects Affecting Navigable Airspace,** provides criteria for establishing and depicting the airspace imaginary surfaces surrounding the airport.

Airport Layout Plan

The Airport Layout Plan (ALP) presents the existing and ultimate airport layout and depicts the improvements which are recommended to meet forecast aviation demand. Airport and Runway data tables provide additional information on existing conditions and dimensions.

The primary improvements at McNary Field are located along the west, south, and eastern sides of the airport. The west side of the airfield currently accommodates virtually all civil aviation development. Expansion or reconfiguration of hangar areas, FBO facilities, and other related facilities is planned to optimize the potential of the existing development areas.

Development of new facilities is identified for the south and east portions of the airport. These areas will accommodate aviation and non-aviation users with larger land requirements. The southern portion

of the airport has previously been identified for industrial development. The configuration depicted on the Airport Layout Plan protects aviation-related land requirements, while providing opportunities for the airport to strengthen its financial base.

Several infrastructure improvements (i.e., utilities, site fill, etc.) for the non-aviation areas will not be eligible for FAA funding. A 700-foot extension for Runway 13-31 (with taxiway extension) is depicted on the Airport Layout Plan. The timing of this improvement will be based on specific aircraft requirements. The runway extension will require the relocation of the glide slope and the approach lighting system for Runway 31.

Terminal Area Plan

The Terminal Area Plan provides a larger scale view of facilities and improvements on the western side of the airfield. The drawing provides additional detail for hangar, apron, and terminal area facilities. As noted above, the primary focus on the west side of the airport will be to improve efficiency and maximize the use of available space. The cost of accommodating near-term hangar demand in this area is expected to be significantly less expensive than developing other areas of the airport. New taxilane access will be required for both the north and south corporate hangar areas.

A terminal area reserve is identified for the area surrounding the existing terminal. New commercial air service at Salem may occur during the current planning period. It is anticipated that the existing terminal will eventually require major renovation or replacement. The terminal reserve will accommodate a larger building, access roadways, and expanded vehicle parking areas which will be configured based on actual demand and user requirements.

Changes in the internal roadway system are also planned for the west side of the airfield. The roadway reconfiguration will improve vehicle movement and provide access to new lease areas. The planned redevelopment of the south general aviation area includes space for new multi-function FBO/GA terminal facilities, reconfigured corporate aviation apron, and expanded corporate hangar areas. Existing vehicle access will be redesigned to improve land use efficiency. T-hangar development is identified for the southern end of the general aviation apron.

Airport Airspace Drawing

The Airport Airspace Drawing for McNary Field was developed based on **Federal Air Regulations (FAR) Part 77, Objects Affecting Navigable Airspace.** In order to protect the airspace and approaches to each runway, federal criteria has been established for use by local planning and land use jurisdictions to control the height of objects in the vicinity of airports. The Part 77 Drawing graphically depicts in plan view, the imaginary surfaces for the airport. The drawing also includes a listing of noted obstructions in the vicinity of the airport. Obstruction data was provided from Airport Obstruction Chart (OC) produced by

National Ocean Survey (NOS). The majority of obstructions are trees and terrain located south and west of the airport. Where trees are identified close to the runways or within the approaches, removal or lowering is recommended. It is recommended that other fixed obstructions (poles, buildings, etc.) which do not create a critical obstruction, be lighted.

The 50,000-foot precision approach surface for Runway 31 is relatively free of terrain penetrations, although some trees are identified within the initial 10,000 feet of the surface. The terrain located west and south of the airport penetrates the horizontal surface (elevation 361 feet mean sea level) and the conical surface (elevation 361-561 feet MSL). For most of this area, tall trees are identified as obstructions; however, since the terrain also penetrates large areas of airspace, it is not considered practical to remove the trees.

Runway Approach Surface Profiles

This drawing depicts the approach profiles for each runway end. Numbered obstructions noted on this drawing correspond to the listing provided on the Airport Airspace Drawing. Runway 31 has a standard 50:1 approach slope which extends 10,000 feet beyond the runway end and primary surface. At 10,000 feet the surface continues at a slope of 40:1 until 50,000 feet beyond the runway end. Runway 13 has a 10,000-foot nonprecision instrument approach slope of 34:1. Runways 16 and 34 have visual approach surfaces with a slope of 20:1 and extend 5,000 feet.

As noted earlier, several trees penetrate the Runway 31 approach surface. Trees within the approach surface should be lowered or removed. The Runway 13 approach nonprecision approach surface has one obstruction noted (tree). The visual approach for Runway 34 has several minor penetrations (trees) which should be removed/lowered. Vehicles traveling on Turner Road beyond the end of Runway 16, penetrate the visual approach surface, per FAR Part 77 standards.

Runway Protection Zone Plan and Profile

The runway protection zone drawing provides plan and profile views for each runway. Obstructions identified and numbered on the Airspace Plan, have also been added to this drawing. The runway profiles also provide elevation data and the approach slope which correspond with each runway protection zone. The runway protection zones have existing avigation easements for the portions located off airport property. However, based on available information, additional easements will be required for portions of the Runway 31, 16, and 34 protection zones.

The future extension of Runway 13-31 will result in a shifted runway protection zone. A tree currently located slightly east of the Runway 31 protection zone (transitional surface) will be located within the future RPZ and approach surface and should be removed/lowered.

Turner Road traverses the Runway 16 protection zone; vehicles traveling on the roadway penetrate the visual approach slope. The Runway 34 protection zone is traversed by a roadway and railroad, although no penetrations to the approach surface exists.

Airport Land Use Plan (with 2015 Noise Contours)

The Airport Land Use Plan drawing depicts existing land use and zoning in the vicinity of the airport and noise contours for the year 2015. The noise contours represent the level of noise exposure anticipated in twenty years, based on updated activity forecasts, aircraft mix, and runway use patterns. Additional information, including current and 10-year noise contours and a description of the noise methodology utilized, is presented in Chapter Six, Noise and Land Use Compatibility.

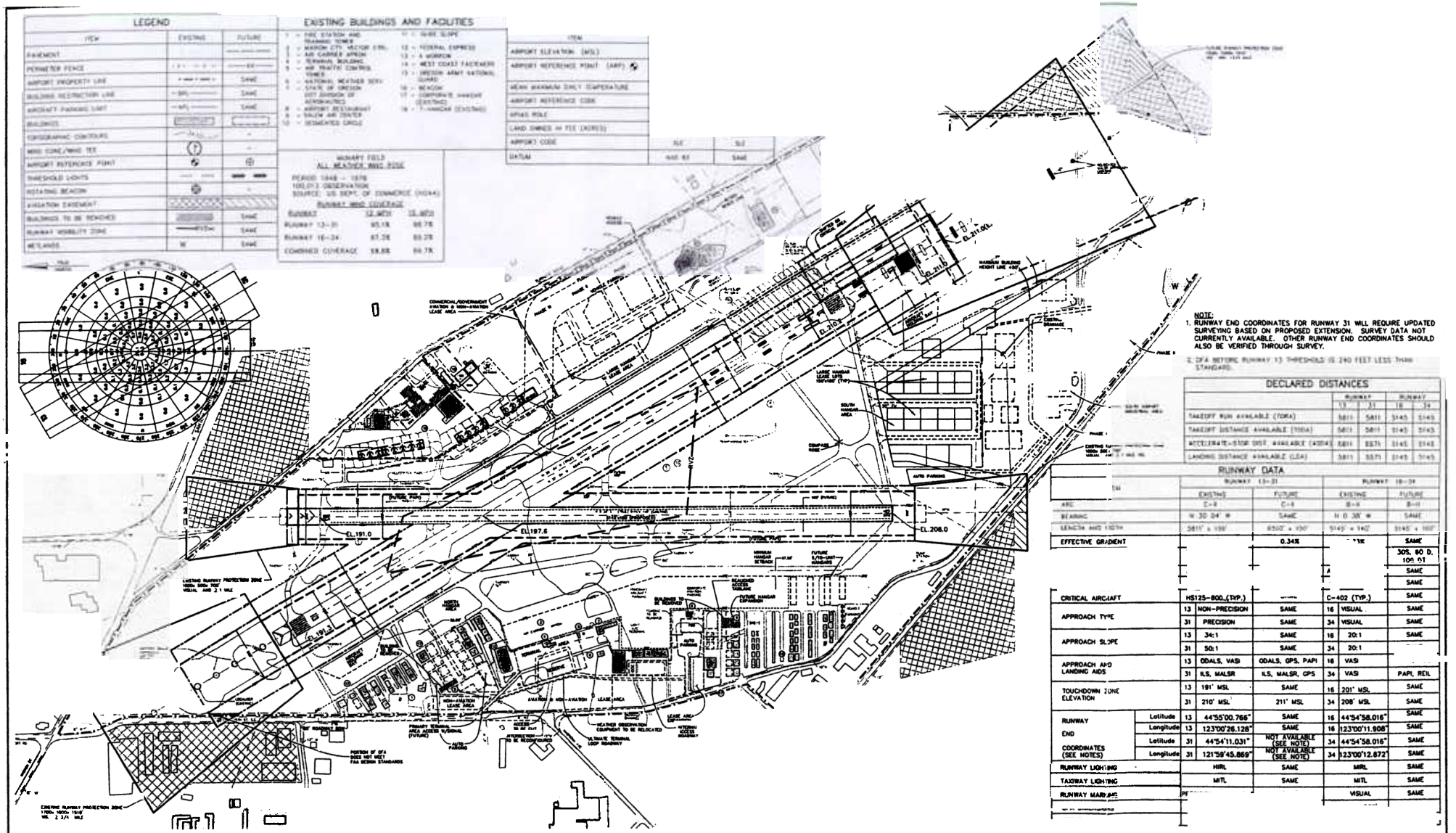
The drawing illustrates that the twenty year 60 and 65 DNL contours fall largely within airport boundaries. The twenty year 55 DNL contour extends beyond airport boundaries to the north, northeast, south, and west, although most of the adjacent land uses are industrial or commercial. A portion of the twenty year 55 DNL contour along the extended centerline of Runway 34 is located over a low-density residential area. It is estimated to three to six existing homes are located within the year 2015 55 DNL contour. Efforts should be made by local land use authorities to limit new residential development in areas expected be beneath future contours.

On Airport Land Use Plan

This drawing depicts existing zoning on the airfield. As noted earlier, the majority of airport property is zoned PS (Public Service), which is the primary zoning used for airfield facilities in Salem. Industrial land on the airport is zoned IP (Industrial Park). The area located between the Runway 31 and 34 protection zones is zoned IP. The northern-most portion of the area will accommodate aviation-related development (large hangars, taxilanes, etc.). The City of Salem should determine whether the existing IP zoning has sufficient flexibility to accommodate primary aviation-related uses without special consideration.

