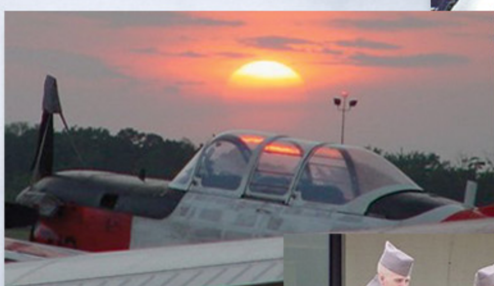

Easterwood Airport Master Plan Update Final Report

Prepared For:

Texas A&M University

Prepared By:

URS

February 2005

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P12-132

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K. Sue Redman
Senior Vice President
and Chief Financial Officer

December 7, 2004

TO: Dr. Robert M. Gates
President

THROUGH: Dr. David B. Prior
Executive Vice President and Provost

DB Prior

FROM: Ms. K. Sue Redman K Sue Redman
Senior Vice President and Chief Financial Officer

WSRuup for CBE

SUBJECT: Airport Master Plan

I am forwarding the Airport Master Plan for your approval. The document contains several individual project cost estimates. However, it does not provide annual cash flow projections. In the absence of annual matched revenue and expenditure estimates, I am unable to validate the plan's financial viability. It is my understanding that each project will be presented separately with documented financials. Given that this is a 20 year plan, I have no objection to its approval subject to each project undergoing separate financial analysis.

cc: Dr. Richard L. Floyd

APPROVAL RECOMMENDED:

Robert M. Gates

Robert M. Gates

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

Section **Page**

TABLE OF CONTENTS
(Continued)

Section **Page**

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

Section **Page**

TABLE OF CONTENTS
(Continued)

Section **Page**

LIST OF TABLES

LIST OF TABLES
(Continued)

LIST OF FIGURES

LIST OF FIGURES
(Continued)

Figure

LIST OF ACRONYMS

ARFF	Aircraft Rescue and Firefighting
ATADS	Air Traffic Activity Data System
ASV	Annual Service Volume
CIP	Capital Improvement Program
GPS	Global Positioning System
HIRL	High Intensity Edge Lighting
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
LOS	Levels of Service
MALSR	Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights
MIRL	Medium Intensity Edge Lighting
OFA	Object Free Area
REILS	Runway End Identification Lights
RSA	Runway Safety Areas
TAF	Terminal Area Forecast
TSA	Transportation Security Administration
VASI	Visual Approach Slope Indicator System
VMC	Visual Meteorological Conditions
WAAS	Wide Area Augmentation System

PREFACE

Easterwood Airport is a critical element of the transportation system serving the Brazos Valley region. The airport provides facilities that enable commercial air service, which in turn, supports the travel needs of residents, businesses, visitors and Texas A&M University. In addition, the airport provides important services and facilities for general aviation and military operations.

To ensure that Easterwood Airport continues to meet the aviation infrastructure needs of Texas A&M and the Brazos Valley region, an update of the airport's 1997 master plan was undertaken. This master plan update provides recommendations for airport facilities needed to accommodate passengers and aircraft operations through 2023. The plan provides airport management with a guide to recommended capital improvements and funding options.

The study was guided by a Task Force comprised of representatives from Texas Department of Transportation, Brazos and surrounding counties, the City of College Station, the City of Bryan, the Bryan-College Station Chamber of Commerce, the Brazos Valley Council of Governments, local citizens and Texas A&M University. These representatives reviewed the findings of the study at key intervals and provided input on future development options.

The resulting plan is briefly summarized on the following pages. For full descriptions and illustrations of proposed projects and other elements of the plan, please refer to the master plan report and the airport layout plan drawing set.

STUDY GOALS AND OBJECTIVES

The goal of the master plan update for Easterwood Airport was to provide a long-term plan for the development of the airport in concert with the needs of the area it serves. The objectives that were established to reach this goal are listed below:

- Inventory existing airport facilities.
- Forecast future passengers and aircraft operations to determine future demand levels for airport facilities.
- Identify the facility improvements needed to accommodate projected levels of demand.

- Devise alternative methods of providing the required facilities.
- Plan future development in a manner that is operationally efficient.
- Assess the environmental impact of proposed development.
- Schedule capital improvements to coincide with the projected demand for each facility.
- Prepare cost estimates of proposed capital improvements.
- Provide a financial implementation plan.

STUDY CONCLUSIONS AND RECOMMENDATIONS

The master plan update provides the following conclusions and recommendations.

Airfield Facilities

- The master plan projects passenger enplanements will grow to 82,000 by 2022 from approximately 68,000 in 2003. This represents an average annual growth rate of 1 percent.
- The master plan projects aircraft operations will grow to 84,000 by 2022 from approximately 65,000 in 2003. This represents an average annual growth rate of 1 percent.
- Existing airfield capacity is sufficient to accommodate projected level of aircraft operations throughout the study period without meaningful delay.
- The master plan examined potential locations for a parallel runway if one were ever needed in the long-term. The analysis revealed that the preferred location would be west of the existing airfield in a parallel orientation to Runway 16/34.
- Existing runway length is sufficient to accommodate projected types of aircraft operations.
- The primary runway strength should be increased to accommodate dual wheel loading of 155,000 pounds when the pavements require rehabilitation.

- Improvements to the Runway 28 safety area are needed to meet FAA standards.

- The master plan recommends a series of taxiway improvements to efficiently accommodate the movement of aircraft to and from runways and to bring existing taxiways into conformance with FAA standards.

- Land acquisition is not recommended by the master plan. However, the re-designation of approximately 293 acres of existing Texas A&M property to airport property is recommended. This land would allow runway safety area improvements to be constructed, would provide protection for runway approaches, and would provide space for expansion of airport facilities.

- A new air traffic control tower is recommended by the master plan to replace the existing tower that lacks fire suppression and an elevator for disabled access and has insufficient electrical capacity and communications.

- The master plan reserves a location for a potential helipad.

- New fencing is recommended for the airfield to improve security.

- The master plan recommends a series of projects to improve airfield drainage.

Terminal Facilities

- The existing passenger terminal is adequately sized to accommodate projected passenger levels throughout the study period.

- The plan recommends the installation of loading bridges and the relocation of the passenger departure lounge and security screening to the second floor to improve passenger comfort and terminal operations.

- Long-term improvements are recommended for the terminal to resolve existing problems with baggage make-up areas and long-term baggage.

- Projects are recommended to resolve existing drainage problems on the access roadway and erosion problems on the upper level driveways to the departure level.

- Expansion of the terminal's aircraft apron is recommended to provide additional space for charter aircraft and other aircraft requiring access to the terminal.

- The existing parking facilities are adequate to service projected demand throughout the study period.

General Aviation Facilities

- The plan recommends that Nuclear Science Road be closed past the Texas A&M Heat Transfer Lab to allow the construction of needed improvements to the Runway 28 safety area.
- The plan recommend the construction of a new access road to the Brayton Fire School and general aviation facilities on the west side of the airport. This road would begin at the intersection of FM 2818 and West Luther Street.
- Rehabilitation and reconfiguration of the parking facilities near the general aviation terminal is recommended.
- Expansion of the existing general aviation aircraft parking apron is recommended to better accommodate peak loads of aircraft parking requirements.
- Additional aircraft parking aprons are also recommended on the west side of airport property.
- The construction of additional hangars to support aircraft and rotorcraft is recommended.

Support Facilities

- A new airfield maintenance building is recommended to replace the existing building that is in poor condition.
- A rental car service facility is recommended for cleaning and servicing rental vehicles.

Environmental Issues

- The airport's noise contours extend off airport property and encompass noise sensitive land uses north and south of the airport. The study provides recommendations for certain re-zonings to ensure that additional incompatible land use is not introduced beneath the airport's approaches in the future.
- Future noise contours are provided for the purpose of understanding potential noise impacts and making informed land use decisions.

- The plan recommends that the airport consider the creation of a joint airport zoning board that would land use zoning authority within areas beneath the approach to Easterwood Airport. Chapter 241 of the State of Texas Local Government Code permits the creation of such a board to ensure the public's investment in airports is protected.

- The plan notes that an environmental assessment will need to be conducted before certain short-term projects, such as the proposed runway safety area improvements, could be implemented.

RECOMMENDED PLAN

The recommended development plan for Easterwood Airport is divided into short-term, intermediate-term, and long-term phases. These phases correspond to two consecutive five-year periods (2004 through 2008 and 2009 through 2013) and one subsequent ten-year period (2014 through 2023). The projects within each phase are intended to meet projected levels of demand. Changes to project scheduling will occur depending upon funding constraints, changes in demand levels and airport management and tenant priorities.

Short-Term Projects (2004 through 2008)

Project priorities during the short-term period include a wide range of airfield and terminal projects. In terms of the airfield, projects related to safety and security, such as the extension of Taxiway H, the construction of an extended safety area on the approach end of Runway 28, and the replacement of airfield fencing, are included. Numerous drainage projects and the construction of new hangars are also airfield priorities. In terms of the passenger terminal, the installation of loading bridges and the relocation of security screening to the second floor is a priority as is new drainage, signage, and landscaping related to the terminal access road. **Table 1** provides the estimated cost of these projects. **Figure 1** illustrates these projects.

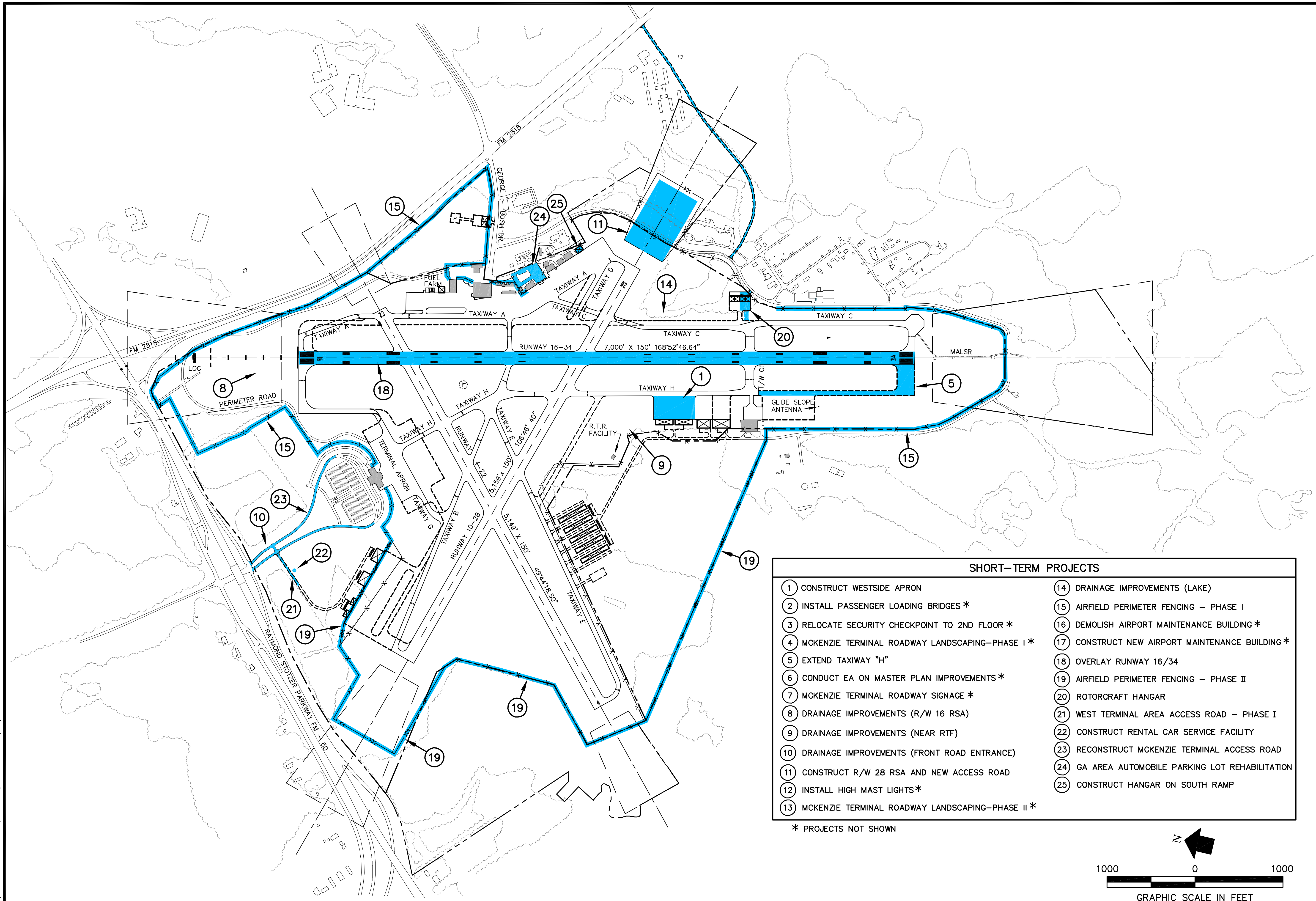
Table 1 Short-Term (2004-2008) Project Cost Estimates		
Project Number	**Project Name**	**Estimated Cost**
1	Construct Westside Apron	$1,276,755
2	Install Passenger Loading Bridges	$700,000
3	Relocate Security to 2nd Floor	$100,000
4	McKenzie Terminal Roadway Landscaping - Phase I	$141,000
5	Extend Taxiway H	$1,976,762
6	Conduct EA on Master Plan Improvements	$300,000
7	Install McKenzie Terminal Roadway Signage	$72,041
8	Construct Drainage Improvements (R/W 16 RSA)	$377,510
9	Construct Drainage Improvements (Near RTR)	$164,033
10	Construct Drainage Improvements (McKenzie Access Road)	$155,000
11	Construct Runway 28 Runway Safety Area	$2,986,683
12	Install High Mast Lights	$299,957
13	McKenzie Terminal Roadway Landscaping - Phase II	$116,400
14	Construct Drainage Improvements (Lake)	$246,837
15	Install Airfield Perimeter Fencing – Phase I	$625,008
16	Demolish Airport Maintenance Building	$18,234
17	Construct New Airport Maintenance Building	$291,785
18	Overlay Runway 16/34	$2,756,535
19	Install Airfield Perimeter Fencing – Phase II	$623,567
20	Construct Rotorcraft Hangar	$833,878
21	Construct West Terminal Area Access Road – Phase I	$66,651
22	Construct Rental Car Service Facility	$329,668
23	Reconstruct McKenzie Terminal Access Road	$727,647
24	Rehabilitate GA Area Automobile Parking Lot	$641,216
25	Construct Hangar on South Ramp	$451,664
	Total	$16,278,831

Source: URS Corporation, Inc., 2004.