If aviation-related development is not easily accommodated, this area should be converted back to PS zoning.

The area located between II-Morrow and the National Guard is also zoned PS. The planned aviation-related development is compatible with PS zoning. Potential commercial/retail development along the 25th Street frontage may also warrant a change in zoning to permit this activity as an outright use. However, aviation-related commercial/retail development may also be compatible with the existing PS zoning, depending on the proposed use.



NOTE:
1. RUNWAY END COORDINATES FOR RUNWAY 31 WILL REQUIRE UPDATED SURVEYING BASED ON PROPOSED EXTENSION. SURVEY DATA NOT CURRENTLY AVAILABLE. OTHER RUNWAY END COORDINATES SHOULD ALSO BE VERIFIED THROUGH SURVEY.
2. DFA BEFORE RUNWAY 13 THRESHOLD IS 240 FEET LESS THAN STANDARD.

DECLARED DISTANCES

	RUNWAY 13	RUNWAY 31	RUNWAY 16	RUNWAY 34
TAKEOFF RUN AVAILABLE (TORA)	5811	5811	5145	5145
TAKEOFF DISTANCE AVAILABLE (TODA)	5811	5811	5145	5145
ACCELERATE-STOP DIST. AVAILABLE (ASDA)	5811	5571	5145	5145
LANDING DISTANCE AVAILABLE (LDA)	5811	5571	5145	5145

RUNWAY DATA

	RUNWAY 13-31 EXISTING	RUNWAY 13-31 FUTURE	RUNWAY 16-34 EXISTING	RUNWAY 16-34 FUTURE
ARC	C-II	C-II	B-II	B-II
BEARING	N 30 34' W	SAME	N 0 38' W	SAME
LENGTH AND WIDTH	5811' x 100'	8500' x 150'	5145' x 140'	5145' x 100'
EFFECTIVE GRADIENT		0.34%	1%	SAME
				30S, 60 D, 10C 01
				SAME
				SAME
CRITICAL AIRCRAFT	HS125-800 (TYP.)	----	C-402 (TYP.)	SAME
APPROACH TYPE 13	NON-PRECISION	SAME	VISUAL	SAME
APPROACH TYPE 31	PRECISION	SAME	VISUAL	SAME
APPROACH SLOPE 13	34:1	SAME	20:1	SAME
APPROACH SLOPE 31	50:1	SAME	20:1	
APPROACH AND LANDING AIDS 13	ODALS, VASI	ODALS, GPS, PAPI	VASI	
APPROACH AND LANDING AIDS 31	ILS, MALSR	ILS, MALSR, GPS	VASI	PAPI, REIL
TOUCHDOWN ZONE ELEVATION 13	191' MSL	SAME	201' MSL	SAME
TOUCHDOWN ZONE ELEVATION 31	210' MSL	211' MSL	208' MSL	SAME
RUNWAY END COORDINATES (SEE NOTES) Latitude 13	44°55'00.766"	SAME	44°54'58.016"	SAME
RUNWAY END COORDINATES (SEE NOTES) Longitude 13	123°00'26.128"	SAME	123°00'11.908"	SAME
RUNWAY END COORDINATES (SEE NOTES) Latitude 31	44°54'11.031"	NOT AVAILABLE (SEE NOTE)	44°54'58.016"	SAME
RUNWAY END COORDINATES (SEE NOTES) Longitude 31	121°59'45.869"	NOT AVAILABLE (SEE NOTE)	123°00'12.872"	SAME
RUNWAY LIGHTING	HIRL	SAME	MIRL	SAME
TAXIWAY LIGHTING	MITL	SAME	MITL	SAME
RUNWAY MARKING	PF		VISUAL	SAME

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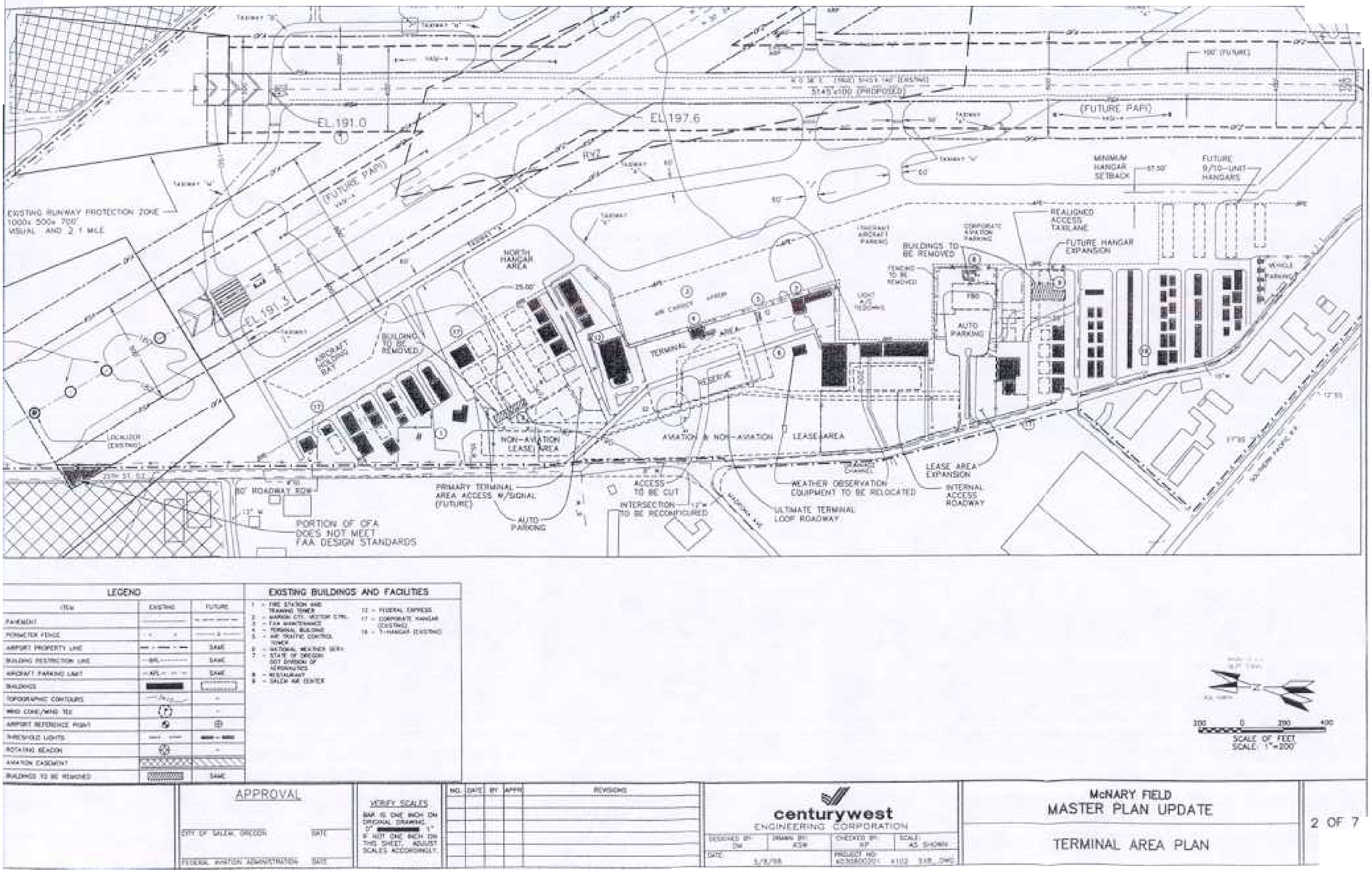
AIRPORT LAYOUT PLAN


EXISTING RUNWAY PROTECTION ZONE
1000x 500x 700'
VISUAL AND 2 1 MILE
EL 191.0
EL 197.6
EL 191.3
(FUTURE PAPI)
100' (FUTURE)
5145'x100 (PROPOSED)
MINIMUM HANGAR SETBACK
FUTURE 9/10-UNIT HANGARS
REALIGNED ACCESS TAXILANE
FUTURE HANGAR EXPANSION
CORPORATE AVIATION PARKING
BUILDINGS TO BE REMOVED
FENCING TO BE REMOVED
ITINERANT AIRCRAFT PARKING
NORTH HANGAR AREA
AIRCRAFT HOLDING BAY
BUILDING TO BE REMOVED
AIR CARRIER APRON
TERMINAL AREA
RESERVE
AUTO PARKING
FBO
VEHICLE PARKING
NON-AVIATION LEASE AREA
AVIATION & NON-AVIATION LEASE AREA
LOCALIZER (EXISTING)
80' ROADWAY ROW
PRIMARY TERMINAL AREA ACCESS W/SIGNAL (FUTURE)
AUTO PARKING
ACCESS TO BE CUT
INTERSECTION TO BE RECONFIGURED
WEATHER OBSERVATION EQUIPMENT TO BE RELOCATED
ULTIMATE TERMINAL LOOP ROADWAY
LEASE AREA EXPANSION
INTERNAL ACCESS ROADWAY
PORTION OF OFA DOES NOT MEET FAA DESIGN STANDARDS
LEGEND
ITEM
EXISTING
FUTURE
PAVEMENT
PERIMETER FENCE
AIRPORT PROPERTY LINE
BUILDING RESTRICTION LINE
AIRCRAFT PARKING LIMIT
BUILDINGS
TOPOGRAPHIC CONTOURS
WIND CONE/WIND TEE
AIRPORT REFERENCE POINT
THRESHOLD LIGHTS
ROTATING BEACON
AVIATION EASEMENT
BUILDINGS TO BE REMOVED
SAME
EXISTING BUILDINGS AND FACILITIES
1 - FIRE STATION AND TRAINING TOWER
2 - MARION CTY. VECTOR CTRL.
3 - FAA MAINTENANCE
4 - TERMINAL BUILDING
5 - AIR TRAFFIC CONTROL TOWER
6 - NATIONAL WEATHER SERV.
7 - STATE OF OREGON DOT DIVISION OF AERONAUTICS
8 - RESTAURANT
9 - SALEM AIR CENTER
12 - FEDERAL EXPRESS
17 - CORPORATE HANGAR (EXISTING)
18 - T-HANGAR (EXISTING)
SCALE OF FEET
SCALE: 1"=200'
200 0 200 400
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TERMINAL AREA PLAN
2 OF 7

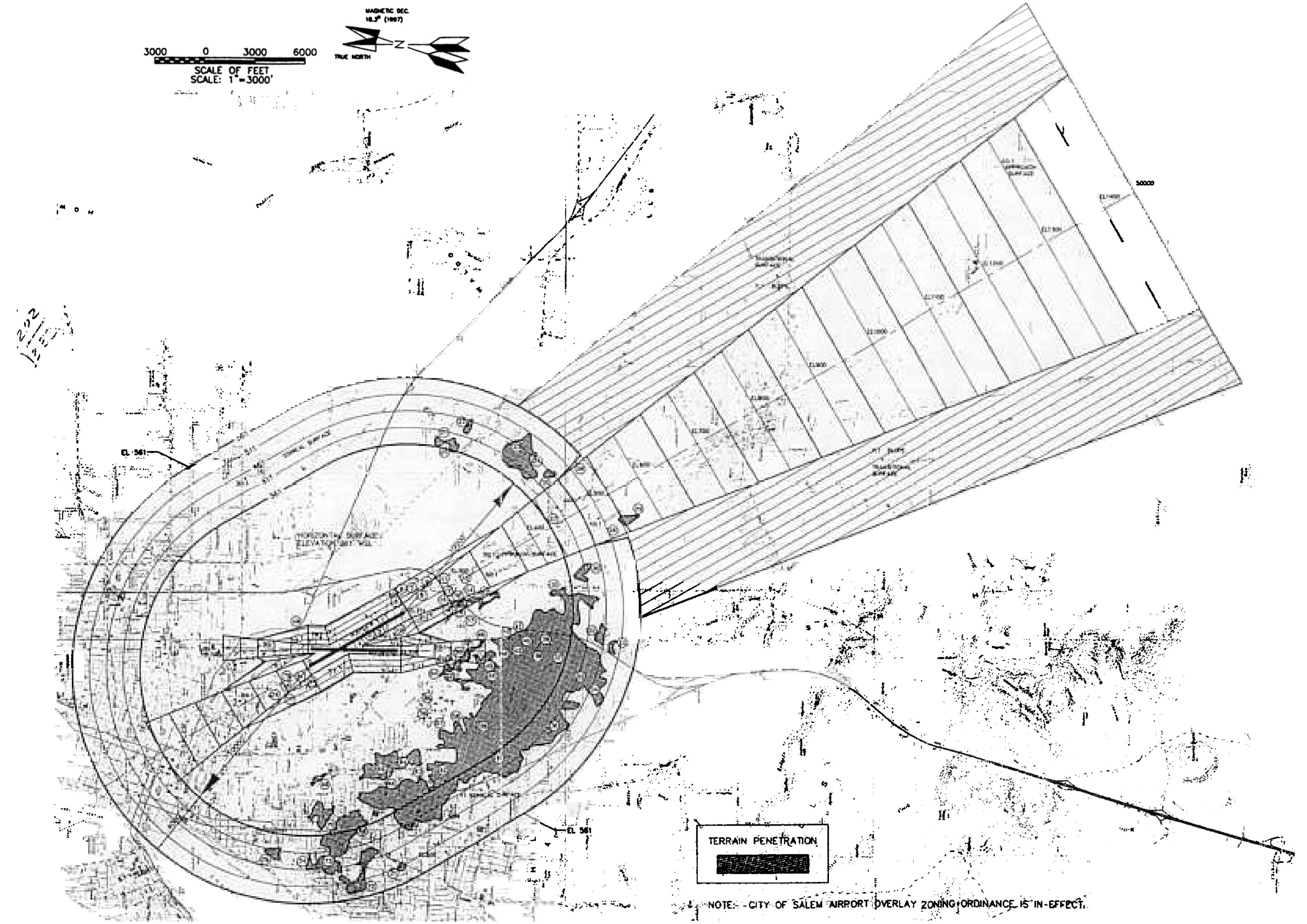
OBSTRUCTIONS					
NO.	ELEV.	DESCRIPTION	SURFACE PENETRATED	AMOUNT PENETRATION	DISPOSITION
1	219	BLAST SLOPE ANT. 31	PRIMARY	30'	NONE
2	215	TRANSPON. OL	PRIMARY	14'	NONE
3	221	ANEMOMETER &	PRIMARY	20'	NONE
4	222	WINDSOCK OL	PRIMARY	20'	NONE
5	227	BLDG	PRIMARY 31 AND 3 APPROACH	17'	LIGHT
6	261	TREE	TRANSITIONAL	8'	TOP/REMOVE
7	262	TREE	TRANSITIONAL	17'	TOP/REMOVE
8	253	TREE	TRANSITIONAL	9'	TOP/REMOVE
9	269	TREE	TRANSITIONAL	20'	TOP/REMOVE
10	277	TREE	TRANSITIONAL	38'	REMOVE
11	320	TREE	RWY 31 APPROACH	45'	REMOVE
12	307	TREE	RWY 31 APPROACH	31'	REMOVE
13	328	TREE	RWY 31 APPROACH	50'	REMOVE
14	317	TREE	RWY 31 APPROACH	33'	REMOVE
15	338	TREE/TERRAIN	RWY 31 APPROACH	36'	TOP/TRIM
16	310	TREE	RWY 31 APPROACH	16'	TOP
17	387	TREE	HORIZONTAL	29'	NONE
18	385	TREE/TERRAIN	TRANSITIONAL	11'	NONE
19	315	TREE/TERRAIN	RWY 31 APPROACH	37'	TOP/REMOVE
20	511	TREE/TERRAIN	CONICAL	147'	NONE
21	540	TREE/TERRAIN	CONICAL	159'	NONE
22	522	TREE/TERRAIN	CONICAL	175'	NONE
23	513	TREE/TERRAIN	CONICAL	160'	NONE
24	536	TREE/TERRAIN	CONICAL	180'	NONE
25	520	TREE/TERRAIN	CONICAL	172'	NONE
26	310	POLE	RWY 31 APPROACH	15'	LIGHT
27	475	TREE	CONICAL	9'	TOP/REMOVE
28	532	TREE	CONICAL	14'	TOP/REMOVE
29	577	TREE	CONICAL	147'	NONE
30	514	TREE	CONICAL	87'	NONE
31	421	TREE	HORIZONTAL	45'	NONE
32	509	TREE	CONICAL	117'	NONE
33	504	TREE	CONICAL	87'	NONE
34	501	TREE	CONICAL	81'	NONE
35	536	TREE	CONICAL	138'	NONE
36	559	TREE	CONICAL	177'	NONE
37	529	TREE	HORIZONTAL	184'	NONE
38	529	TREE	HORIZONTAL	184'	NONE
39	585	TREE	HORIZONTAL	226'	NONE
40	507	TREE	HORIZONTAL	148'	NONE
41	534	TREE	HORIZONTAL	173'	NONE
42	436	POLE	HORIZONTAL	77'	LIGHT
43	493	TREE	HORIZONTAL	132'	NONE
44	495	TREE	HORIZONTAL	134'	NONE
45	444	TREE	HORIZONTAL	83'	NONE
46	420	TERRAIN	RWY 34 APPROACH	—	NONE
47	424	TREE/TERRAIN	RWY 34 APPROACH	1'	NONE
48	208	ROAD	RWY 16 APPROACH	5'	NONE
49	480	TREE/TERRAIN	HORIZONTAL	119'	NONE
50	320	TREE/TERRAIN	RWY 34 APPROACH	17'	NONE
51	274	TREE	RWY 34 APPROACH	1'	NONE
52	392	TANK-OL	HORIZONTAL	31'	NONE
53	421	TREE/TERRAIN	HORIZONTAL	60'	NONE
54	[illegible]	TREE/TERRAIN	HORIZONTAL	52'	NONE
55	374	TREE	HORIZONTAL	13'	NONE
56	[illegible]	ANTENNA OL	HORIZONTAL	77'	LIGHT
57	475	TREE/TERRAIN	HORIZONTAL	114'	NONE
58	457	[illegible]	HORIZONTAL	96'	NONE
59	532	TREE/TERRAIN	HORIZONTAL	171'	NONE
60	589	TREE/TERRAIN	HORIZONTAL	228'	NONE
61	570	TREE/TERRAIN	CONICAL	168'	NONE
62	453	TREE/TERRAIN	HORIZONTAL	92'	NONE
63	489	TREE/TERRAIN	HORIZONTAL	128'	NONE
64	455	TREE/TERRAIN	HORIZONTAL	94'	NONE
65	475	TREE/TERRAIN	HORIZONTAL	114'	NONE
66	479	TREE/TERRAIN	HORIZONTAL	118'	NONE
67	384	TREE/TERRAIN	HORIZONTAL	23'	NONE
68	386	TREE/TERRAIN	HORIZONTAL	25'	NONE
69	461	TREE/TERRAIN	HORIZONTAL	100'	NONE
70	431	TREE/TERRAIN	HORIZONTAL	70'	NONE
71	538	TREE/TERRAIN	CONICAL	22'	NONE
72	626	[illegible]	CONICAL	165'	LIGHT
73	540	TREE/TERRAIN	CONICAL	87'	NONE
74	512	TREE/TERRAIN	CONICAL	51'	NONE
75	442	TREE/TERRAIN	CONICAL	47'	NONE
76	268	TREE/TERRAIN	TRANSITIONAL	6'	TOP/REMOVE
77	271	TREE/TERRAIN	TRANSITIONAL	4'	TOP/REMOVE
78	275	TREE/TERRAIN	TRANSITIONAL	4'	TOP/REMOVE
79	247	TREE/TERRAIN	TRANSITIONAL	31'	TOP/REMOVE
80	220	LIGHT STD.	TRANSITIONAL	4'	LIGHT
81	308	TREE	RWY 13 APPROACH	12'	TOP/REMOVE
82	277	TREE/TERRAIN	TRANSITIONAL	47'	NONE

NOTES:

1. KNOWN PENETRATIONS TO APPROACH, HORIZONTAL, TRANSITIONAL, AND CONICAL SURFACES ARE PRESENTED. OTHER MAY EXIST.

2. INFORMATION SOURCE: NOAA AIRPORT OBSTRUCTION CHART, USGS MAPS, PREVIOUS AIRSPACE PLANS.

3. DISPOSITION OF INDIVIDUAL OBSTRUCTIONS SHOULD BE VERIFIED BY AIRPORT SPONSOR; OBSTRUCTIONS WHICH ARE LIGHTED (OL), ARE NOTED ON DESCRIPTION. TREE ELEVATIONS BASED ON PREVIOUS NOS/NOAA OBSTRUCTIONS SURVEY; CURRENT ELEVATION CAN BE ASSUMED TO BE HIGHER (UNKNOWN AMOUNT).