Easterwood Airport
Master Plan Update

CAPITAL IMPROVEMENT PROGRAM
SHORT TERM PROJECTS (2004-2008)

FIGURE 1



SHORT-TERM PROJECTS

1. CONSTRUCT WESTSIDE APRON
2. INSTALL PASSENGER LOADING BRIDGES *
3. RELOCATE SECURITY CHECKPOINT TO 2ND FLOOR *
4. MCKENZIE TERMINAL ROADWAY LANDSCAPING-PHASE I *
5. EXTEND TAXIWAY "H"
6. CONDUCT EA ON MASTER PLAN IMPROVEMENTS *
7. MCKENZIE TERMINAL ROADWAY SIGNAGE *
8. DRAINAGE IMPROVEMENTS (R/W 16 RSA)
9. DRAINAGE IMPROVEMENTS (NEAR RTF)
10. DRAINAGE IMPROVEMENTS (FRONT ROAD ENTRANCE)
11. CONSTRUCT R/W 28 RSA AND NEW ACCESS ROAD
12. INSTALL HIGH MAST LIGHTS *
13. MCKENZIE TERMINAL ROADWAY LANDSCAPING-PHASE II *
14. DRAINAGE IMPROVEMENTS (LAKE)
15. AIRFIELD PERIMETER FENCING - PHASE I
16. DEMOLISH AIRPORT MAINTENANCE BUILDING *
17. CONSTRUCT NEW AIRPORT MAINTENANCE BUILDING *
18. OVERLAY RUNWAY 16/34
19. AIRFIELD PERIMETER FENCING - PHASE II
20. ROTORCRAFT HANGAR
21. WEST TERMINAL AREA ACCESS ROAD - PHASE I
22. CONSTRUCT RENTAL CAR SERVICE FACILITY
23. RECONSTRUCT MCKENZIE TERMINAL ACCESS ROAD
24. GA AREA AUTOMOBILE PARKING LOT REHABILITATION
25. CONSTRUCT HANGAR ON SOUTH RAMP

* PROJECTS NOT SHOWN

J:\COLLEGE STATION TX\EXHIBITS\FIG 1.DWG 08/02/04 10:31

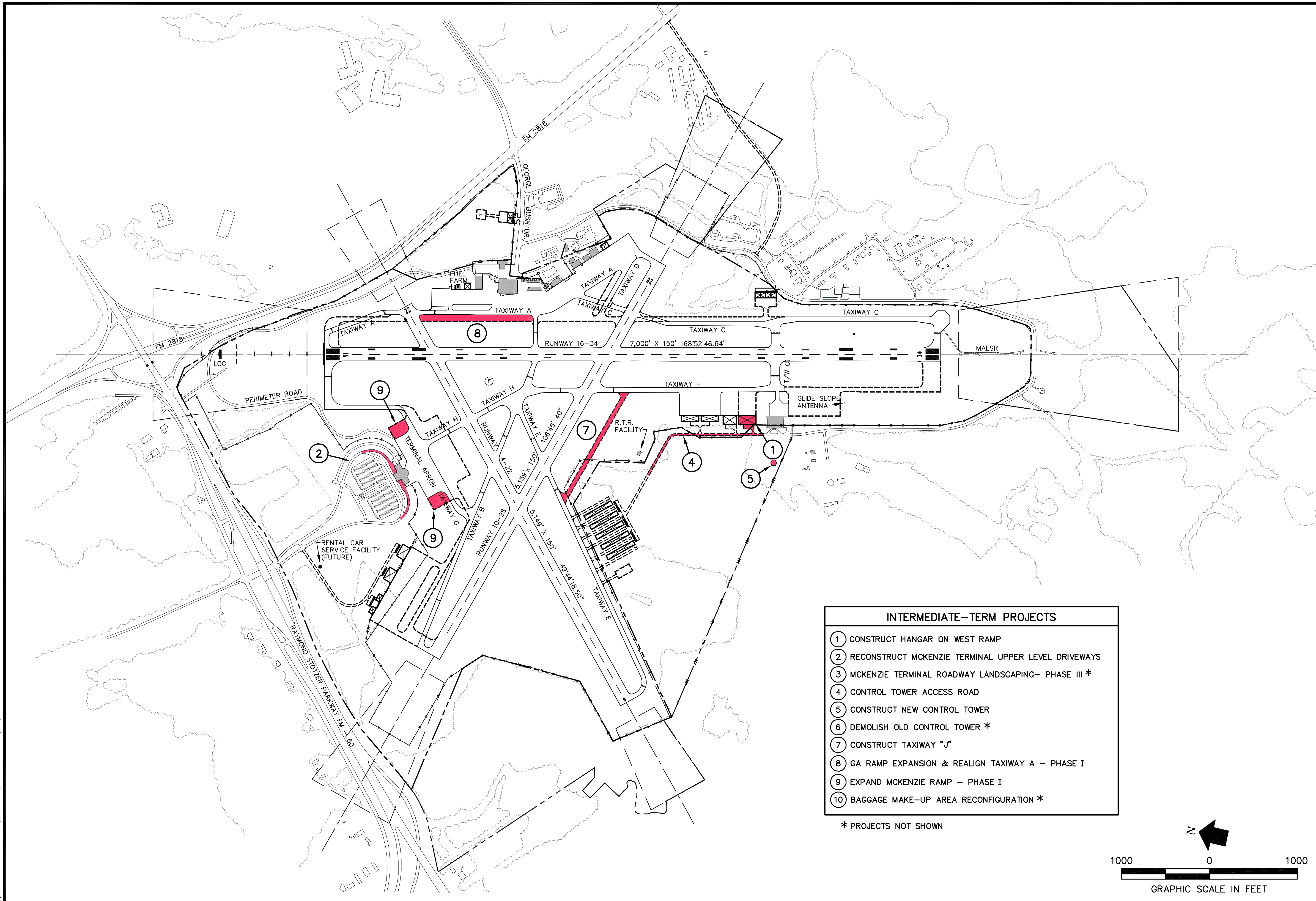
Intermediate-Term Projects (2009 through 2013)

Project priorities during the intermediate-term include expansions of aircraft parking apron at both the McKenzie Terminal and the general aviation area, the construction of a new control tower, and improvements to the terminal access roadways and elevated automobile driveways to the upper level of the McKenzie Terminal. **Table 2** provides the estimated cost of these projects. **Figure 2** illustrates these projects.

Table 2
Intermediate-Term (2009-2013)
Project Cost Estimates

Project Number	Project Name	Estimated Cost
1	Construct Hangar on West Ramp	$1,836,033
2	Reconstruct McKenzie Terminal Upper Level Driveways	$911,299
3	McKenzie Terminal Roadway Landscaping - Phase III	$240,400
4	Construct Control Tower Access Road	$590,098
5	Construct New Control Tower	$4,075,500
6	Demolish Old Control Tower	$57,946
7	Construct Taxiway J	$871,643
8	GA Ramp Expansion & Realignment of Taxiway A	$1,490,699
9	Expand McKenzie Ramp – Phase I	$1,968,553
10	Baggage Make-Up Area Reconfiguration	$190,748
	Total	$12,232,919

Source: URS Corporation, Inc., 2004.



INTERMEDIATE–TERM PROJECTS

1. CONSTRUCT HANGAR ON WEST RAMP
2. RECONSTRUCT MCKENZIE TERMINAL UPPER LEVEL DRIVEWAYS
3. MCKENZIE TERMINAL ROADWAY LANDSCAPING– PHASE III *
4. CONTROL TOWER ACCESS ROAD
5. CONSTRUCT NEW CONTROL TOWER
6. DEMOLISH OLD CONTROL TOWER *
7. CONSTRUCT TAXIWAY "J"
8. GA RAMP EXPANSION & REALIGN TAXIWAY A – PHASE I
9. EXPAND MCKENZIE RAMP – PHASE I
10. BAGGAGE MAKE–UP AREA RECONFIGURATION *

* PROJECTS NOT SHOWN

FIGURE 2

CAPITAL IMPROVEMENT PROGRAM INTERMEDIATE TERM PROJECTS (2009-2013)

Easterwood Airport Master Plan Update

J:\COLLEGE STATION TX\EXHIBITS\FIG 2.DWG 07/02/04 11:17

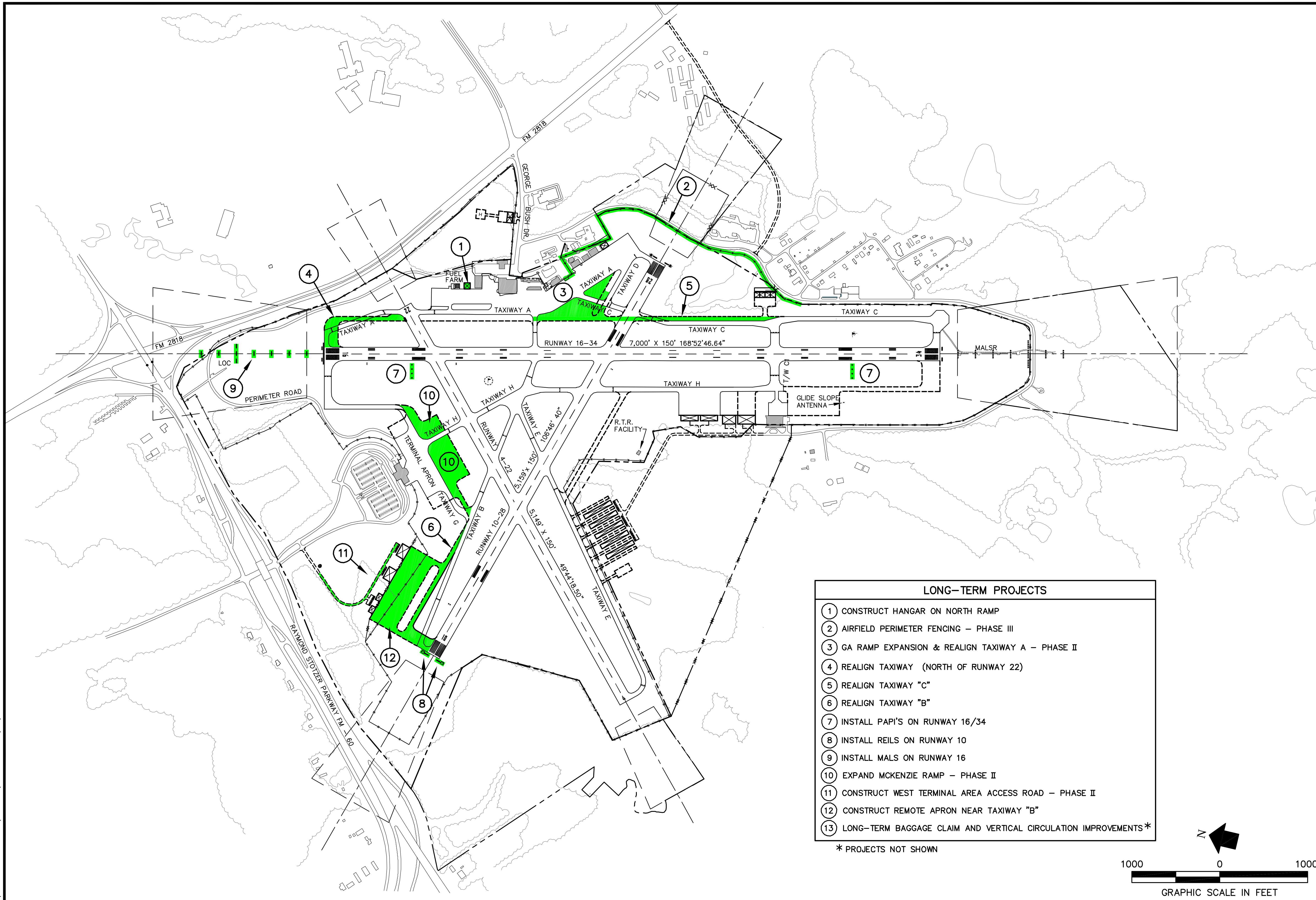
Long-Term Projects (2014 through 2023)

Project priorities during the long-term include a series of taxiway projects to meet FAA geometric standards, navigational lighting and further expansion of aircraft parking apron to meet anticipated demand. Additional terminal projects are also proposed. **Table 3** provides the estimated cost of these projects. **Figure 3** illustrates these projects.

Table 3
Long-Term (2014-2023)
Project Cost Estimates

Project Number	Project Name	Estimated Cost
1	Construct Proposed Hangar on North Ramp	$797,519
2	Install Airfield Perimeter Fencing - Phase III	$203,780
3	GA Ramp Expansion & Realign Taxiway A – Phase II	$2,075,280
4	Realign Taxiway A (North of Runway 22)	$982,876
5	Realign Taxiway C	$1,021,106
6	Realign Taxiway B	$1,077,920
7	Install PAPI's on Runway 16/34	$123,420
8	Install REILS's on Runway 10	$74,989
9	Install MALS on Runway 16	$468,683
10	Expand McKenzie Ramp – Phase II	$1,413,758
11	Construct West Terminal Access Road – Phase II	$310,757
12	Construct Remote Apron Near Taxiway B	$3,002,421
13	Baggage Claim and Vertical Circulation Improvements	$701,201
	Total	$12,253,710

Source: URS Corporation, Inc., 2004.



LONG-TERM PROJECTS
1 CONSTRUCT HANGAR ON NORTH RAMP
2 AIRFIELD PERIMETER FENCING – PHASE III
3 GA RAMP EXPANSION & REALIGN TAXIWAY A – PHASE II
4 REALIGN TAXIWAY (NORTH OF RUNWAY 22)
5 REALIGN TAXIWAY "C"
6 REALIGN TAXIWAY "B"
7 INSTALL PAPI'S ON RUNWAY 16/34
8 INSTALL REILS ON RUNWAY 10
9 INSTALL MALS ON RUNWAY 16
10 EXPAND MCKENZIE RAMP – PHASE II
11 CONSTRUCT WEST TERMINAL AREA ACCESS ROAD – PHASE II
12 CONSTRUCT REMOTE APRON NEAR TAXIWAY "B"
13 LONG-TERM BAGGAGE CLAIM AND VERTICAL CIRCULATION IMPROVEMENTS*

* PROJECTS NOT SHOWN

FIGURE 3

CAPITAL IMPROVEMENT PROGRAM
LONG TERM PROJECTS (2014-2023)

Easterwood Airport
Master Plan Update

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PLAN FUNDING

The recommended capital improvement program at Easterwood Airport would be funded through a combination of sources including grants from the FAA passenger facility charges currently in effect at the airport, private third party financing, a government entities fund and airport operating funds. The total cost of the Capital Improvement Program (CIP) is $40.7 million in 2004 dollars. The escalated cost of the CIP assuming a 2 percent rate of inflation is $46.8 million. The proposed sources and uses of funds are shown in **Table 4**.

Table 4
Summary of Sources and Uses of Capital Funding

Sources of Capital Funding (2004 to 2023):	
AIP Entitlement Grants	$ 20,318,080
AIP Discretionary Grants	12,912,007
Passenger Facility Charges	5,516,413
Government Entities Fund	535,528
Private Third Party Financing	3,323,010
Airport Operating Funds/Cash Reserves	4,267,212
Total Sources of Capital Financing	$46,867,248
Uses of Capital Funding:	
Short Term Projects (2004 to 2008)	$ 16,790,404
Intermediate Term Projects (2009 to 2013)	13,913,334
Long Term Projects (2014 to 2023)	16,168,510
Total Project Costs	$46,872,248
Note: Addition errors are due to rounding of calculated amounts.	