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McNARY FIELD
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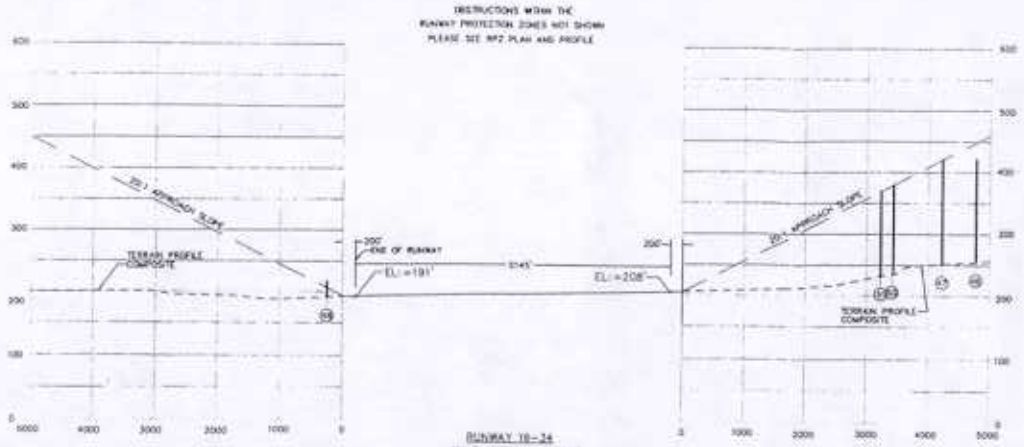
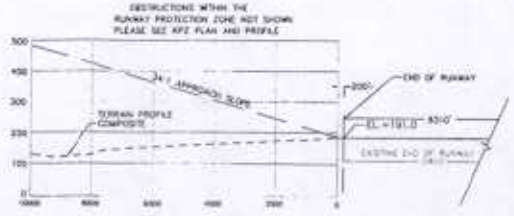
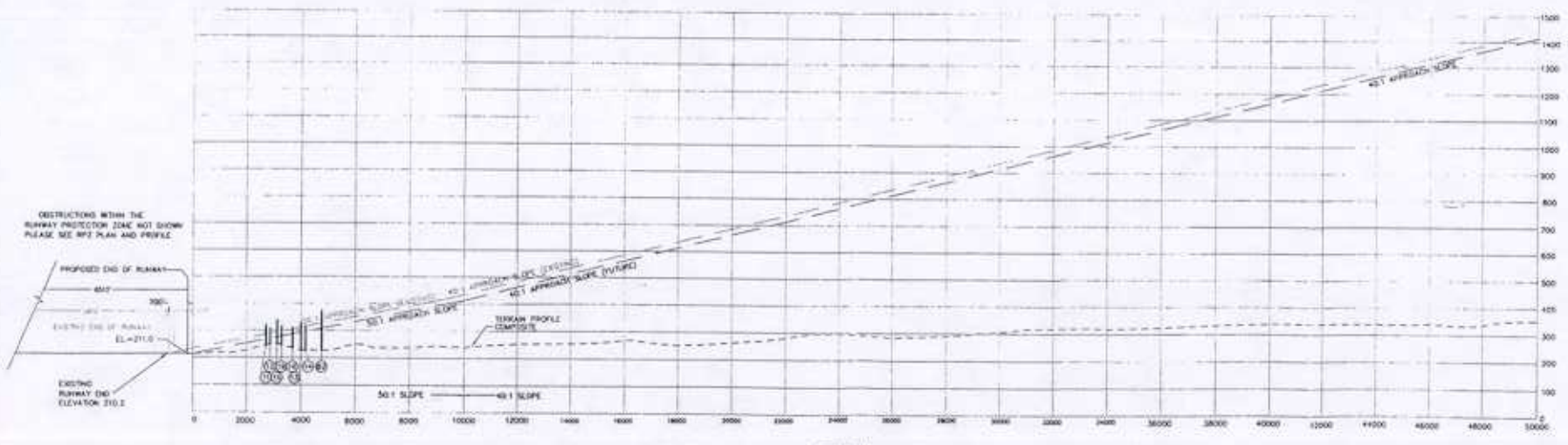
AIRSPACE DRAWING



RUNWAY 16-34
SCALE: HORIZONAL 1"=1000'
VERTICAL 1"= 100'



RUNWAY 13
SCALE: HORIZONAL 1"=2000'
VERTICAL 1"= 200'



RUNWAY 31
SCALE: HORIZONAL 1"=2000'
VERTICAL 1"= 200'

NOTE: SEE DRAWING 3 FOR OBSTRUCTION DATA LISTING

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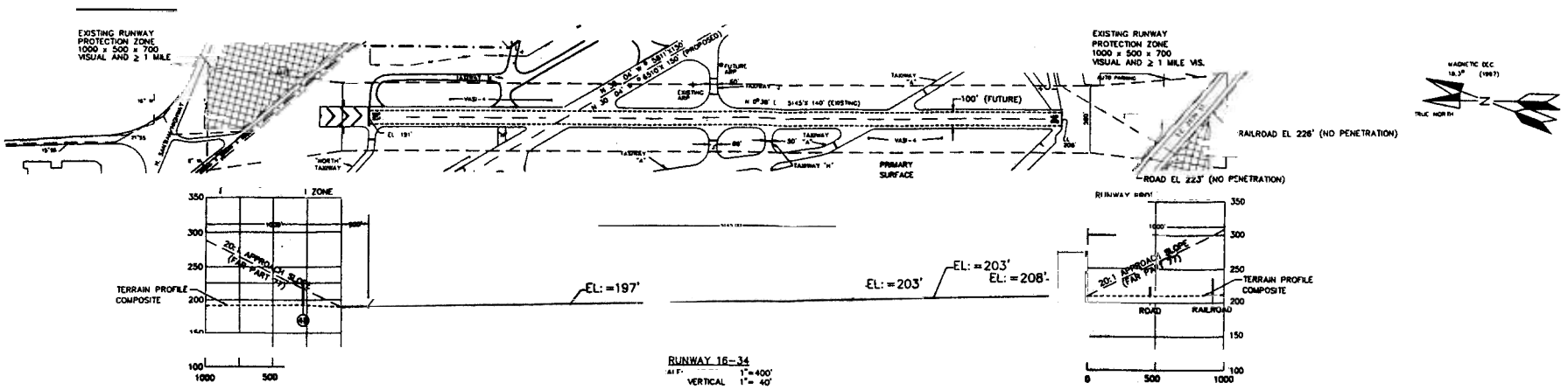
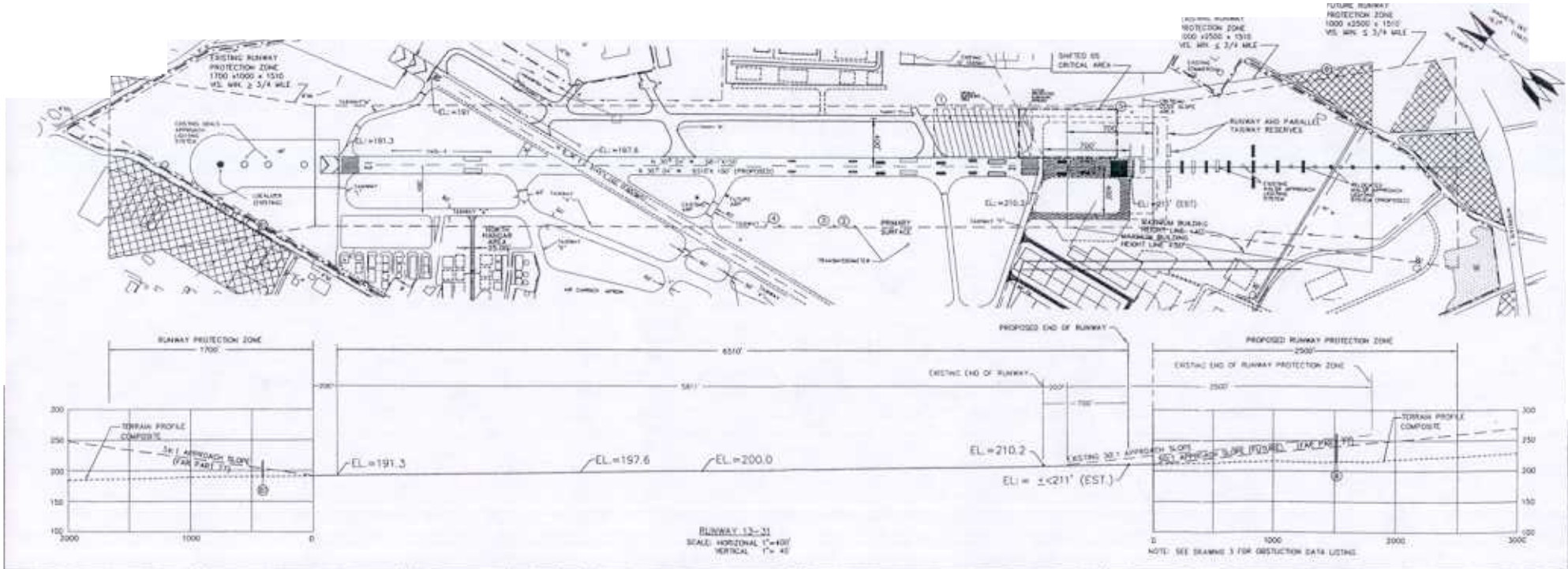
AIRPORT RUNWAY
APPROACH SURFACE PROFILES





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McNARY FIELD
MASTER PLAN UPDATE

RUNWAY PROTECTION ZONE
PLAN AND PROFILE

5 OF 7

CITY OF SALEM ZONING
ABBREVIATIONS

EFU EXCLUSIVE FARM USE

RA RESIDENTIAL AGRICULTURE

RS SINGLE FAMILY RESIDENTIAL

RD DUPLEX RESIDENTIAL

RM MULTIPLE FAMILY RESIDENTIAL

RH MULTIPLE FAMILY HIGH-RISE RESIDENTIAL

CO COMMERCIAL OFFICE

CN NEIGHBORHOOD COMMERCIAL

CR RETAIL COMMERCIAL

CG GENERAL COMMERCIAL

CB CENTRAL BUSINESS DISTRICT

IC INDUSTRIAL COMMERCIAL

IBC INDUSTRIAL BUSINESS CAMPUS

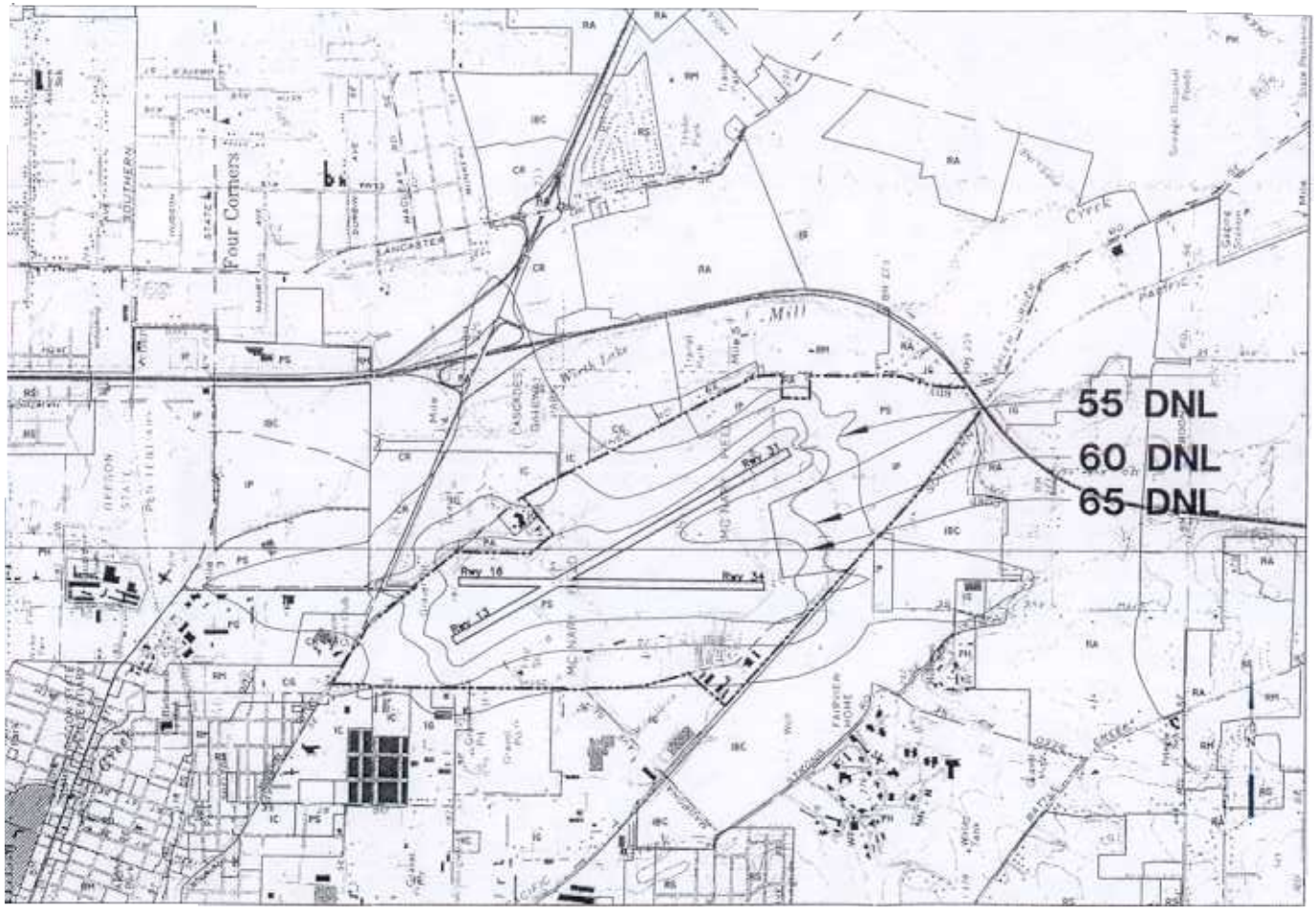
IP INDUSTRIAL PARK

IG GENERAL INDUSTRIAL

II INTENSIVE INDUSTRIAL

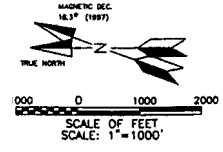
P PUBLIC USE
(PS – PUBLIC SERVICE)
(PA – PUBLIC AMUSEMENT)

AIRPORT PROPERTY LINE



NOTES

1. CITY OF SALEM AIRPORT OVERLAY IN EFFECT. (CHAPTER 125)
2. YEAR 2015 NOISE CONTOURS 55, 60, 65 DNL.
3. NOISE ANALYSIS CONDUCTED BY:
   ARON FAEGRE & ASSOCIATES
   520 SW YAMHILL, ROOF GARDEN 1
   PORTLAND OR 97204
   (503) 222-2546
4. NOISE CONTOURS REFLECT FUTURE RUNWAY EXTENSION (700 FEET) ON RUNWAY 13-31.



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McNARY FIELD
MASTER PLAN UPDATE

LAND USE PLAN
WITH NOISE CONTOURS

Chapter Eight
FINANCIAL MANAGEMENT and DEVELOPMENT PROGRAM

The analyses conducted in the previous chapters have evaluated airport development need based on forecast changes in aircraft activity, environmental factors, and operational efficiency. 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 presentation of this program and its feasibility has been organized in several sections. First, the airport development schedule and cost summaries will be presented, outlining the costs for each project and the staging of development through the twenty-year planning period. Secondly, projections of operating revenues and expenses are provided through a basic cash flow analysis showing the airport's ability to support the capital program through the first five years of the planning period.

Historically, funding of major capital projects at the airport has been through Federal Aviation Trust Fund monies, local funding, and private investment. The primary source for airport development funds has historically been through aviation user fees. In cases where federal grant monies and local funds are not sufficient to conduct a particular project or group of projects, other funding sources may need to be pursued, or the project deferred until adequate funding may be obtained.

AIRPORT DEVELOPMENT SCHEDULE AND COST ESTIMATES

The analyses presented in Chapter Five described the airport's overall development needs for the next twenty years. However, for subsequent feasibility analyses, details need to be included for these capital expenditures. This has been accomplished by applying estimates of cost for projects within the development program. Cost estimates for each project are based on 1997 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 1997-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:

$$\frac{X}{160.1} = Y$$

Where:
X = CPI in any given future year
Y = Change Ratio
160.1 = USCPI in May, 1997; (1982-1984 = 100)

Multiplying the change ratio (Y) times any 1997-based cost figures presented in this study will yield the adjusted dollar amounts appropriate in any future year evaluation. However, national CPI data should be used, as local or region measures may vary.

Before summarizing staged capital costs, two important points should be emphasized. First, the staging of development projects is based upon projected airport activity levels. 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.

Secondly, due to the conceptual nature of a master plan, implementation of recommended capital projects will occur following further refinement of design and cost estimates through architectural or engineering analyses. Capital costs presented in this chapter should be viewed only as estimates, subject to subsequent refinement. Nevertheless, these estimates are considered accurate for performing the feasibility analysis in this chapter. A summary of development costs during the twenty-year master plan is presented in **Table 8-1**. Recent airport operational revenues and expenses are presented in **Table 8-2.**

Cost estimates for each development project are presented in **Table 8-3. Table 8-4** identifies each project's eligibility for FAA funding. The FAA will not typically participate in vehicle parking, hangar development, and costs associated with non-aviation developments.

Preliminary coordination with the Seattle Airports District Office of the FAA indicates that three projects are currently included in the five-year CIP:

FY 1997
Regional Fire Training Simulator
FY 1998
No FAA funding is expected to be available for this year.
FY 1999
Runway 16-34, Apron Slurry Seals.

The master plan update will provide a revised list of project priorities which will be used by the City of Salem and the FAA in developing their capital project scheduling. Stage I of the capital improvement program includes the highest priority projects to be conducted during the first five years.

Projects have been listed for 1998, despite the FAA's preliminary indication that no funding will be available in that year. The City will pursue project funding in the event that some projects can be completed. Alternatively, the projects will be deferred to the following year.

The capital improvement program provides planning-level estimates of project costs. Additional engineering analyses will be required

Table 8-1
Summary of Development Costs

Stage I	1997-2001	$1,870,837
Stage II	2002-2006	$2,685,266
Stage III	2007-2016	$6,242,344
Total Development Costs		$10,798,447

Table 8-2
McNary Field - Operational Revenues and Expenses

Revenue Sources	**1993-1994 Actual**	**1994-1995 Actual**	**1995-1996 est.**
Tiedown Fees	$5,812	$10,485	$11,000
Landing Fees	19,285	9,430	11,200
Parking	13,543	10,584	14,000
Land/Building Rent	217,717	230,097	215,000
Concessions, Other	4,138	7,601	30,750
Fuel	18,107	14,874	19,200
Interest, Other Unclassified	4,781	6,887	10,500
Total Operational Revenues	**$283,383**	**$289,958**	**$311,650**
Expenses			
Personal Services	$120,801	$132,042	$141,370
Materials & Services	165,026	172,576	416,875*
Debt Service	3,000	3,000	3,000
Total Operational Expenses	**$288,827**	**$307,618**	**$561,245***
Balance	($5,444)	($17,660)	($249,595)*

Source: City of Salem

* *This figure includes Contract Services of $296,450 related to specific projects with a funding source other than operational revenues. Typical expense for this category: $13,496 1994-95; $46,502 1995-96.*

TABLE 8-3
McNary Field Master Plan Update
Capital Improvement Projects

Stage II (2002-2006)	Unit Type	Quantity	Unit $	Cost	30% Engineering & Contingency	Total
1 South Industrial Area Utilities - Phase I	LS	1	$95,500.00	$95,500	$28,650	$124,150
2 South Ind. Access Road - Phase I (1650 lf)	SY	5500	$35.00	$192,500	$57,750	$250,250
3 South Ind. Site Fill - Phase I	CY	48150	$9.00	$433,350	$130,005	$563,355
4 South Ind. Fencing - Phase I	LF	1700	$14.00	$23,800	$7,140	$30,940
5 Taxiway C Sealcoat	SY	20000	$1.26	$25,200	$7,560	$32,760
6 Taxiway A Sealcoat	SY	41400	$1.26	$52,164	$15,649	$67,813
7 South Airport Taxiway - Phase I	SY	2500	$26.00	$65,000	$19,500	$84,500
8 South Airport Access Road, Parking	SY	2300	$35.00	$80,500	$24,150	$104,650
9 Runway 16-34 Overlay	SY	57200	$5.60	$320,320	$96,096	$416,416
10 PAPI - Rwy 16 & 34	Ea	2	$15,000.00	$30,000	$9,000	$39,000
11 Rwy 16 & 34 REIL	Ea	2	$14,000.00	$28,000	$8,400	$36,400
12 North Hangar Taxilanes Sealcoat	SY	10000	$1.26	$12,600	$3,780	$16,380
13 South Hangar Taxilane 2 & 3 Overlay	SY	2780	$5.60	$15,568	$4,670	$20,238
14 South Hangar Taxilane 1,4,5,6 Sealcoat	SY	5560	$1.26	$7,006	$2,102	$9,107
15 South Apron Overlay	SY	57800	$5.60	$323,680	$97,104	$420,784
16 Runway 13-31 Sealcoat	SY	96900	$1.26	$122,094	$36,628	$158,722
17 Taxiway A Overlay	SY	36300	$5.60	$203,280	$60,984	$264,264
18 Taxiway B Sealcoat	SY	27800	$1.26	$35,028	$10,508	$45,536
Total Stage II				**$2,065,590**	**$619,677**	**$2,685,266**