Source: Leibowitz & Horton AMC Analysis

The reasonableness of the CIP from a financial perspective can be examined through the use of several measurements. One measurement is cost per enplaned passenger. This measurement is commonly used by airlines to compare their cost of operations at the airports they serve. It consists of airline fees and rentals divided by enplaned passengers.

Easterwood Airport's airline cost per enplaned passenger is projected to range from $5.28 in 2004 to $6.71 in 2023. By comparison, the industry average for airports of similar size ranges from $5.88 in 2004 to a projected $7.85 in 2023. This indicates that Easterwood Airport's costs will remain extremely competitive even with full implementation of the CIP.

The financial analysis also examined Easterwood Airport's operating revenue per enplaned passenger versus the industry average for airports of similar size. Easterwood Airport's operating revenue per enplaned passenger is projected to grow from $18.09 in 2004 to $22.65 in 2023. The industry average ranges from $16.48 in 2004 to $21.99 in 2023. This indicates that total revenues at Easterwood Airport are currently higher and are projected to remain above those at similar size airports throughout the planning period. This is primarily due to the profitability of the airport's Fixed Base Operator (FBO) services and fuel sales. Most commercial passenger service airports in the United States do not provide FBO service or sell fuel. Thus, the viability of Easterwood Airport's financial management is largely dependent on the continuation of the FBO.

SECTION 1 STUDY GOALS

1.1 INTRODUCTION

This master plan update has been undertaken by Texas A&M University (Texas A&M) for the purpose of providing a comprehensive plan for the future development of Easterwood Airport. The plan provides an assessment of existing and forecasted aviation demand and includes a description of the facilities required to meet that demand. A primary element of the plan is a series of drawings referred to as the Airport Layout Plan Drawings (see Section 7). These drawings depict existing and future development at Easterwood Airport for a 20-year planning period extending from 2003 through 2023. This report provides the justification and reasoning for the development depicted on the plans. The plan was financed through passenger facility charges paid by passengers using Easterwood Airport.

The master plan update report consists of the following elements:

- **Inventory** – Existing facilities and operational conditions are documented.
- **Forecasts** – Projected growth rates for passengers and aircraft operations are established.
- **Demand/Capacity Analysis and Facility Requirements** – Comparisons are made between the capacity of existing facilities and projected levels of demand for those facilities. New facilities are recommended on the basis of any shortfalls identified in the demand/capacity analysis.
- **Alternatives Analysis and Recommended Plan** – Various methods of providing new or expanded facilities are identified and evaluated. Following the evaluation, a recommended plan is selected.
- **Environmental Overview** – The potential for environmental impacts resulting from proposed development is evaluated.
- **Airport Plans** – A consolidated plan for airfield, terminal area, and general aviation facilities is prepared on the basis of recommended alternatives.
- **Implementation Plan** – An implementation plan consisting of project identification, project cost estimates, and project phasing is developed. Once these tasks are completed, a consolidated capital improvement plan is produced.
- **Financial Plan** – A financial plan that identifies sources and uses of funding is prepared along with an analysis of the economic feasibility of the plan.

1.2 AIRPORT MISSION

Easterwood Airport has a mission statement that guides the operation of the airport through the Aviation Services Department of Texas A&M. The mission of the Aviation Services Department is to provide a gateway to the world for the students, faculty, and staff of Texas A&M and the citizens of Brazos Valley. The vision of the Aviation Services Department is:

- To become a respected role model for the aviation industry.
- To create a work environment that promotes a culture of ownership and pride.
- To focus on the significance of the customer and strive to exceed their expectations.
- To provide an airport that excels in safety, security, cleanliness, convenience, friendliness, and efficiency.

Furthermore, the Aviation Services Department has established goals to support this vision. The Aviation Services Department will:

- Provide the resources and maintain the flexibility necessary to fulfill compliance requirements with the ever-changing standards and regulations of the Federal Aviation Administration (FAA).
- Continue to upgrade runways and safety areas to ensure a high level of safety for the aviation community and the traveling public.
- Beautify and improve the interior and exterior environment of Easterwood Airport, including the McKenzie and General Aviation terminals, to enhance the experience of the aviation community and the traveling public.
- Provide a level of customer service that exceeds the expectations of the aviation community and the traveling public.
- Increase the Brazos Valley communities' awareness of the value and contribution of Easterwood Airport to the entire area.
- Create a work environment that enables employees to find professional and personal fulfillment in their responsibilities while completing the mission of the airport.

1.3 STUDY GOALS

To ensure that this master plan update reflects the needs of Texas A&M, passengers and tenants, as well as residents and businesses of the airport's service area, several goals have been prepared. These goals will serve as guidelines during the preparation of the master plan. It is anticipated that these goals will be supplemented through input from various stakeholders during the course of the study.

1.3.1 GENERAL GOALS

- The plan shall provide for the air transportation needs of Texas A&M and the Brazos Valley.
- The plan shall propose development in a manner that optimizes income potential and remains financially sound.
- The plan shall propose development that is environmentally acceptable in accordance with Federal guidelines.
- The plan shall identify locations on the airport that are suitable for aviation-related development.
- The plan shall address the needs of all types of airport users including scheduled and charter passenger airlines, cargo operators, general aviation, and the military.

1.3.2 AIRFIELD DEVELOPMENT GOALS

- **Maximize Safety of Existing and Future Facilities** – Ensure that all existing and future airfield facilities are planned in accordance with FAA safety requirements.
- **Examine Runway Issues** – Examine options for the long-term placement of a parallel runway.
- **Examine Runway Safety Area Issues** – Explore options for bringing the airport's runway safety areas into conformance with FAA standards
- **Examine Taxiway Issues** – Examine options for extending Taxiway Hotel to the approach end of Runway 34 and address impacts to the ILS glide slope antenna.

1.3.3 TERMINAL DEVELOPMENT GOALS

- **Maintain Operational Flexibility** – Plan and phase terminal improvements to minimize their impact on existing operations.
- **Address Baggage Claim Issues** – Plan for the renovation and expansion of baggage claim facilities that would provide sufficient baggage tug maneuvering space.
- **Examine Vertical Circulation** – Explore the potential for the installation of an escalator in addition the existing central stairway in the McKenzie Terminal.
- **Examine Apron Space Requirements** – Examine the amount of apron needed to accommodate charter operations in addition to the scheduled commercial service at the McKenzie Terminal.

- **Examine Reuse of 1st Floor Departure Lounge** – Examine options for the efficient reuse of space on the 1st floor of the McKenzie Terminal once the departure lounge is relocated from the 1st floor to the 2nd floor.

1.3.4 SUPPORT FACILITIES GOALS

- **Examine Rental Car Maintenance Facilities** – Explore suitable locations for individual or common use rental car maintenance facilities.

- **Address Maintenance Facilities** – Explore options for the construction of a maintenance facility to support the airport equipment and storage needs.

SECTION 2 AIRPORT INVENTORY

The data presented in this section of the Airport Master Plan Update was collected through on-site inspections and interviews, survey questionnaires, and the review of previously prepared documents. Data was also obtained from secondary sources at Federal, state, regional, and local levels.

The following sections address general information, major airport facilities, airspace and air traffic control, and the local community characteristics relevant to the master plan update. Tables and figures are presented to facilitate a comprehensive understanding of the components to be studied.

2.1 GENERAL INFORMATION

2.1.1 AIRPORT LOCATION AND STUDY AREA

Easterwood Airport is located in the east-central part of Texas, approximately three miles southwest of the City of College Station and approximately six miles south of the City of Bryan, at the intersection of Raymond Stotzer Parkway (FM 60) and Harvey Mitchell Parkway (FM 2818) as illustrated in **Figure 2-1**.

2.1.2 HISTORY OF THE AIRPORT

Texas A&M University (Texas A&M) approved Easterwood Airport to be built at its present site in 1938. Its primary purpose was to serve as a flight training school under the provisions of the War Training Service Program for which Texas A&M applied to the Civil Aeronautics Authority (CAA) for certification.

The airport was named after Navy Lieutenant Jesse L. Easterwood, a World War I aviator hero who graduated from Texas A&M in 1909. Lieutenant Easterwood was awarded the Navy Cross for distinguished and heroic service during World War I. Tragically, Lieutenant Easterwood died while testing an aircraft at Coco Sola, Panama in 1919.

The original airfield consisted of three turf landing strips and taxiways that later were paved. The first control tower was erected at the airport in 1952 and the first commercial passenger terminal for the airport was constructed in 1957. A new two-level modern commercial passenger terminal began construction in 1988, known as the McKenzie Terminal, named after William A. McKenzie. This new facility provides more than five times as much space as the previous terminal and the capability to handle up to four airlines along with other passenger facilities. The new terminal became operational in 1990 at which time plans were made to convert the old passenger terminal into a general aviation terminal. This allowed the airport to further meet the needs of non-commercial pilots and passengers to include corporate operators that utilize the airport. The completion of this renovation project allowed the opening of the general aviation terminal in 1994.

The airport has had many airport improvement projects over the years. Listed in **Table 2.1** are major federally funded developments that have been completed over the past decade.

Table 2.1
Airport Improvement Projects

Project Number	Year	Project Name/Description
2-2679	1991,1994	Overlay Runway 10-28 and Taxiway B
2-2735	1993	Airport Pilot Guidance System
2-2746	1994	Storm Drainage Renovation – Phase I
2-2752	1994,1995	Seal Coating and Perimeter Fencing
2-2796	1997	Runway 16-34 HIRL, Taxiway MITL, Runway 10-28 and Taxiway B Seal Coat, Taxiway F Fillet, Taxiway H Phase I
2-2797	1997	Airport Fire Station
2-2837	1999	Taxiway 10-28 MITL, Taxiway H Extension Phase III and IV, Runway 10 Safety Area Extension, Runway 10-28 Pavement Grooving and Marking, Taxiway H Phase V
2-2879	2000	General Aviation Aprons – Phase III
2-2887	2001	Rehabilitate Runway 4-22, Taxiways A and D Rehabilitation, New Aircraft Aprons
2-2889	Future	Taxiway H Extension to Runway 16 (Currently On Hold)
2-2890	2003	North Perimeter Road
2-2922	Future	Taxiway E Rehabilitation, Aircraft Aprons, West Side Perimeter Road

Source: Easterwood Airport Management Records, 2003

2.1.3 AIRPORT ACREAGE AND CLASSIFICATION

Since the airport's original construction in 1938, little change in overall area has taken place. Airport property currently encompasses approximately 700 acres. It is anticipated that an additional 140 acres of Texas A&M's property will be designated to the airport for its use in the near future. All surveyed existing airport property will be identified in the Airport Layout Plan (ALP) drawing set.

There are a number of Federal Aviation Administration (FAA) classifications for the nation's civil airports according to the National Plan of Integrated Airport Systems (NPIAS) 2001-2005, which is made up of over 3,364 airports that are significant to national air transportation. In the NPIAS, commercial service airports are defined as public airports receiving scheduled passenger service and having 2,500 or more enplaned passengers per year. Commercial airports with more than 10,000 enplanements are classified as primary airports. With respect to the type of service level the airport currently provides, Easterwood Airport's role is designated as a primary commercial service airport in the NPIAS.

2.1.4 PREVIOUS STUDIES

The following studies were obtained from the Texas A&M University System (A&M System) and other sources during the inventory phase of this project. These documents were reviewed for valuable historic data and significant insight into the process of long-range planning at the Easterwood Airport.

Easterwood Airport

N

SCALE: N.T.S

Easterwood Airport Master Plan Update	**LOCATION MAP**	**FIGURE** **2-1**

- Easterwood Airport Master Plan Update 1996-2016, Carter-Burgess Consultants, November 1997.
- The FAA National Plan of Integrated Airport Systems (NPIAS) 2001-2005, FAA, 2002.
- Texas Aeronautical Facilities Plan Summary, 1988-1993.
- City of College Station, Comprehensive Plan, 1995-2015.
- 2000-2020 Bryan Comprehensive Plan, City of Bryan, Texas.
- 2000-2025 Metropolitan Transportation Plan, Bryan-College Station Metropolitan Planning Organization, 1999.
- Pavement Engineering Services for Easterwood Airport, HVJ Associates Inc., 2001.

2.2 AIRPORT FACILITIES

A description of each of the components of the airport as they existed in February 2003 is summarized in the following sections. Included are the airfield, commercial and general aviation facilities, on-airport access and parking, and other support facilities.

2.2.1 AIRFIELD

An inventory of primary airfield components was included in the February 2003 inventory process. Data pertaining to runways and taxiways, lengths and widths, designations, lighting and marking, orientations, and separations; pavement conditions; and obstacles to the surrounding airspace and runway protection zones, were inventoried. The following sections provide an account of applicable airfield assets at the airport. For ease of reference, **Figure 2-2** depicts the major airfield components identified in this section.

2.2.1.1 Runways and Taxiways

The existing airfield configuration at Easterwood Airport consists of three active runways: Runway 16-34, Runway 10-28, and Runway 4-22. Runway 16-34 is the airport's primary runway. Runway 10-28 and Runway 4-22 are the airport's secondary runways. **Table 2.2** presents the existing airfield facilities.

Runways 16-34 and 10-28 are marked and lighted to facilitate safe operations during daytime and nighttime conditions. Pavement markings on Runway 16-34 are in good condition and conform to FAA requirements for a precision instrument runway. Pavement markings on Runway 10-28 meet FAA requirements for a non-precision instrument runway. Runway 16-34 is equipped with high intensity runway edge lights (HIRL) and Runway 10-28 is equipped with medium intensity runway edge lights (MIRL). Runway 4-22 has markings in fair condition on the 4 end, and markings in poor condition on the 22 end. Runway 4-22 does not have lighting, which prohibits nighttime operations on this runway. It is also not equipped for instrument operations and therefore is only available for VFR operations only. Section 2.2.1.4 will address the visual navigation aids that equip each runway.

Table 2.2
Existing Airfield Facilities

Runway	Length (feet)	Width (feet)	End Elevations (feet MSL)	Effective Runway Gradient (%)	Parallel Taxiway	Runway to Parallel Taxiway Separation (feet)
16-34	7,000	150	16 – 320.9 34 – 304.7	0.23	Taxiways A, C, and H	Varies 400 to 700
10-28	5,159	150	10 – 319.5 28 – 311.7	0.15	Taxiway B	Varies 200 to 600
4-22	5,149	150	04 – 307.1 22 – 318.4	0.22	Taxiway E	Varies 300 to 500

Note: MSL = Mean Sea Level.
Sources: FAA Form 5010-1, 01/28/2003.
Airport Obstruction Chart (OC 928), 10th Edition, National Ocean Service, 1992.

Runway 16-34 is served by a parallel taxiway that extends the entire length of the runway on the east side by the merging of Taxiway A and Taxiway C and partially served by Taxiway H on the west side. Taxiway B serves Runway 10-28 and extends from Runway 16-34 to Runway 10. Runway 4-22 is served by Taxiway E, a three-quarter length parallel taxiway that starts at the Runway 4 end and extends 3,400 feet on the south side of the runway.