Stage III (2007-2016)	Unit Type	Quantity	Unit $	Cost	30% Engineering & Contingency	Total
1 South Airport Taxiway - Phase II	SY	3610	$26.00	$93,860	$28,158	$122,018
2 Center Apron Overlay	SY	40000	$5.60	$224,000	$67,200	$291,200
3 Taxiway C Overlay	SY	20000	$5.60	$112,000	$33,600	$145,600
4 Terminal Area Bypass Roadway	SY	6000	$35.00	$210,000	$63,000	$273,000
5 South Industrial Area Utilities - Phase II	LS	1	$89,500.00	$89,500	$26,850	$116,350
6 South Ind. Access Road - Phase II	SY	3300	$35.00	$115,500	$34,650	$150,150
7 South Ind. Site Fill - Phase II	CY	176926	$9.00	$1,592,334	$477,700	$2,070,034
8 Main Apron Overlay	SF	28330	$5.60	$158,648	$47,594	$206,242
9 East Side Taxiway	SY	3750	$26.00	$97,500	$29,250	$126,750
10 East Side Access Roadway (1600 lf)	SY	5330	$35.00	$186,550	$55,965	$242,515
11 East Side Site Prep/Floodway Grading	SY	38900	$2.00	$77,800	$23,340	$101,140
12 East Side Fencing	LF	1800	$14.00	$25,200	$7,560	$32,760
13 South Hangar Taxilane 2 & 3 Sealcoat	SY	2780	$1.26	$3,503	$1,051	$4,554
14 South Hangar Taxilane 1,4,5,6 Overlay	SY	5000	$5.60	$28,000	$8,400	$36,400
15 Runway 13-31 Overlay	SY	96900	$5.60	$542,640	$162,792	$705,432
16 Taxiway B Overlay	SY	27800	$5.60	$155,680	$46,704	$202,384
17 Taxiway A Sealcoat	SY	36300	$1.26	$45,738	$13,721	$59,459
18 Taxiway C Sealcoat	SY	20000	$1.26	$25,200	$7,560	$32,760
19 Runway 13-31, Parallel Txy Extension	SY	19100	$35.00	$668,500	$200,550	$869,050
20 Extend Edge Lighting	LF	700	$40.00	$28,000	$8,400	$36,400
21 Relocate MALSR	ea	1	$50,000.00	$50,000	$15,000	$65,000
22 South Airport Taxiway - Phase III	SY	3750	$26.00	$97,500	$29,250	$126,750
23 Terminal Area Loop Roadway	SF	27000	$6.45	$174,150	$52,245	$226,395
Total Stage III				**$4,801,803**	**$1,440,541**	**$6,242,344**
Total All Stages				**$8,456,498**	**$2,341,949**	**$10,798,447**

TABLE 8-3
McNary Field Master Plan Update
Capital Improvement Projects

	Stage I Projects (1997-2001)	Unit Type	Quantity	Unit $	Cost	30% Engineering & Contingency	Total
	Year 1 - 1997						
1	ARFF Training Equipment	ea	1	$550,000.00	$550,000	$0	$550,000
	Total Year 1			**$550,000.00**	**$550,000**	**$0**	**$550,000**
	Year 2 - 1998						
1	T-Hangar Development	n/a	To be privately funded				
2	North Hangar Taxiway	SY	1944	$26.00	$50,544	$15,163	$65,707
3	N. Hangar Access Road, Parking	SY	5350	$40.25	$215,338	$64,601	$279,939
4	Apron Rehabilitation (@ ODOT Hangar)	SY	1960	$19.00	$37,240	$11,172	$48,412
	Total Year 2				**$303,122**	**$90,936**	**$394,058**
	Year 3 - 1999						
1	Runway 16-34 Sealcoat	SY	82900	$1.26	$104,454	$31,336	$135,790
2	West Side Apron Sealcoat	SY	127000	$1.26	$160,020	$48,006	$208,026
3	Airport Flood Management Plan	LS			$100,000	$0	$100,000
	Total Year 3				**$364,474**	**$79,342**	**$443,816**
	Year 4 - 2000						
1	Demo Flight Deck Restaurant Bldg.	LS	1	$20,000.00	$20,000	$6,000	$26,000
2	Reconfigure FBO/GA Terminal Apron	SY	11000	$17.73	$195,030	$58,509	$253,539
3	Reconfigure FBO Access Road	SY	600	$60.00	$36,000	$10,800	$46,800
4	SW GA Parking Lot Reconfiguration	LS	1	$95,000.00	$95,000	$28,500	$123,500
5	SW Hangar Taxiway (new)	SY	980	$26.00	$25,480	$7,644	$33,124
	Total Year 4				**$371,510**	**$111,453**	**$482,963**
	Year 5 - 2001						
	No Projects This Year						
	Total Year 5				**$0**	**$0**	**$0**
	Total Stage I (Years 1-5)				**$1,589,106**	**$281,732**	**$1,870,837**

TABLE 8-4
McNary Field Master Plan Update
Capital Improvement Project Eligibility

	Stage I Projects	Total Cost	FAA Eligible	Local
Yr 1	ARFF Training Equipment	$550,000	$495,000	$55,000
	Total Year 1	**$550,000**	**$495,000**	**$55,000**
Yr 2*	T-Hangar Development (Privately Funded)	$0	$0	$0
Yr 2*	North Hangar Taxiway	$65,707	$59,136	$6,571
Yr 2*	N. Hangar Access Road, Parking	$279,939	$139,970	$139,970
Yr 2*	Apron Rehabilitation (@ ODOT Hangar)	$48,412	$43,571	$4,841
	Total Year 2	**$394,058**	**$242,677**	**$151,381**
Yr 3	Runway 16-34 Sealcoat	$135,790	$122,211	$13,579
Yr 3	West Side Apron Sealcoat	$208,026	$187,223	$20,803
Yr 3	Airport Flood Management Plan	$100,000	$90,000	$10,000
	Total Year 3	**$443,816**	**$399,434**	**$44,382**
Yr 4	Demo Flight Deck Restaurant Bldg.	$26,000	$0	$26,000
Yr 4	Reconfigure FBO/GA Terminal Apron	$253,539	$228,185	$25,354
Yr 4	Reconfigure FBO/GA Terminal Access Road	$46,800	$42,120	$4,680
Yr 4	SW GA Parking Lot Reconfiguration	$123,500	$0	$123,500
Yr 4	SW Hangar Taxiway (new)	$33,124	$29,812	$3,312
	Total Year 4	**$482,963**	**$300,117**	**$182,846**
Yr 5	No Projects This Year			
	Total Stage I	**$1,870,837**	**$1,437,228**	**$433,609**

Note: For Year 2 (1998), No FAA Funding is Currently Available; Projects will be deferred if funding is not avail

	Stage II Projects			
1	South Industrial Area Utilities - Phase I	$124,150	$0	$124,150
2	South Ind. Access Road - Phase I (1650 lf)	$250,250	$0	$250,250
3	South Ind. Site Fill - Phase I	$563,355	$0	$563,355
4	South Airport Fencing - Phase I	$30,940	$27,846	$3,094
5	Taxiway C Sealcoat	$32,760	$29,484	$3,276
6	Taxiway A Sealcoat	$67,813	$61,032	$6,781
7	South Airport Taxiway - Phase I	$84,500	$76,050	$8,450
8	South Airport Access Road, Parking	$104,650	$52,325	$52,325
9	Runway 16-34 Overlay	$416,416	$374,774	$41,642
10	PAPI - Rwy 16 & 34	$39,000	$35,100	$3,900
11	Rwy 16 & 34 REIL	$36,400	$32,760	$3,640
12	North Hangar Taxilanes Sealcoat	$16,380	$14,742	$1,638
13	South Hangar Taxilane 2 & 3 Overlay	$20,238	$18,214	$2,024
14	South Hangar Taxilane 1,4,5,6 Sealcoat	$9,107	$8,196	$911
15	South Apron Overlay	$420,784	$378,706	$42,078
16	Runway 13-31 Sealcoat	$158,722	$142,850	$15,872
17	Taxiway A Overlay	$264,264	$237,838	$26,426
18	Taxiway B Sealcoat	$45,536	$40,982	$4,554
	Total Stage II	**$2,685,265**	**$1,530,899**	**$1,154,366**

	Stage III Projects			
1	South Airport Taxiway - Phase II	$122,018	$109,816	$12,202
2	Center Apron Overlay	$291,200	$262,080	$29,120
3	Taxiway C Overlay	$145,600	$131,040	$14,560
4	Terminal Area Bypass Roadway	$273,000	$245,700	$27,300
5	South Industrial Area Utilities - Phase II	$116,350	$0	$116,350
6	South Ind. Access Road - Phase II	$150,150	$0	$150,150
7	South Ind. Site Fill - Phase II	$2,070,034	$0	$2,070,034
8	Main Apron Overlay	$206,242	$185,618	$20,624
9	East Side Taxiway	$126,750	$114,075	$12,675
10	East Side Access Roadway (1600 lf)	$242,515	$218,264	$24,252
11	East Side Site Prep/Floodway Grading	$101,140	$0	$101,140
12	East Side Fencing	$32,760	$29,484	$3,276
13	South Hangar Taxilane 2 & 3 Sealcoat	$4,554	$4,099	$455
14	South Hangar Taxilane 1,4,5,6 Overlay	$36,400	$32,760	$3,640
15	Runway 13-31 Overlay	$705,432	$634,889	$70,543
16	Taxiway B Overlay	$202,384	$182,146	$20,238
17	Taxiway A Sealcoat	$59,459	$53,513	$5,946
18	Taxiway C Sealcoat	$32,760	$29,484	$3,276
19	Runway 13-31, Parallel Txy Extension	$869,050	$782,145	$86,905
20	Extend Edge Lighting	$36,400	$32,760	$3,640
21	Relocate MALSR	$65,000	$58,500	$6,500
22	South Airport Taxiway - Phase III	$126,750	$114,075	$12,675
23	Terminal Area Loop Roadway	$226,395	$203,756	$22,640
	Total Stage III	**$6,242,343**	**$3,424,202**	**$2,818,141**
	Total All Stages	**$10,798,445**	**$6,392,329**	**$4,406,116**

for specific projects to determine costs associated with actual design and construction. Several projects such as the South Industrial Area fill, may differ significantly depending on the final design of floodways, building areas, etc.