All three runways have an array of entrance and exit taxiways to facilitate the efficient movement of aircraft on/off the runways. Additional taxiways at Easterwood Airport include connector Taxiways D, F, and G, which provide access to all three runways either directly or by connecting with previous mentioned taxiways. The taxiways also provide access and points of ingress and egress to the apron areas. All taxiways have a width of 50 feet.

2.2.1.2 Runway Protection Zones

The Runway Protection Zone (RPZ) is a two-dimensional trapezoidal area at ground level that begins 200 feet beyond each end of the runway. The dimensions of the RPZ is a function of the design (critical) aircraft and the type of approach (visual, non-precision, or precision). **Figure 2-2** depicts the RPZs for the runways at Easterwood Airport. It should be noted that the Federal government recommends that the airport operator have adequate property interests in the RPZs to prevent incompatible development.

The existing RPZ for Runway 16 is based on a non-precision approach with a not lower than 3/4-mile visibility for all aircraft approach categories[1]. The RPZ for Runway 16 is centered along the runway centerline, with an inner width of 1,000 feet and outer width of 1,510 feet. The RPZ begins 200 feet beyond the runway end and extends 1,700 feet outward. The existing RPZ for

[1] Aircraft approach categories will be discussed in detail in the Facility Requirements section of this study.

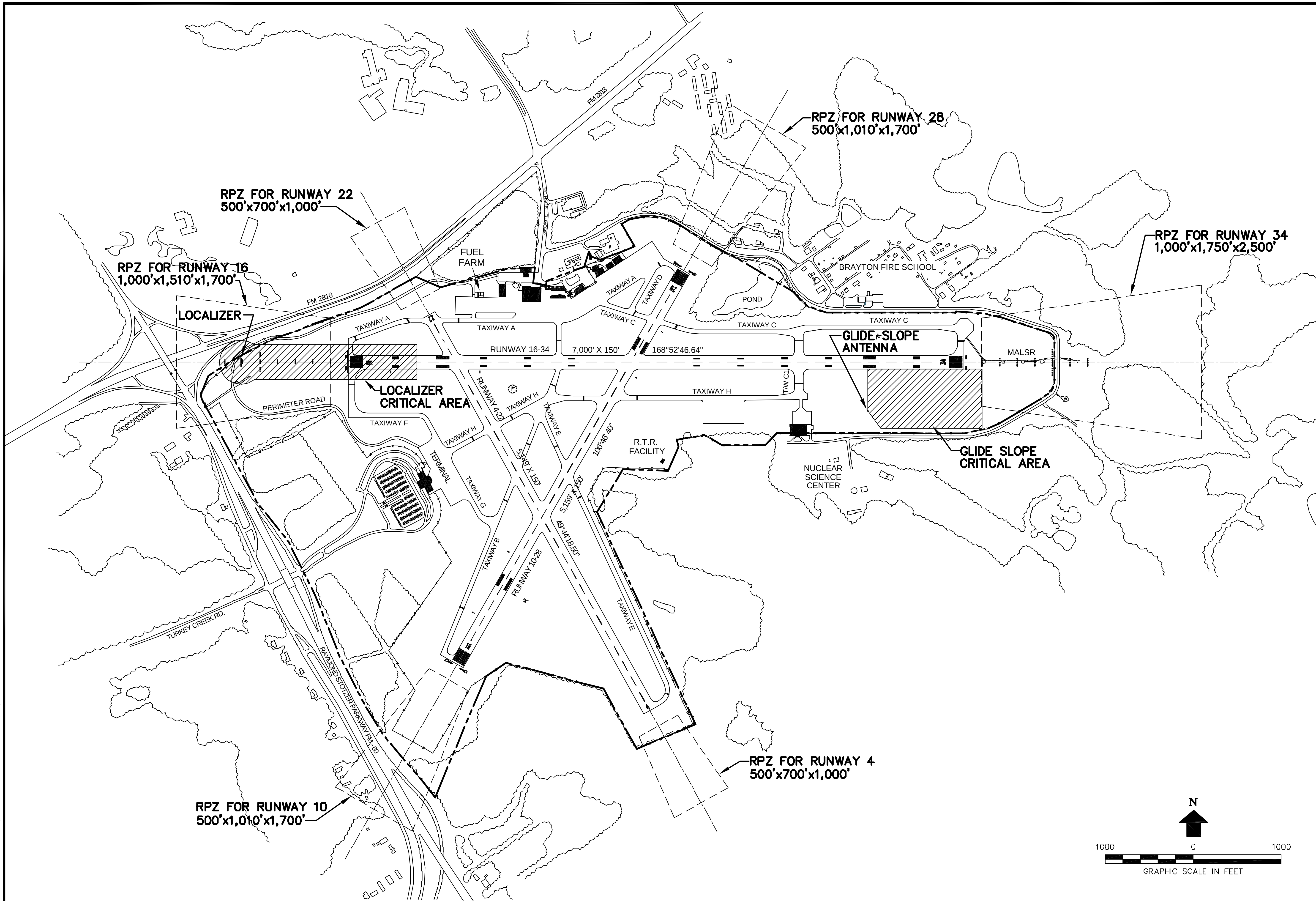

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FIGURE 2-2

AIRFIELD FACILITIES

Easterwood Airport
Master Plan Update

Runway 34 is based on a precision approach with lower than ¾-mile visibility for all aircraft approach categories. The RPZ for Runway 34 is centered along the runway centerline, with an inner width of 1,000 feet and outer width of 1,750 feet. The RPZ begins 200 feet beyond the runway end and extends 2,500 feet outward.

The existing RPZs for Runways 10 and 28 are based on non-precision approaches with a not lower than one-mile visibility for all aircraft approach categories. Each associated RPZ area for Runways 10 and 28 are centered along the runway centerline, with an inner width of 500 feet and outer width of 1,010 feet. Beginning 200 feet beyond the runway end, the RPZs extend 1,700 feet outward.

The existing RPZs for Runways 4 and 22 are based on visual approaches with visibility minimums greater than or equal to one mile serving aircraft in approach categories A and B[1]. This area is centered along the runway centerline and positioned 200 feet beyond the runway end. It extends 1,000 feet and has an inner width of 500 feet and an outer width of 700 feet.

2.2.1.3 Pavement Conditions

Two types of pavement design, flexible and rigid, are used at airports. Flexible pavement consists of a bituminous surface placed on a base course, and when required by sub-grade conditions, a sub-base. The bituminous surface prevents the penetration of surface water to the base course, provides a smooth well-bonded surface free of loose particles, resists the shearing stresses of aircraft loads, and provides a nonskid quality. The base course is the principal structural component of flexible pavement. It distributes the aircraft wheel loads to the pavement foundation, the sub-base and/or sub-grade. The function of the sub-base is similar to that of the base course, while the compacted sub-grade provides stability and support to the entire pavement.

Rigid pavement is composed of cement concrete placed upon a granular or treated sub-base course that rests upon a compacted sub-grade. The concrete surface must provide a nonskid surface, prevent the infiltration of surface water, and provide structural support to aircraft. The sub-base under a rigid pavement provides uniform stable support for the pavement slabs. The sub-grade of a rigid pavement is compacted to provide adequate stability and support for the pavement.

The pavements at Easterwood Airport are considered rigid pavements with or without asphalt overlay. The surface type is Portland cement concrete (PCC) and APC asphalt overlay on PCC (ACC). The pavements with an asphalt surface are classified as composite pavements and due to the underlying concrete are also considered rigid pavements. **Table 2.3** presents the distribution of pavement types at Easterwood Airport as calculated by HVJ Associates as part of a pavement management plan conducted in 2001.

Table 2.3 Distribution of Pavement Surfaces			
Pavement Surface	**Apron**	**Runway**	**Taxiway**
Portland Cement Concrete (PCC)	93%	27%	61%
APC Asphalt Overlay on PCC (ACC)	7%	73%	39%

Source: Pavement Engineering Services for Easterwood Airport, HVJ Associates Inc., 2001.

According to the plan, the primary distresses identified on the asphalt pavements at Easterwood Airport include: longitudinal/transverse cracking, block cracking, and joint reflection cracking. All three of these distresses are caused by climate/durability. Another pavement primary distress is weathering/raveling caused by load. The primary distresses observed on the concrete surface pavements at Easterwood Airport include: corner breaks, linear cracking, and shattered slab, which are all related to load causes.

The Pavement Condition Index (PCI) is a numerical index used for rating pavement condition. The index ranges from 0, for a completely failed pavement, to 100 for a pavement in perfect condition. The PCI for the pavements at Easterwood Airport as determined for the pavement management plan are illustrated in **Figure 2-3.** Pavement areas that were identified by the plan as being in poor or failed condition are being addressed through ongoing pavement projects.

2.2.1.4 Pavement Strength

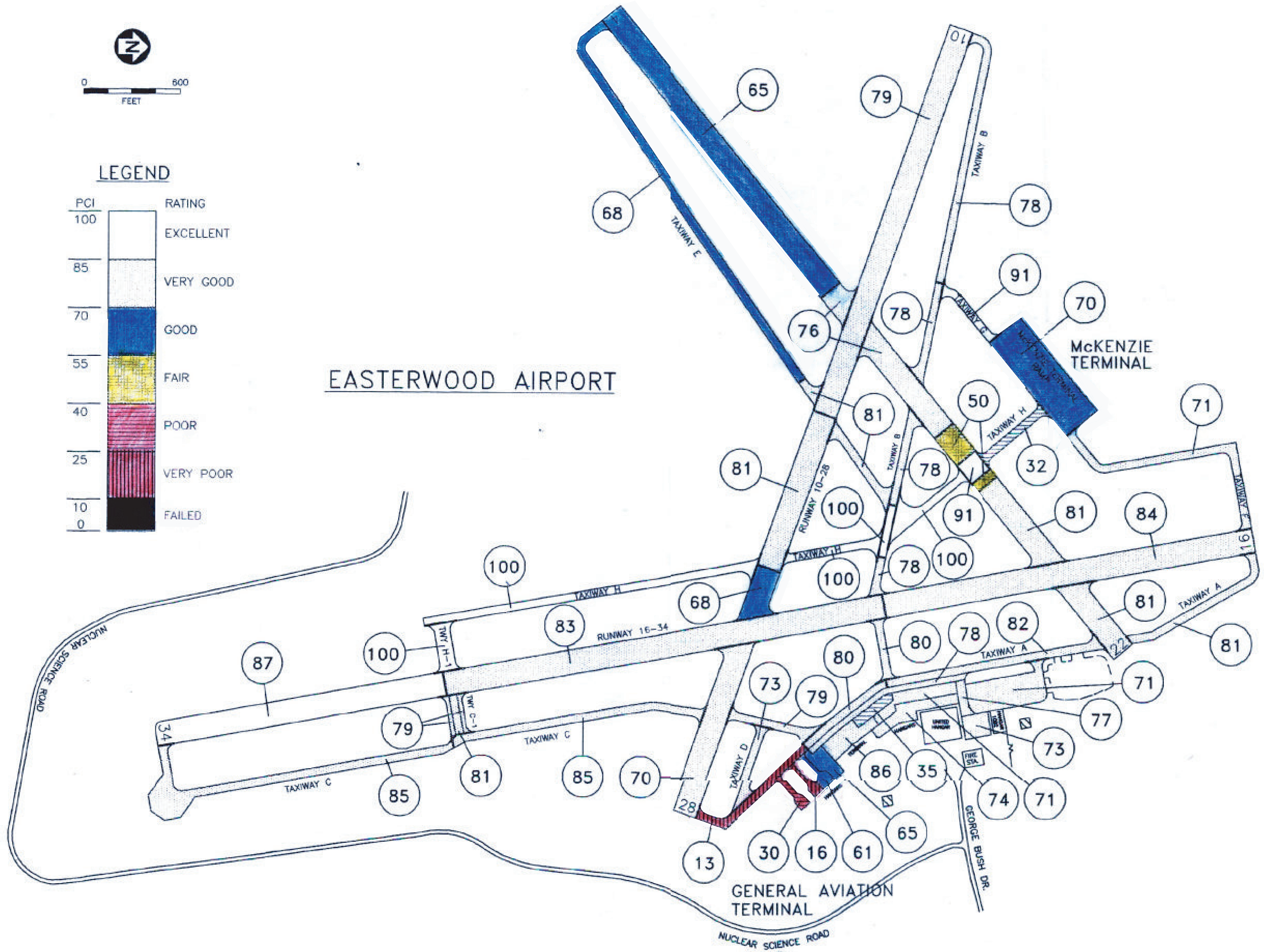
Table 2.4 presents the pavement strengths for the three runways at Easterwood Airport. This data was obtained from the FAA's Form 5010-1.

Table 2.4 Pavement Strengths			
Wheel Configuration	**Runway 16-34**	**Runway 10-28**	**Runway 04-22**
Single	70,000 lbs.	27,000 lbs.	27,000 lbs.
Double Wheel	90,000 lbs.	50,000 lbs.	50,000 lbs.
Double tandem	150,000 lbs.	87,000 lbs.	87,000 lbs.

Source: FAA Form 5010-1, 01/28/2003.

2.2.1.5 Navigational Aids and Instrument Procedures

Information on the existing landing and lighting navigational aids (NAVAIDS) at the airport was obtained from the Airport/Facility Directory - South-Central, U.S., U.S. Department of Transportation, January 23, 2003 and the FAA Form 5010-1. These NAVAIDS are listed in **Table 2.5**. Three specific components were addressed: navigation aids for specific runways, en-route navigation aids, and lighting. In addition to the landing and lighting NAVAIDS presented in **Table 2.5**, a lighted wind cone and segmented circle is located in the center of the airfield to help pilots identify wind direction and speed.



Source: Pavement Engineering Services for Easterwood Airport, HVJ Associates Inc., 2001.

FIGURE 2-3

PCI SUMMARY

Easterwood Airport Master Plan Update

Table 2.5 Landing and Lighting Navigational Aids	
Designated Runway	**Existing Facility**
16	HIRL, VASI – V4R
34	MALSR, HIRL
10	VASI – V4L, MIRL
28	VASI – V4L, REIL, MIRL
4	None
22	None

Legend:

MIRL	Medium Intensity Runway Lights.
HIRL	High Intensity Runway Lights.
VASI	Visual Approach Slope Indicator System.
V4L	4-box VASI on left side of runway.
V4R	4-box VASI on right side of runway.
REIL	Runway End Identifier Lights.
MALSR	Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights.

Source: Airport Facility Directory – South Central U.S., U.S. Department of Transportation, January 23, 2003

Navigation Aids by Runway – There are nine published instrument approach procedures for Easterwood Airport serving Runways 10-28 and 16-34. The approaches were obtained from the U.S. Terminal Procedures - South Central (Volume 5), U.S. Department of Transportation, dated January 23, 2003. **Table 2.6** presents the approach procedures published for Easterwood Airport.