FINANCING OF DEVELOPMENT PROGRAM

Federal Grants

The primary source of funds which have been identified in this plan are from 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 which have certified eligibility. The funds are distributed through grants administered by the Federal Aviation Administration.

Under current guidelines, the airport sponsor receives 90 percent participation on eligible projects. According to FAA guidelines "As a general aviation airport, McNary Field is eligible under the Airport Improvement Program (AIP) to receive what is called State Apportionment funding, which is discretionary to the extent that it is not an "entitlement." It is also eligible to receive "pure discretionary" funding as well...Projects at all airports are subject to a priority coding system in the AIP."

As in the past, federal grants are expected to play a significant role in the financing of the airport's projected capital expenditures.

FINANCING THE LOCAL SHARE OF CAPITAL IMPROVEMENTS

Several airport improvement projects recommended in the master plan are not eligible for large amounts of federal funding. The City has in the past, used local government bonds as a funding source to support major airport development projects. For larger projects such as terminal building construction or infrastructure improvements, airports often use local bonds for funding. The south airport industrial area site improvements are divided into two phases with the overall development cost estimated at approximately $3.3 million, including site preparation, utility extensions, and roadway improvements. Most of these improvements will not be eligible for FAA funding. The use of local bond issues should be evaluated as part of the City's overall airport funding program. A description of bond types which are often used by airports to fund capital projects is presented below:

General Obligation Bonds

General Obligation (GO) bonds are a common form of municipal/borough bonds in which payment is secured by the full faith, credit, and taxing power of the issuing agency. GO bonds are instruments of credit and, because of the community guarantee, reduce the available debt level of the sponsoring community. This type of bond uses taxes to retire

the debt and the key element becomes the approval of the electorate of a tax levy to support airport development. If approved, GO bonds are typically issued at a lower interest rate than other types of bonds.

Self-Liquidating General Obligation Bonds

As with other GO bonds, self-liquidating general obligation bonds are secured by the issuing agency and also require voter approval. They are retired, however, by the adequate cash flow from the operation of the facility. Since the credit of the local government bears the ultimate risk of default, the bond issue is still considered, for the purpose of financial analysis, as part of the debt burden of the community. Therefore, this method of financing may result in a higher rate of interest on all bonds sold by the community. The amount of increase of the interest rate depends in part upon the degree of exposure risk of the bond. Exposure risk occurs when there is insufficient net operating income to cover debt service plus coverage requirements, thus forcing the community to absorb the residual.

Revenue Bonds

Revenue Bonds are payable solely from the revenue of a particular project or from operating income of the borrowing agency. Generally, they fall outside constitutional and statutory limitations and in many cases, do not require electorate approval. Because of the limitations on other public bonds, airport sponsors are increasingly turning to revenue bonds whenever possible. However, revenue bonds typically carry a higher rate of interest because they lack the guarantees of other municipal bonds.

Revenue bonds also require that the borrower must maintain specific coverage ratios between income and debt service. This often requires that surplus cash, which might otherwise be available for use in funding operations or improvements, be maintained in reserve.

Third Party Support

Private development on the airport is expected to consist of hangar construction, expanded fixed base operator facilities, and other tenant-sponsored projects.

It is also noted that approximately 55 acres of industrial use property located in the south airport development area, is included within the boundaries of the Fairview Urban Renewal Area. This designation provides a potential vehicle for funding specific infrastructure improvements.

CASH FLOW ANALYSIS

The review of the airport's cash flow analysis **(Table 8-5)** focuses on the relationship between operating revenues and expenses. According to data provided by the City of Salem, operating expenses and revenues at McNary Field are running about even, at approximately $310,000 per year.

Current operations do not provide significant surplus funds for use in facility development. It is expected that airport revenues will increase during

the planning period as additional aviation and non-aviation lands are leased. Revenues from land and building income will be projected to increase based on new leases for hangars and light industrial developments.

In order to create an implementation strategy for land development, it will be necessary to establish realistic goals for the current planning period. While there are numerous opinions about the demand for leased land on the airport, it is evident that without a well-coordinated effort of improvements and promotion, there will be minimal change from the status quo.

With the exception of some hangar lease areas on the west side of the airport, most new lease areas on the airport will require site preparation, airside or landside access, and utilities. The improvements which involve considerable initial investment will be implemented as funding becomes available. It is recognized that in order for the airport to fully benefit from increased land lease revenues, an investment in infrastructure is required.

For planning purposes, it is assumed that additional land leases will contribute to airport revenues. Initially, approximately 2 acres per year, with an average lease rate of $0.10 per square foot is assumed. Following the first phase of industrial area infrastructure improvements, this could be expected to increase to 5-8 acres per year, depending on market conditions and the marketing program used. The new leases would include hangars and other aviation-related developments and non-aviation developments around the airport.

Other airport revenues are projected to increase at an average of 3 percent annually. Operational revenues are assumed to increase at a slightly greater rate, mostly from increased land lease revenues.

The rate of land development will be partly dependent on the ability to fund basic infrastructure improvements. Operational expenses at the airport are expected to increase at a modest rate (2 percent annually).

The cash flow projection provides a general indication of the typical capital costs and the funds available to support development. However, the airport's ability to improve its revenue-generating capabilities will be heavily dependent on completing infrastructure improvements and the effective promotion of available airport lands.

It is apparent that the funds generated through airport operations and FAA AIP grants will not always be sufficient to fully support the entire capital improvement program. It should also be noted that although most of the projects are eligible for federal funding, it is unlikely that AIP grant monies will be available every year. The limitations of AIP funding will dictate in large part, the actual schedule for completing airport improvement projects. As a result, many projects included in the twenty-year CIP may be deferred beyond the twenty-year time frame.

Depending on the project requirements, several possible options may exist for the City to consider:

Seek alternative FAA funding

- *Pursue other federal funding (Congressional Appropriations, Economic redevelopment funds, etc.)*

Pursue state funding (Lottery funds, Tourism and Economic Development Funds, etc.)
Local Bond Issues
Third Party Development
Airport Rates and Fees Increases
Defer Project(s) until funding is obtained

Table 8-5
Salem - McNary Field CIP Funding Projection

Five Year Projection	1997	1998	1999	2000	2001
OPERATING REVENUES					
Airside/Landside Fees	$36,000	$36,720	$37,454	$38,203	$38,968
Land/Bldg. Rents	265,000	271,625	279,774	288,167	296,812
Other	10,500	10,710	10,924	11,143	11,366
Total Operating Revenues	**$311,500**	**$319,055**	**$328,152**	**$337,513**	**$347,145**
OPERATING EXPENSES					
Personal Services	$141,000	$143,820	$146,696	$149,630	$152,623
Airfield Oper. & Maint.	$165,000	$168,300	$171,666	$175,099	$178,601
Debt Service	$3,000	$0	$0	$0	$0
Total Operating Expenses	**$309,000**	**$312,120**	**$318,362**	**$324,730**	**$331,224**
Income (Loss) Before Depreciation	**$2,500**	**$6,935**	**$9,790**	**$12,783**	**$15,921**
Assume Contribution from Operations (60%)	$1,500	$4,161	$5,874	$7,670	$9,552
Local Funding for Projects					
Development Costs	$550,000	$394,058	$443,816	$482,963	$0
FAA AIP Grant Receipts	($495,000)	($354,652)	($399,434)	($300,117)	$0
NET LOCAL FACILITY DEVELOPMENT COST	($55,000)	($39,406)	($44,382)	($182,846)	$0
NET CASH FLOW (From Operations)	($53,500)	($35,245)	($38,508)	($175,176)	$9,552

Airport Master Plan Update

McNary Field
Salem, Oregon

Task 3.2 Commercial Air Service Assessment

The objective of this task is to give a brief overview of the timing, likelihood, and type of commercial air service that could serve Salem Airport. Commercial service was provided on a limited basis until April 1994. The purpose of this overview is to identify what factors would cause air service to return, when that might happen, and the likely type of service.

Commercial air service at Salem Airport is not likely in the near-term. Portland International Airport (PDX) is too easily reached by car. Passengers choose airports based on:

- Frequency of flights
- Destinations
- Fare levels.

These three factors will lead a person to drive to an airport, especially when it is within a two hour drive. The drive to PDX is a fairly predictable one hour drive. Passengers are surprisingly willing to drive an extra hour to save a little in air fares or to find more convenient travel times.

The prospects of direct air service in Salem will change when three conditions are met.

- Less predictability in transit time
- More than two hours to drive to PDX
- Adequate market size.

Salem has an adequate market size now, based upon population size. The other necessary conditions, however, are not present. An airline needs a concentration of passengers to make money. Airlines know that it takes a combination of frequent flights and a concentration of passengers. These two requirements are an incentive for an airline to pull passengers from outlying areas, such as Salem, to support service at the larger airport of PDX. When the travel times to PDX make the trip inconvenient, air service becomes more viable in Salem.

1995 Air Passenger Market Areas

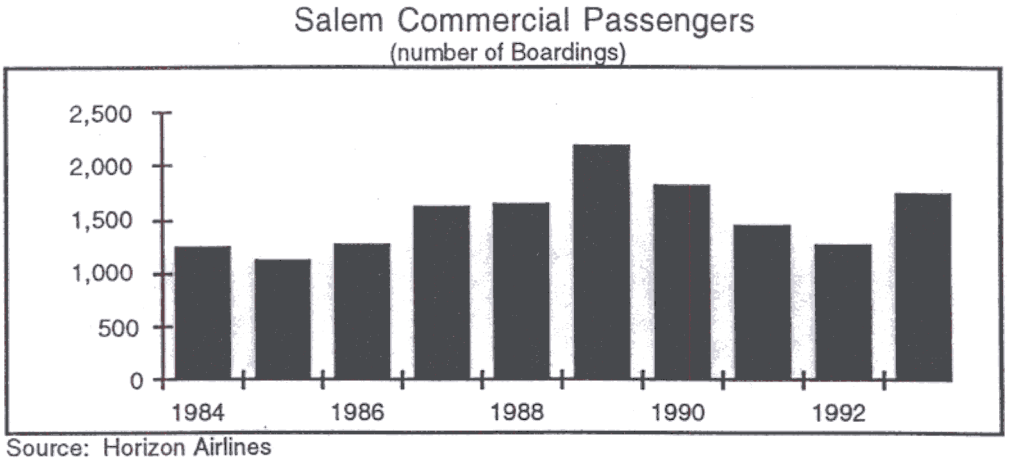
Metro Areas	Employment	Population	Boardings	Ratio
Salem *	149,900	313,400	2,800	0.01
Eugene	147,000	301,900	352,200	1.17
Medford	77,020	164,400	180,794	1.10
Spokane	187,400	401,200	1,492,956	3.72
Yakima	99,700	204,100	88,074	0.43
Pasco	86,500	175,000	186,000	1.06

Source: Gene Leverton and Assoc., Airport Administrations

* Marion and Polk Counties

Metropolitan areas similar in size to Salem generate significant numbers of commercial air passengers. The key factor affecting passenger boardings is distance from alternative airports. Spokane, Medford and Eugene are at least two hours from large commercial airports. Salem is about one hour from PDX.

Salem commercial air passenger traffic was fairly stable over the ten years of daily scheduled service. Horizon Air's annual boardings averaged about 1,500 per year. Horizon stopped service in April 1994.



Source: Horizon Airlines

This table shows the historic boardings at Salem Airport on a Horizon airplane when one or two daily flights were offered. For perspective, viable commuter air service generally has 800-1,000 boardings per month, and about 10,000 per year.

Charter air passengers on special travel packages to casinos also board aircraft at Salem Airport. The total traffic of commercial and charter boardings of aircraft is shown in the following table.

Commercial & Charter Traffic

Year	Boarding Passengers
1995	2,800
1994	3,736
1993	6,220
1992	4,045
1991	5,010

Salem's 2,800 boarding passengers in 1995 are primarily gambling charters to Nevada. Charter volumes have declined in the past few years. Likely reasons for this decline are increased commercial services to Nevada from PDX, and new casinos in Oregon. In 1991, for example, there were 4 daily flights from PDX to Reno/Las Vegas. In 1996, there are 14 daily scheduled flights from Portland to these destinations. Charter traffic continues, but at a slower pace.

In the early 1990s Horizon Air had a unique agreement with a Salem airport tenant to shuttle passengers between Salem and Portland International Airport (PDX). Travelers would park their cars at the Salem air terminal, buy an airline ticket, and ride a bus to PDX where they actually boarded an airplane.

The HUT/Horizon program ended in 1994, when direct air service was also dropped. The shuttle bus is not currently affiliated with any particular airline.

The approximate number of passengers now boarding a PDX bus at Salem Airport is 50 per day, and 18,250 per year. According to the bus operator, ridership over the past ten years has grown steadily by about 10% per year. These passengers prefer the convenience of parking at Salem Airport and being dropped off at the PDX terminal building. [Note: See Comment Below]

The combined travel volume from bus shuttle and Horizon's direct service is estimated at 21,000 boardings per year. This volume, however, is a small fraction of Salem's total air travel. Most Salem passengers drive to Portland to board an airplane.

Because of the proximity of air service at PDX, Salem is not expected to attract and retain direct commercial air service in the foreseeable future. The factors that will signal the timing of air service at Salem are:

- congestion on Interstate 5, leading to unpredictable transit times.
- further population growth between Salem and Portland
- congestion at PDX, slowing aircraft turnaround times

These factors could possibly reach critical mass in 10 to 15 years. There has been significant growth in recent years, but there is no indication that traffic volumes on I-5 or at PDX are exceeding capacity.

When air service resumes at Salem it will likely be with regional jets flying up and down the West Coast. Air service to PDX is not expected because of the short flight segment. The economics of such a short flight are unfavorable. In a general sense, an airline makes money during the flight, not at takeoff and landing. Salem-Portland is probably a 15 minute flight segment, when a flight segment of at least an hour is more attractive to the airline.

There are narrow opportunities for specialized service in most markets. Capitalizing on these market niches requires considerable effort to define the market size, and translate how this market strategically benefits an air carrier. In the Salem market, a possible niche exists between Salem and Seattle. The aircraft size would probably be in the 40-seat range, such as a Dash-8. However, making opportunities like this happen requires community initiative, resources and support. Lack of these, at this time, leads to the assumption used in this analysis that the community will wait for an air carrier to propose service, rather than pursuing active recruitment.

Note: (8/97) Airport Management indicates that Hut Shuttle departures and passenger boardings have increased in recent months. Additional passenger shuttle service to PDX may also be provided at McNary Field.

Forecasts

It is impossible to be very precise about market factors 10 to 15 years from now. For planning purposes, we can employ some industry assumptions to arrive at an estimated number of boarding passengers in order-of-magnitude.

Moderate Forecast

The aircraft most likely to serve Salem are regional jets seating 50 to 70 passengers. Aircraft type include the Canadair Regional Jets (CRJ-50, CRJ-X), Embraer EMB-145, and the Avro RJ85.

The markets served would be Seattle and the San Francisco Bay Area, with a possible stop in Medford. When service starts, it would probably involve 3 to 5 departures per day. Airlines know that without frequent choices for travel times, passengers will drive.

Assume a 70 seat plane operating at a 65% load factor serving Seattle-Salem-San Francisco. This equals 45 passengers boarding the plane. Twenty to thirty percent of this total would board the plane in Salem, the rest in Seattle or San Francisco.

Future Passenger Service

Salem's Share	Boardings per Year
20%: 9 per flight x 4 flights = 36 per day	x 365 days = 13,140
30%: 13 per flight x 4 flights = 52 per day	x 365 days = 18,980

The higher share of 30% represents the benefit of adding a stop at Medford. The estimated passenger count of about 19,000 is very similar to current HUT passenger service through PDX to all destinations.

These boardings represent only a share of Salem's market. The service is to Seattle and the Bay Area, although some passengers would be connecting onto other flights. Even with direct service, many travelers will continue driving to PDX to reach the same destinations. They will be motivated by higher frequency, lower fare levels, and other factors.

Aggressive Forecast

Use of 100 to 150-seat jets, such as a Boeing 737, serving markets between Seattle and Los Angeles. With market development, service could be expanded to include east-west routes. This expanded service would be to markets such as Boise and Salt lake City.

Conclusions

Air service is possible in 10 to 15 years. The most likely commercial air service will be provided with regional jets seating up to 70 passengers. Markets between Seattle and the San Francisco Bay area would be served, with a possible stop in Medford. About 20,000 passengers per year are estimated to board at Salem with this type of service.

Airport Master Plan Update

McNary Field
Salem, Oregon

BILL NO. 78 **A BILL FOR** ORDINANCE NO. 3-98

AN ORDINANCE relating to the Airport Master Plan, amending SRC 64.230.

THE CITY OF SALEM ORDAINS AS FOLLOWS:

SECTION 1. SRC 64.230 is amended to read:

64.230. ADOPTION OF DETAILED PLANS. The following detailed plans are hereby adopted as part of this Code the same as if fully reproduced herein. One copy of each is kept on file in the office of the city recorder. Any portion of an adopted detail plan found not to be in conformance with the comprehensive plan shall be considered null and void.

(a) Park and Recreation Technical Study, July 1977. Regional Parks and Recreation Agency of the Mid-Willamette Valley. Adopted July 11, 1977 (Long-range Facilities Plan).

(b) Salem Area Wastewater Management Master Plan, 1996, CH2M-Hill. Adopted December 16, 1996.

(c) Stormwater Management Plan, City of Salem, Department of Public Works. Adopted May 14, 1984.

(d) Water System Master Plan, 1994, CH2M-Hill. Adopted April 25, 1994, and amended September 23, 1996.

(e) McNary Field Airport Master Plan, Salem, Oregon, Hodges and Shutt, May 1979. Adopted June 18, 1979 ~~and~~, revised April 27, 1987, and further revised November 24, 1997.

(f) Urban Growth Management Program. As amended and adopted July 23, 1979, and as further amended January , 1982, and November 28, 1983, and September 23, 1996.

(g) Willamette River Greenway Plan, July, 1979. Adopted September 24, 1979.

(h) West Salem Sector Plan, save and except the sewer element, which is superseded by the Salem Area Wastewater Management Master Plan and the water element, which is superseded by the Water System Master Plan. Adopted January , 1982.

(i) Northeast Salem Sector Plan, save and except the sewer element, which is superseded by the Salem Area Wastewater Management Master Plan and the water element, which is superseded by the Water System Master Plan. Adopted January , 1982, and revised April 9, 1984, amended March 8, 1993, and further amended September 12, 1994.

(j) South Liberty Road Corridor Study. Approved December 27, 1982.

(k) Fairview Sector Plan, save and except the sewer element, which is superseded by the Salem Area Wastewater Management Master Plan and the water element, which is superseded by the Water System Master Plan. Adopted May 29, 1984, revised January 26,1987.

(l) East Salem Sector Plan, save and except the sewer element, which is superseded by the Salem Area Wastewater Management Master Plan and the water element, which is superseded by the Water System Master Plan. Adopted December 10, 1984, and amended March 8, 1993.

(m) South Salem Sector Plan, save and except the sewer element, which is superseded by the Salem Area Wastewater Management Master Plan and the water element, which is superseded by the Water System Master Plan. Adopted February 10, 1986, amended November 26, 1990 and further amended March

(n) Croisan Sector Plan, save and except the sewer element, which is superseded by the Salem Area Wastewater Management Master Plan and the water element, which is superseded by the Water System Master Plan. Adopted February 10, 1986.

(o) Southeast Salem Sector Plan, save and except the sewer element, which is superseded by the

System Master Plan. Adopted July 28, 1986.

(p) Year 2005 Area Wide Transportation Plan for the Salem-Keizer Urban Area dated April 1, 1987.

(q) Salem Transportation Plan adopted August 13, 1990, and amended November 26, 1990; January 27, 1992; February 24, 1992; March 23, 1992; June 22, 1992; May 24, 1993; and October 23, 1995.

(r) Salem Urban Area Public Facilities Plan. Adopted October 12, 1992.

Section 2. REVISIONS ADOPTED AND FINDINGS. The revisions to the Airport Master Plan

PASSED by the council this 12 day of January 1998.

ATTEST:

Jean Levy

City Recorder and Custodian of City Records

Approved by City Attorney: [signature]

COUNCIL OF THE CITY OF SALEM, OREGON