Enroute Navigation Aids – The available en-route navigation aids for Easterwood Airport include the College Station VORTACW (very high frequency omni-directional radio beacon with UHF navigational facility-omnidirectional course and distance information), located 3.1 nautical miles east of the center of the field; a Hazardous In-flight Weather Advisory Service (HIWAS), and the Rowdy Non-Directional Beacon (NDB) which is located with the College Station VORTACW.

Lighting – Runway 16-34 has HIRL and a Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) on the Runway 34 End. Runway 10-28 at Easterwood Airport is equipped with MIRL. Runway 4-22 does not have runway edge lighting. The runways' lighting systems are provided to improve the level of safety during nighttime and inclement weather operations and assist in approach procedures.

Table 2.6 Published Approach Procedures		
Approach Procedure	**Height Above Touchdown (feet)**	**Visibility (statute miles)**
LOC BC Runway 16	659	1
ILS Runway 34	200	½
GPS Runway 16	519	1
GPS Runway 34	350	½
NDB Runway 34	410	¾
VOR or TACAN Runway 10	401	1
VOR/DME Runway 28	487	1
GPS Runway 10	401	1
GPS Runway 28	446	1

Legend:
ILS Instrument Landing System.
LOC BC Localizer Back Course.
VOR Very High Frequency (VHF) Omni-directional Radio Beacon.
DME Distance Measuring Equipment.
TACAN Tactical Air Navigation.
NDB Non-Directional Beacon.
GPS Global Positioning System.

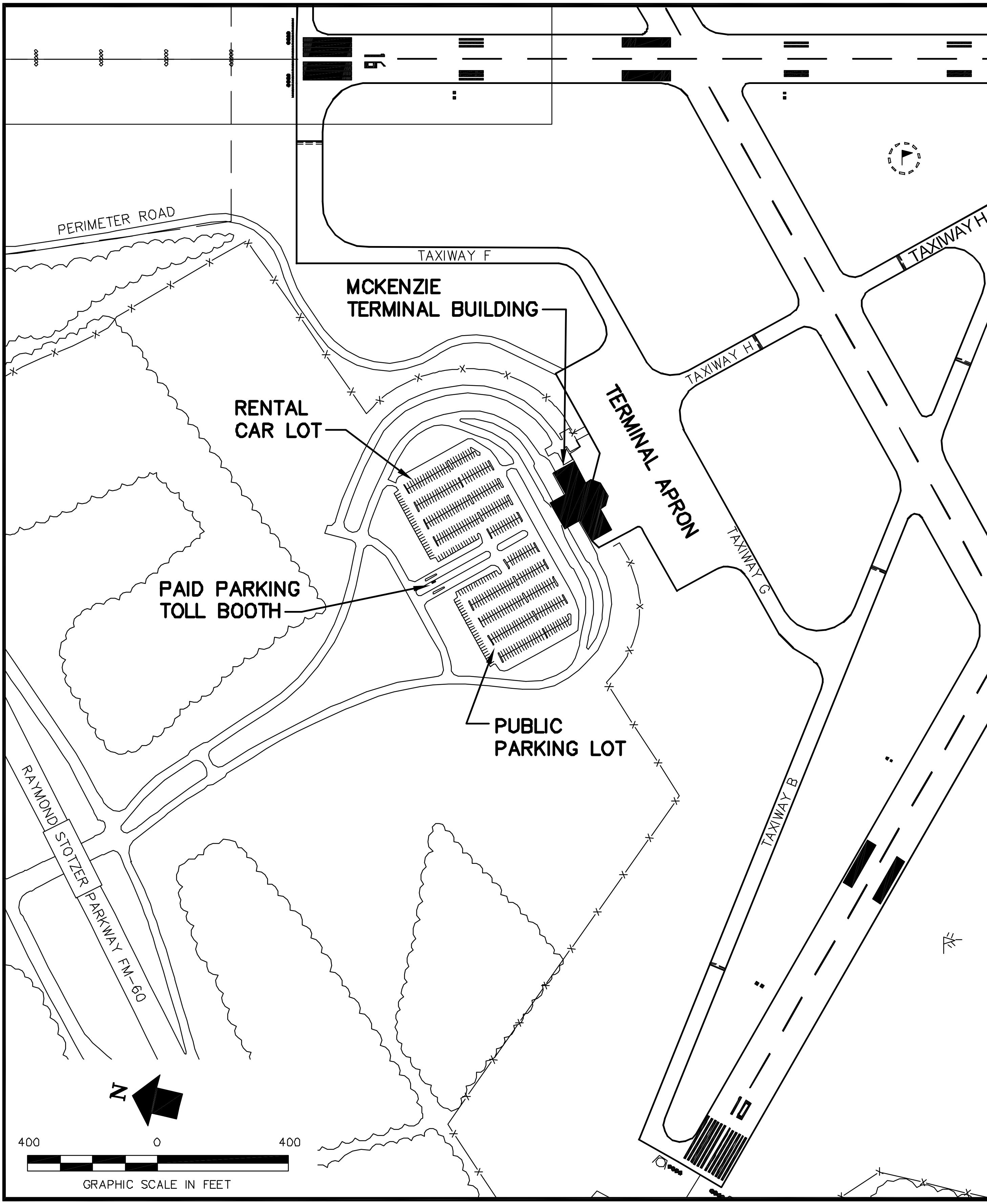
Source: Airport Facility Directory – South Central U.S., U.S. Department of Transportation, January 23, 2003.

2.2.2 COMMERCIAL PASSENGER TERMINAL AREA

The commercial passenger terminal area is located in the northeast quadrant of the airport as depicted in **Figure 2-4**. The facilities in the passenger terminal area include the McKenzie Terminal Building, an air carrier ramp, and automobile parking facilities.

2.2.2.1 Commercial Passenger Terminal Building

The McKenzie Terminal Building was constructed in 1988 and now serves as the passenger terminal for all commercial service at Easterwood Airport. The terminal provides approximately 28,000 square feet of floor space on two levels. The terminal building is in good condition. However, there is evidence of some pavement distress on the upper level curbside due to subsidence. **Figures 2-5** and **2-6** show the floor plans for each level of the terminal.



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Easterwood Airport Master Plan Update

COMMERCIAL TERMINAL AREA FACILITIES

FIGURE 2-4

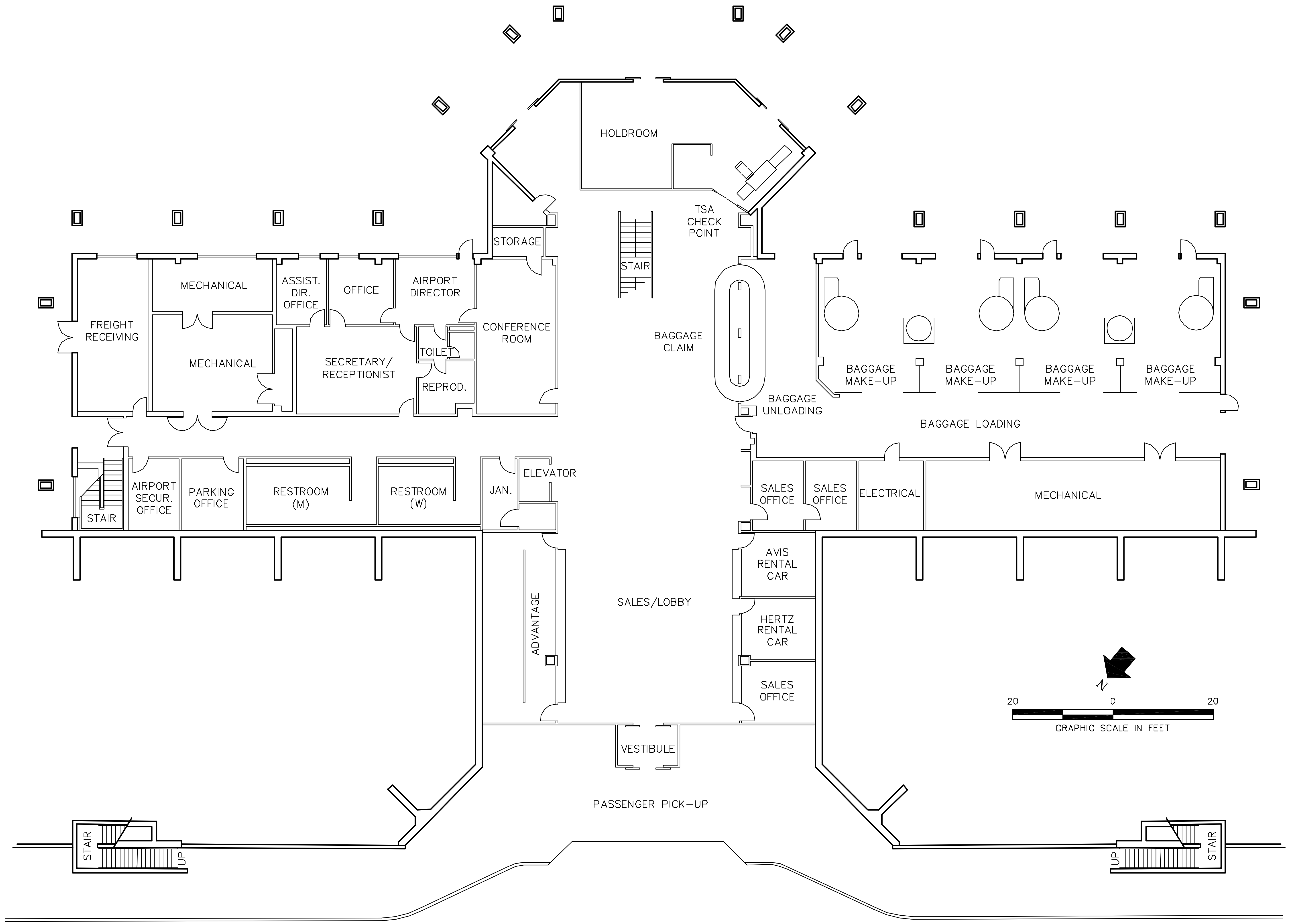

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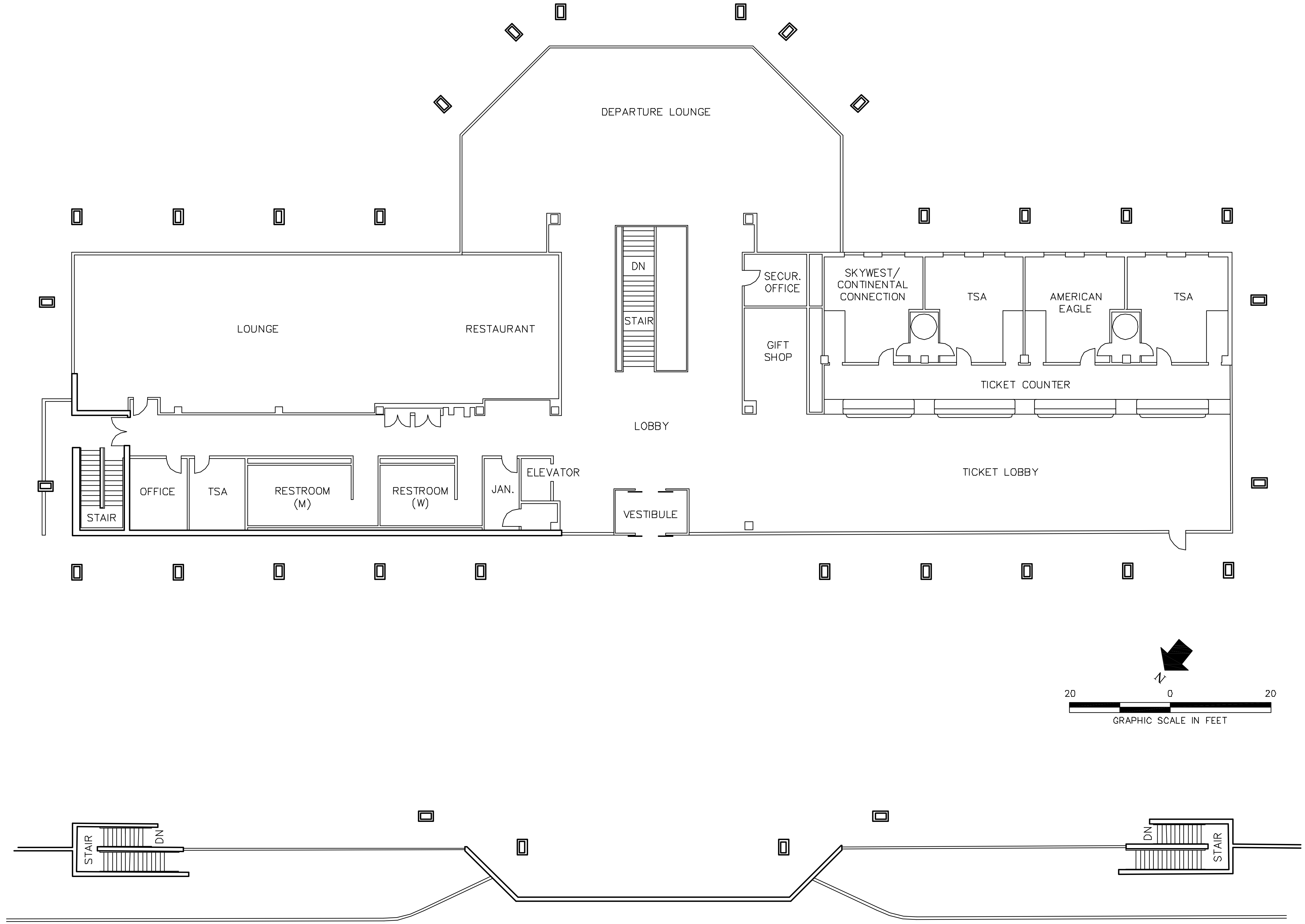
FIGURE 2-5

COMMERCIAL TERMINAL
FIRST FLOOR PLAN

**Easterwood Airport
Master Plan Update**

FIGURE 2-6

COMMERCIAL TERMINAL SECOND FLOOR PLAN



Easterwood Airport Master Plan Update

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The terminal currently accommodates two commercial airlines, three rental car companies, ticketing, baggage handling, and Transportation Security Administration (TSA) offices. Vending areas, food service facilities, and airport management are other entities that use the McKenzie Terminal for accommodating passenger traffic. **Table 2.7** presents the current allocations of space within the terminal building.

Table 2.7
Commercial Passenger Terminal Building Space Allocations

Services or Areas within Terminal Building	Current Allocations
Aircraft Gates	2
Curb - Enplaning (Linear Feet (LF))	400
Curb – Deplaning (LF)	400
Ticketing	
Positions (Each (EA))	8
Ticket Counter Length (LF)	80
Airlines Offices (Square Feet (SF))	785
Ticketing Lobby (SF)	2,220
Departure Lounge (SF)	1,200
Security Check Point (SF)	110
Security Queue & Circulation (SF)	100
Transportation Security Administration Offices (SF)	1,205
Baggage Claim Lobby (SF)	1,250
Baggage Claim Frontage (LF)	28
Baggage Claim Offload Area (SF)	280
Baggage Make-up (SF)	1,120
Tug Drive Circulation (SF)	960
Restrooms (SF)	1,255
Airport Administration (SF)	1,580
Rental Auto	
Counter Length (LF)	75
Back Office Space (SF)	1,230
Concessions (SF)	3,240
Custodial Areas (SF)	250
Mechanical/Electrical Areas (SF)	1,900
Public Circulation (SF)	7,748
Vertical Circulation (SF)	1,180
Total Terminal Area (SF)	**27,613**

Sources: Ben Lao & Associates analysis, 1996.
URS Corporation analysis, 2003.

2.2.2.2 Security Issues

The TSA security checkpoint for departing passengers is on the lower level of the terminal adjacent to the baggage claim lobby. As a result, the queue for the security check usually extends out into the baggage claim lobby and impedes passenger circulation in this area. In addition, the sterile hold room becomes congested during peak times when there is more than one departing flight.

2.2.2.3 Passenger Flow

The main passenger flow is focused on the first level to the lower level gates. As mentioned previously, the public areas on the lower level are generally congested during peak demand. Proposed jet bridges will enable new "gates" to be used on the second level and allow for easier flow as in-bound and out-bound passengers will have more room with the use of a larger second-level secure hold room.

2.2.2.4 Baggage Handling

The existing baggage claim lobby and claim device area is impacted by the volume of passengers moving towards the security checkpoint. Other issues associated with baggage claim and handling were noted. There is some wear and tear to the spiral chute that delivers checked bags to the make-up area. In addition, the internal and external walls of the baggage make-up area have suffered collision damage from baggage tugs.

2.2.2.5 Passenger Waiting Areas

The McKenzie Terminal building was originally designed to accommodate second-level boarding of one or two jet aircraft. Currently, the terminal is arranged for ground-level boarding with a secure departure lounge on the first floor. Passengers currently check-in on the upper level and precede downstairs via a stairway or elevator, where they wait in the secured departure lounge. This forces both enplaning and deplaning passengers to the first floor, creating a conflict in passenger flow. The current passenger flow arrangement not only creates congestion due to insufficiently using all available floor space on both levels, but also creates a problem of overuse in the restroom and customer facilities on the first floor as well as related problems in the baggage claim area, baggage make-up areas, and baggage tug and offload areas, the ticketing lobby, and the terminal access loop road pavement. It is anticipated that the passenger waiting areas will be better utilized if the security checkpoint and departure lounge are relocated to the second floor.

2.2.2.6 Description of Tenant Services

The tenants located in the McKenzie Terminal Building serving commercial passengers include two airlines (American Eagle and Skywest/Continental Connection), three rental car companies, the Transportation Security Administration, and Easterwood Airport Administration. See **Table 2.8** for a listing of tenants using the McKenzie Terminal building and the services they offer. In addition, Appendix A summarizes the results of the tenant survey.

Table 2.8 McKenzie Terminal Tenants and Services	
Tenant	**Service Offered**
American Eagle	Commercial Airline
Skywest/Continental Connection	Commercial Airline
Advantage Car Rental	Car Rental Agency
Avis	Car Rental Agency
Hertz	Car Rental Agency
Transportation Security Administration	Federal Airport Security
Easterwood Airport Administration	Airport Administration

Source: URS Corporation analysis, 2003.

2.2.2.7 Air Carrier Ramp Parking

The North Terminal Area air carrier ramp, constructed in 1986, serves the McKenzie commercial passenger terminal. It encompasses approximately 17,700 square yards and is constructed of Portland Cement Concrete (PCC). The weight capacity for this ramp area is 73,000 pounds for single wheel configurations, 130,000 pounds for dual wheel, and 200,000 pounds for dual tandem wheel configurations. The ramp accommodates existing operations by regional jets and Saab 340's as well as occasional air carrier aircraft.

Automobile parking facilities in the north terminal area are discussed in Section 2.2.4.

2.2.3 GENERAL AVIATION FACILITIES

The general aviation facilities inventory includes the general aviation terminal building, general aviation aircraft parking, and storage facilities as depicted in **Figure 2-7**.

2.2.3.1 General Aviation Terminal

After the completion of the McKenzie Terminal, the old passenger terminal was converted into a general aviation terminal to further meet the needs of general aviation passengers and pilots to include corporate operators that were based at or frequently used Easterwood Airport. The terminal was renovated and opened for general aviation service in 1994. This facility is in good condition and is used to house line service and support personnel as well as general aviation flight operations.

The general aviation terminal building consists of approximately 5,200 square feet of floor space. **Figure 2-8** shows a floor plan layout of this facility. This terminal includes allocated space for a passenger waiting area, concessions, pilot lounge with sleeping and shower facilities as well as kitchen facilities, a flight planning area, TV room connected to the pilot lounge, and customer restrooms to include a shower room, as well as storage areas, janitor rooms, and office allocations for four offices.

2.2.3.2 Based and Itinerant Aircraft Apron Areas

Aircraft aprons at Easterwood Airport are used to park a variety of general aviation aircraft including small general aviation aircraft, larger corporate aircraft, private helicopters, and military jets. Parking space is required for the following:

- ***Small aircraft*** – parking space with tie-down capability, sized to accommodate single-engine and light multi-engine aircraft.
- ***Large aircraft*** – spaces on a paved apron suitable for parking the larger corporate and business jets, such as the Boeing 737, 727, Learjet, Citation, Gulfstream, and Falcon aircraft fleets. Military aircraft occupy this area also include: the T-37, T-6, T-38, T-34, King Air, and helicopters.

The new north ramp provides approximately 4,200 square yards of based aircraft parking space for 7 tie-down spaces.

The north ramp provides approximately 15,400 square yards of space for based and transient aircraft parking. The ramp area extends south from Hangar 1092 to the T-hangars. This apron area provides 24 tie-down spaces opposite Hangar 1092 and 18 tie-down spaces opposite Hangar 756 and the T-hangars.

The south apron area is approximately 24,800 square yards and extends south from the T-hangars to south of Hangar 1260. There are six large aircraft parking spaces available on the transient portion of the ramp. The new portion of the ramp in front of Hangars 1260 and 1259 will accommodate military and potentially charter aircraft.

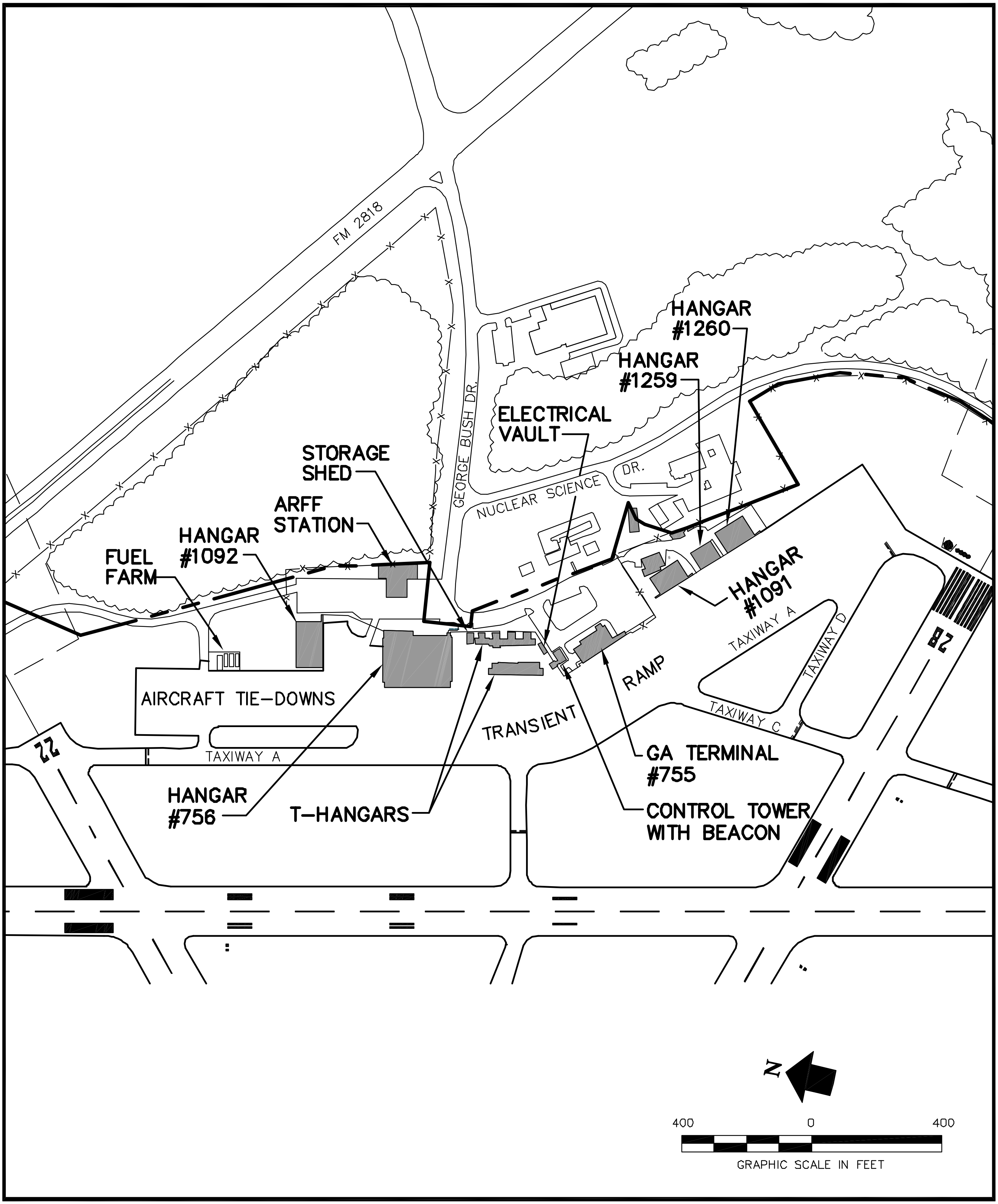
Figure 2-7 depicts apron areas for based and itinerant aircraft.

2.2.3.3 Hangars

As depicted in **Figure 2-7**, Easterwood Airport currently utilizes all of the types of facilities described below to accommodate aircraft storage:

- ***Community Bay hangars*** – a fully enclosed building typically capable of holding anywhere between 5 and 15 aircraft each, depending on the aircraft types.
- ***Corporate Bay hangars*** – similar to clearspan hangars, but are typically smaller and privately owned with an attached office. These hangars typically house only a few aircraft.

T-hangars – a fully enclosed building housing individual stalls, each capable of storing one aircraft, typically a single-engine or a light multi-engine aircraft.



Easterwood Airport Master Plan Update	GENERAL AVIATION TERMINAL AREA	FIGURE 2-7

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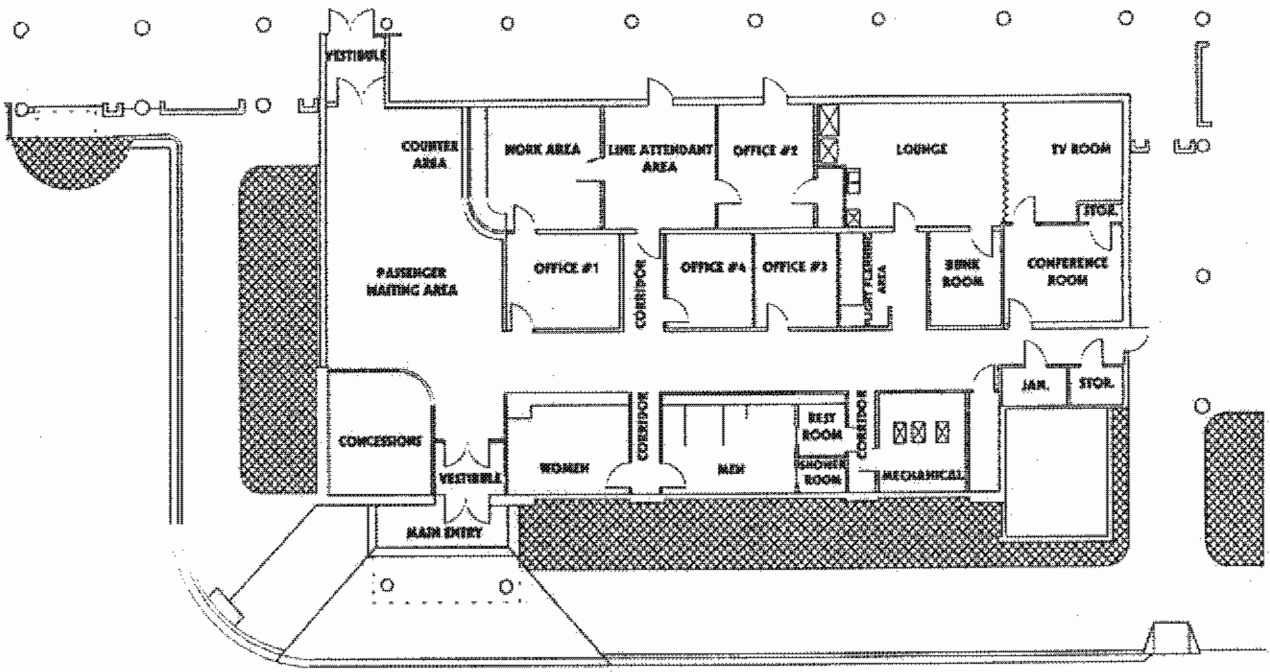


Easterwood Airport Master Plan Update

GENERAL AVIATION TERMINAL FLOOR PLAN

FIGURE 2-8

Table 2.9 presents the current hangar facilities being used at Easterwood Airport. This information was provided by Texas A&M University Audit.

Table 2.9
Hangar Facilities

Owner	Hangar No.	Type of Hangar	Number of Aircraft[1.]	Condition	Tenant or Number of Aircraft Hangared
Texas A&M	756	Community	7-14	Fair[2.]	Currently 14 A/C
Texas A&M	1091	Corporate	3-6	Good	Texas Task Force One
Texas A&M	1092	University	3-5	Good	System Aircraft
Texas A&M	1260	Corporate	2-9	Good	20 yr. Lease
Texas A&M	1259	Corporate	2-3	Good	Texas Task Force One
Texas A&M	T-Hangars	Individual	1 each 9 total	Fair	9 of 9 leased

Notes:
1. Depends on types of aircraft.
2. Adjacent offices being renovated.

Source: Texas A&M University Audit (Audit Period 08/31/98 – 10/31/99).

2.2.3.4 Description of General Aviation Services Provided by Tenants

The tenants located in the general aviation terminal building and in general aviation hangars include: repair facilities, flight schools, flying clubs, corporate, University, and individual usage. **Table 2.10** lists the tenants that occupy the general aviation facilities and the service they offer, if applicable, as well as the facility being used. Please refer to Appendix A for the results of the tenant survey.

Table 2.10
General Aviation Tenants and Services Offered

Tenant	Service Offered (If applicable)	Facility Used
United Flight Systems	Flight School	Hangar 756
College Station Aircraft Repair. Inc.	Aircraft Repair Facility	Hangar 756
Easterwood Avionics	Avionic Repair Facility	Hangar 756
Texas A&M Flying Club	Flight Club	Hangar 756
ARFF Personnel	Airport Firefighting & Rescue	ARFF Station
Administration & Operations Staff	Administration & Line Services	GA Terminal Building
Associate Director	Management	GA Terminal Building
Task Force One	Emergency Response	Hangars 1091 & 1259
Texas A&M	System Aircraft	Hangar 1092
Individual Renters	Private Use Only	T-Hangars
Corporate	Corporate Use	Hangar 1260

Source: URS Corporation, 2003.

2.2.4 AIRPORT ACCESS AND PARKING

This section describes the physical elements of the surface transportation system serving Easterwood Airport, including the public roadways and restricted use service roads and parking facilities.

2.2.4.1 Public Use Roadways

Roadway access to the McKenzie Terminal is provided by Raymond Stotzer Parkway (FM 60) and Harvey Mitchell Parkway (FM 2818). FM 60 provides direct access from the City of College Station and the City of Bryan, while FM 2818 provides access from areas northwest and east of the airport.

Roadway access to general aviation and support facilities is provided by West George Bush Drive (FM 2347). FM 2347 connects to FM 2818 and provides access to Texas A&M University. Public use roadways in the vicinity of Easterwood Airport are depicted in **Figure 2-9.**

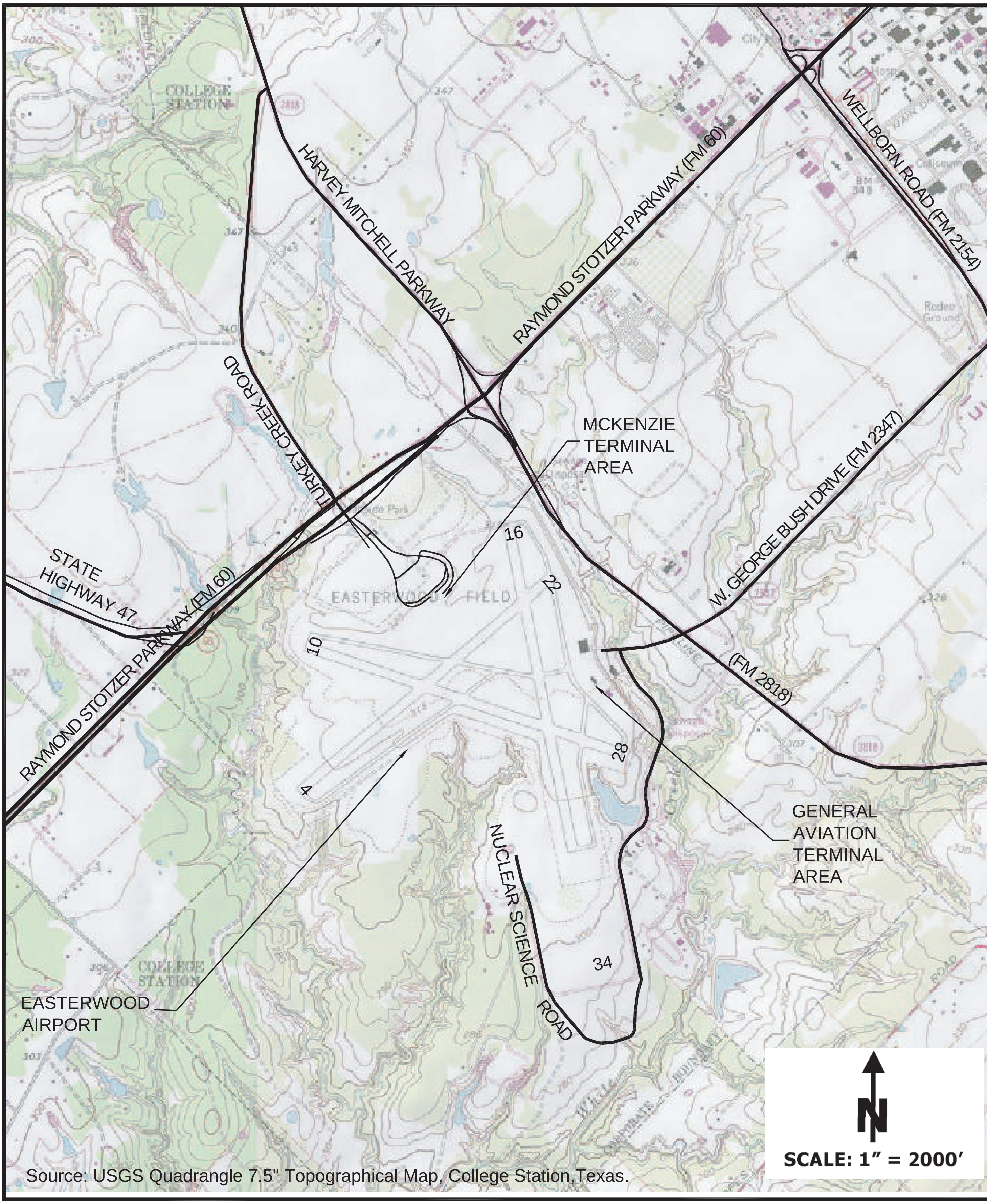
2.2.4.2 Restricted Use Service Roads

Restricted use service roads are located on airport property and typically accommodate traffic by non-licensed vehicles such as Aircraft Rescue and Fire Fighting (ARFF) vehicles, airport maintenance and service vehicles, and mobile fuel trucks. Service roads at Easterwood Airport consist of one paved road and a few unpaved roads. The paved service road provides perimeter access from the air carrier ramp around the approach ends of Runway 16 and Runway 22 to the north general aviation terminal area. Unpaved roads provide access to the FAA Remote Transmitter Receiver (RTR) Facility and the runway alignment indicator lights (RAIL) beyond Runway 34.

2.2.4.3 Parking Facilities

Parking facilities at the McKenzie Terminal consist of 361 spaces for paid public parking, 10 reserved spaces, and 150 rental car spaces for a total of 521 spaces. The paid public parking lot includes four handicapped spaces located in proximity to the terminal building entrance. The parking facility is located on the landside of the McKenzie Terminal Building and is accessible from FM 60 and Turkey Creek Road.

Parking facilities at the general aviation terminal area provide a total of 61 parking spaces. Fifteen parking spaces are reserved for half-hour visitor parking and three for handicapped parking. There is an additional parking area located adjacent to Hangar 756 for tenant and surplus visitor parking. The general aviation parking areas are accessible from George Bush Drive and Nuclear Science Road.



Easterwood Airport Master Plan Update	**ROADWAY ACCESS**	FIGURE 2-9

2.2.5 SUPPORT FACILITIES

Support facilities at Easterwood Airport include airport maintenance, ARFF, and fuel storage facilities.

2.2.5.1 Maintenance Facilities and Equipment

Maintenance facilities at the airport consist of two covered vehicle storage sheds for field equipment, a maintenance garage (Building 754) for auxiliary equipment storage and vehicle/equipment maintenance, and an equipment storage shed adjacent to the T-hangars. The airport has a variety of maintenance equipment. As of May 2003, this equipment consisted of the following items:

- Rhino SR – 15 Shredder
- Front Bucket Loader with Pallet Fork
- John Deere Model 6300 Tractor
- John Deere Model 6410 Tractor
- John Deere 820 Tractor
- John Deere 1518 Rotary Cutter
- Two Toro Groundmaster Mowers
- Two Kawasaki Mule Utility Vehicles
- Tymco Vacuum Sweeper Truck
- Dodge Ram Stake-side Dump Truck
- Magnetic Road Sweeper
- Rhino Saturn Rotary Cutter
- Massey-Ferguson 1030 Tow Tractor
- 1988 Chevrolet Pickup
- Daihatsu People Mover
- Yamaha All Terrain Vehicle (ATV)
- John Deere Riding Mower

2.2.5.2 Aircraft Rescue and Fire Fighting Equipment

Easterwood Airport has a modern ARFF station that was opened in 1999. The station provides three drive through bays that house response vehicles. There are full-time personnel on duty in the ARFF station 24 hours a day, 7 days per week. Texas A&M and the City of College Station have a mutual aid agreement in effect for ARFF support and personnel.

Airport ARFF equipment includes:

- Primary Response Vehicle: 1998 E-One Titan. This vehicle is capable of holding 1,500 gallons of water, 450 pounds of Purple K (potassium), and 200 gallons aqueous film forming foam (AFFF).
- Reserve Response Vehicle: 1986 Oshkosh P-19. This vehicle is capable of holding 1,000 gallons of water, 450 pounds of Purple K, and 130 gallons AFFF.

In addition to the materials carried by the trucks, an excess capacity of 400 gallons of AFFF and 900 pounds of Purple K is stored at the station. Based on the fire fighting equipment on site, Easterwood Airport's ARFF station meets Index B requirements.

2.2.5.3 Fuel Storage and Facilities

The Easterwood Airport Fuel Farm and facilities are located north of the Texas A&M Hangar 1092 in the new north general aviation area and currently meets all Environmental Protection Agency (EPA) criteria. Facilities and equipment used for serving the fueling needs include:

- One 20,000-gallon above-ground storage tank used for Jet-A fuel.
- Two 12,000-gallon above-ground storage tanks used for Jet-A fuel.
- One 12,000-gallon above-ground storage tank used for 100LL (low lead) aviation gasoline (AVGAS).
- One 750-gallon above-ground storage tank used for diesel.
- One 750-gallon above-ground storage tank used for automotive gasoline.
- Two 2,500-gallon fuel trucks used for Jet-A fuel.
- Two 750-gallon fuel trucks used for AVGAS.

2.3 AIRSPACE AND AIR TRAFFIC CONTROL

This section of the study describes the surrounding airspace, airspace structure, airspace operational limitations and obstructions, and air traffic control procedures in the vicinity of Easterwood Airport.

2.3.1 AIRSPACE

Airspace in the United States is classified into the following categories: controlled, uncontrolled, special use, and other. A brief description of these categories and how they apply to airspace in the vicinity of Easterwood Airport is provided in the following sections.

2.3.1.1 Controlled Airspace

Controlled airspace is classified as Class A, B, C, D, and E. Each of these classes have different dimensions, purposes, and requirements. A generic view of these various classes and their relationship to each other is provided in **Figure 2-10.**

Class A airspace covers the United States and encompasses all airspace from 18,000 feet MSL to 60,000 feet MSL above Easterwood Airport. Aircraft flying in Class A airspace must operate under instrument flying rules.

There are no Class B or C airspaces in the vicinity of Easterwood Airport. However, the airport is located in the center of an area defined as Class D airspace. Aircraft operating in Class D airspace must maintain radio contact with the appropriate control facility while operating in the airspace. Pilots must also abide by certain operating, pilot, and equipment rules while operating within Class D airspace. The Class D airspace surrounding Easterwood Airport extends outward 5 nautical miles (NM) and extends upward to an altitude of 2,500 feet.

Class E airspace includes all the airspace that is not classified as A, B, C, or D. Class E airspace has no special restrictions with respect to pilot or aircraft equipment rules. However, it is controlled airspace, meaning that aircraft can be provided with air traffic control services. Class E airspace with a floor of 700 feet above ground level (AGL) is in effect for the Easterwood Airport area when the tower is not in operation.

Figure 2-11 depicts the airspace that surrounds the airport. This information was obtained from the Houston Sectional Aeronautical Chart, FAA - National Aeronautical Charting Office.

2.3.1.2 Uncontrolled Airspace

Class G airspace is uncontrolled airspace. It consists of all airspace that is not classified as A, B, C, D, or E. Pilots flying in Class G airspace have the responsibility to see and avoid other aircraft. No air traffic control services are available in this airspace.

2.3.1.3 Special Use Airspace

According to the Airman's Information Manual, Special Use Airspace consists of that airspace wherein activities must be confined because of their nature, or wherein limitations are imposed upon aircraft operations that are not a part of those activities, or both. Special Use Airspace consists of Prohibited and Restricted Areas, Warning Areas, Military Operation Areas, Alert Areas, and Controlled Firing Areas. There is no Special Use Airspace in the vicinity of Easterwood Airport.

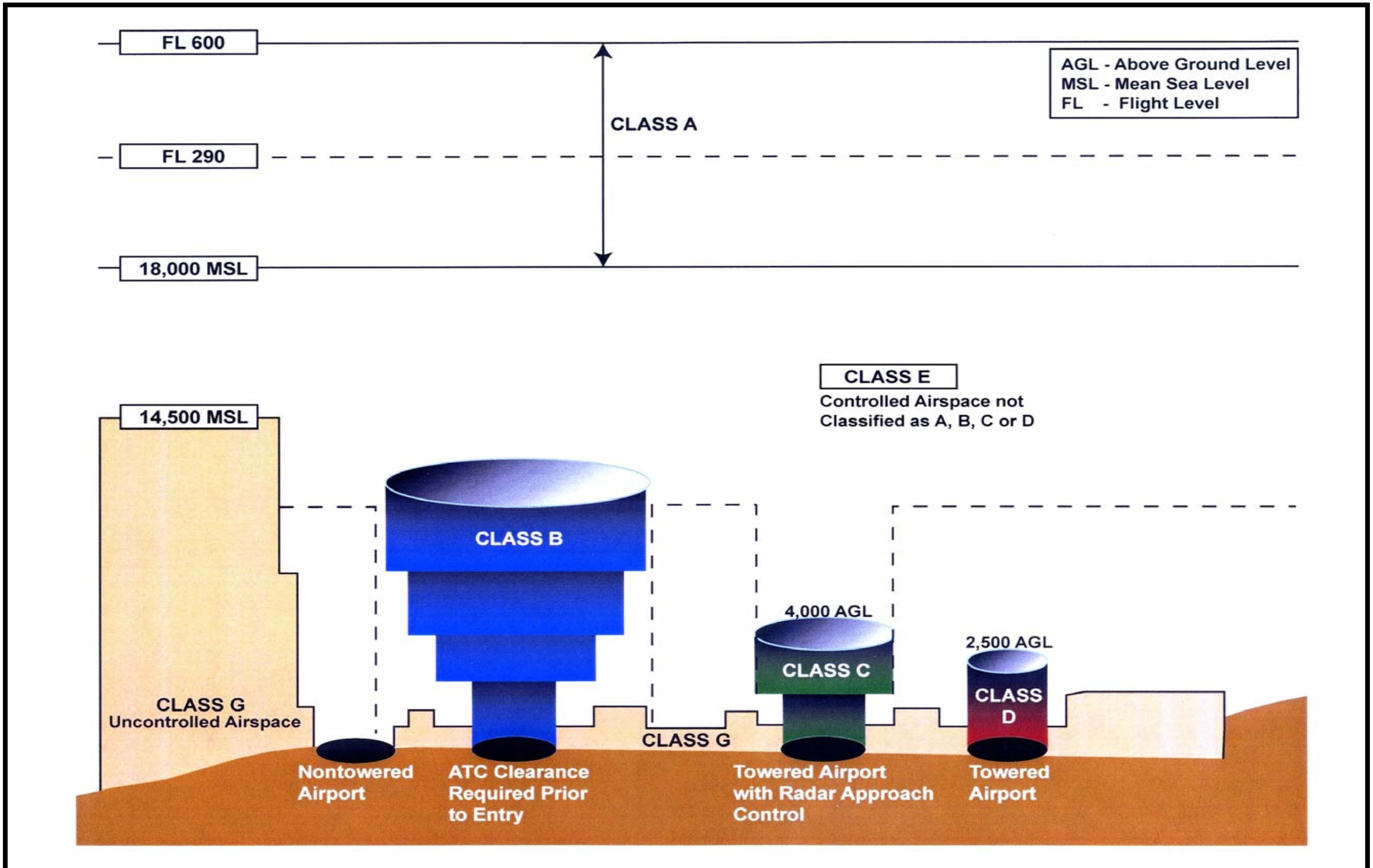
2.3.1.4 Airspace Structure

To facilitate safe and orderly air navigation, Part 71 of the Federal Aviation Regulations designates Federal airways, routes and reporting points. Victor (VOR) airways are designated paths in the sky. The airways are formed by selected radials from VOR transmitters and are numbered according to their general direction so that even numbered airways are oriented east/west, while odd numbered airways are oriented north/south.

Victor airways generally have a floor of 1,200 feet AGL or 3,000 feet above the base of a control area, and extend up to an altitude of 18,000 feet MSL. The standard width of airways is four nautical miles either side of the centerline, expanding at a 4.5 degree angle beginning 51 miles from the VOR transmitter because of decreasing accuracy of the received radio signal.

There are five VOR Airways that lead into and away from the College Station VORTAC that allow for easy access to this area by navigating with instrumentation and allow for consistent traffic flow coordination with Air Traffic Control. The five VOR Airways that feed into and out of College Station VORTAC are shown in **Figure 2-12.** This information was derived from the IFR Enroute Low Altitude - U.S. Chart, Panel L-17, dated January 23, 2003, and are as follows:

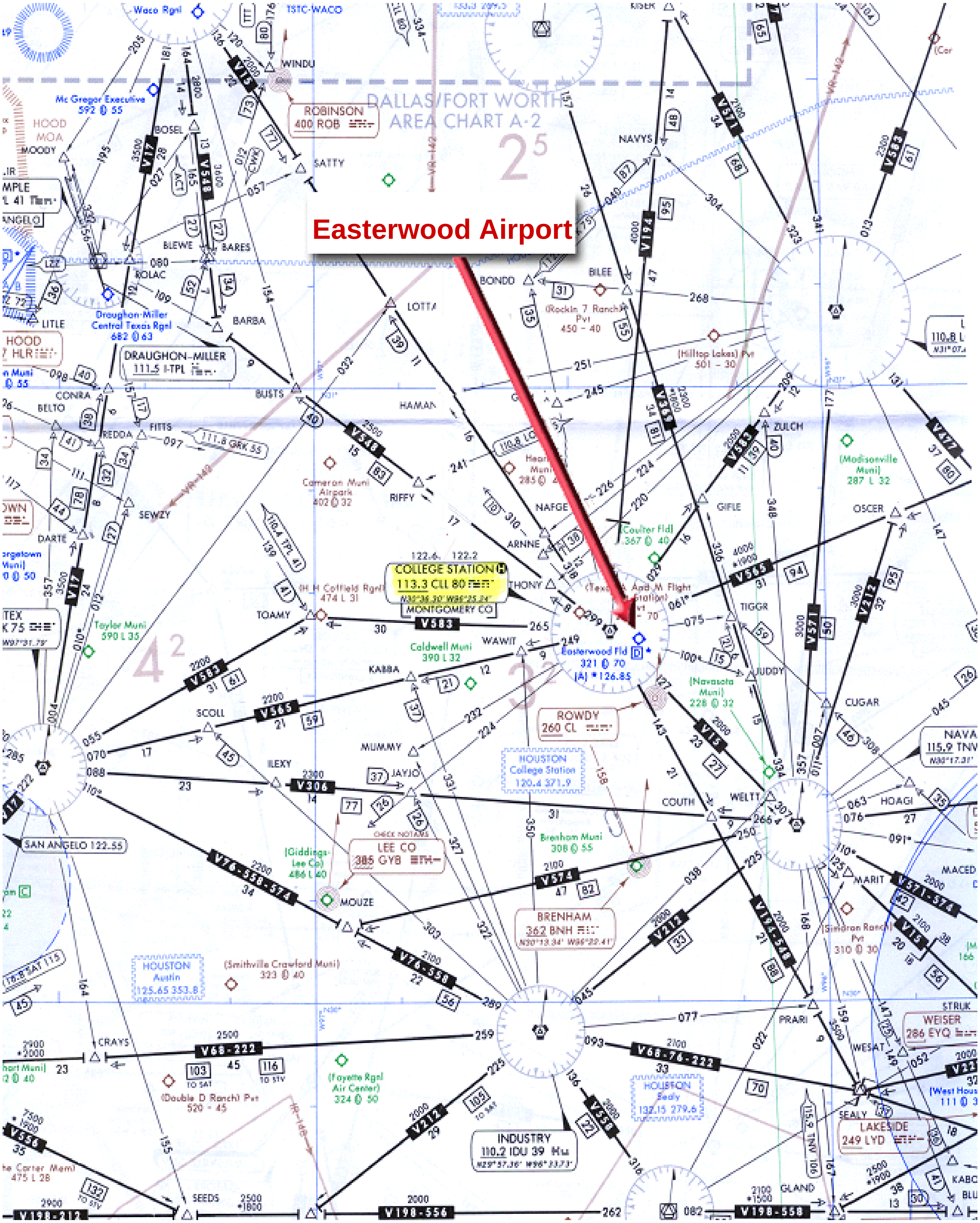
- V15 serves a northwest corridor to the WACO RGNL VORTAC off the 318-degree radial at College Station. It also extends from the College Station VORTAC to the southeast on the 127-degree radial towards the Hobby VOR/DME.
- V194 originates to the north at the CEDAR CREEK VORTAC and enters the College Station VORTAC from the north on the 358-degree radial and extends to the southeast on the 143-degree radial.
- V583 enters College Station from the west on the 265-degree radial and extends to the northeast on the 029-degree radial to the LEONA VORTAC at which point it continues on to the northeast.



Easterwood Airport Master Plan Update	AIRSPACE CLASSES	FIGURE 2-10

SOURCE: Houston Sectional Aeronautical Chart, FAA – National Aeronautical Charting Office, dated October 3, 2002.

Easterwood Airport Master Plan Update	SECTIONAL AERONAUTICAL CHART	FIGURE 2-11



SOURCE: IFR Enroute Low Altitude – U.S. Chart, Panel L-17, FAA National Aeronautical Charting Office, dated January 23, 2003.

Easterwood Airport Master Plan Update	LOW ALTITUDE AIRSPACE	FIGURE 2-12

- V565 enters College Station from the west on the 249-degree radial and extends to the northeast on the 061-degree radial where it eventually merges with the V212 airway.

- V548 leads into College Station from the northwest on the 299-degree radial and merges with the V194 airway on the 143-degree radial from College Station.

2.3.1.5 Operational Limitations Due to Alternate Airport Traffic Interactions

Figure 2-11, shown previously, illustrates the airspace and airports in the vicinity of Easterwood Airport. Alternate airports in the vicinity of Easterwood Airport do not impose any operational limitations at the airport. In addition, the air traffic control tower (ATCT) personnel at Easterwood Airport have not observed any operational limitations due to traffic interactions.

2.3.1.6 Airspace Obstructions

Part 77 of the Federal Aviation Regulations defines a series of imaginary surfaces that extend outward and upward from an airport's runways. These surfaces define a volume of airspace that, ideally, should be kept clear of items such as vegetation, buildings, towers, antennas, etc. Objects that penetrate these surfaces are obstructions and may be hazards to air navigation.

The geometry of these imaginary surfaces is governed by the type of aircraft using the runway and the runway's instrument approach minimums. **Figure 2-13** depicts the general layout of imaginary surfaces as described under FAR Part 77. A description of these surfaces is provided as follows:

- Primary Surface – A surface that is longitudinally centered on the runway, extending 200 feet beyond the threshold in each direction.

- Approach Surface – An inclined slope or plane going outward and upward from the ends of the primary surfaces. The innermost portion of the approach slope overlaps with the runway protection zone.

- Horizontal Surface – A horizontal plane 150 feet above the established airport elevation. Arcs of specified dimensions set forth the plan dimensions of the horizontal surface from the extended runway centerline at the end of the primary surfaces, connected by tangents. The arcs correspond with the approach surface lengths for each of the runway ends.

- Transitional Surface – An inclined plane with a slope of 7:1 extending upward and outward from the primary and approach surfaces, terminating at the point where they intersect with the horizontal surface or any other surface where more critical restrictions are intercepted.

- Conical Surface – An inclined plane at a slope of 20:1 extending upward and outward from the periphery of the horizontal surface for a distance of 4,000 feet.

An Airport Obstruction Chart (OC 928) for Easterwood Airport, published by the National Ocean Service in July 1992, was used to better identify obstructions located on the airfield that might protrude into or above the imaginary surfaces of a runway as previously discussed. Obstructions located on the airfield include the following NAVAIDS: one lighted windsock and one lighted anemometer. NAVAIDS are not considered hazardous because they are fixed by function. Additional noted obstructions that violate the approach surfaces to varying degrees are adjacent trees, terrain, light poles, rods and antennae on buildings. A full analysis of these obstructions will be presented in the Airspace Drawing of the ALP drawing set.

There are close-in obstructions at Easterwood Airport associated with Runways 10-28 and 4-22 that impact the runway approaches. **Table 2.11** presents these obstructions, the location and the resulting change in glide slope for an aircraft approaching the runway. The information contained in **Table 2.11** was derived from the FAA Form 5010-1, Airport Master Record, dated January 28, 2003.

Table 2.11
Obstructions to Runway Approaches
Easterwood Airport

Runway	Obstruction	Height (feet)	Affected Surface	Clear Glide Over
10	Tree	20 (above runway end elevation)	1,500 feet from end, 225 feet left of centerline	32:1 slope, 3 degree visual glide path angle
28	Tree	30 (above runway end elevation)	1,427 feet from end, 102 feet right of centerline	40:1 slope, 3 degree visual glide path angle
4	Tree	28 (above runway end elevation)	900 feet from end, 0 feet of Centerline	25:1 slope, 3 degree visual glide path angle
22	Tree	31 (above runway end elevation)	1,066 feet from end, 105 feet left of centerline	27:1 slope, 3 degree visual glide path angle

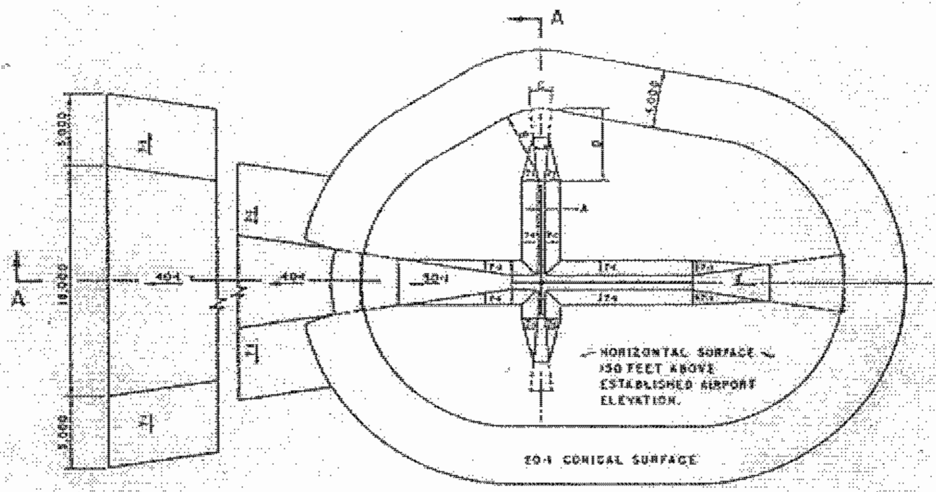
Source: FAA Form 5010: Airport Master Record, January 28, 2003.

2.3.2 AIR TRAFFIC CONTROL

The ATCT at Easterwood Airport is located on the east side of the airport adjacent to the general aviation terminal. The tower was constructed during the 1980s and is operational from 8:00 a.m. until 9:00 p.m., seven days per week. Air traffic control personnel at the airport are employed by a private company that provides services according to FAA requirements.

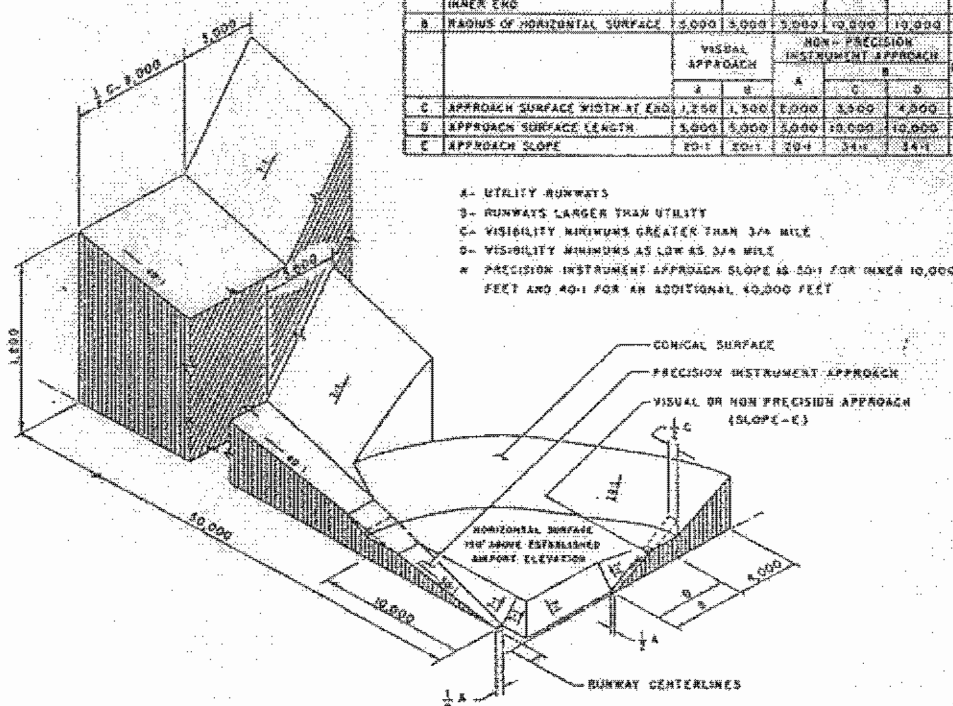
2.3.2.1 V.I.P. Arrivals

Easterwood Airport is periodically frequented with V.I.P. arrivals such as notable political figures that require certain security and safety measures prior to their arrival. The ATCT in cooperation with Easterwood Airport temporarily closes the airport for these arrivals and restricts use of the airport by other operators during this time.



DIM	ITEM	DIMENSIONAL STANDARDS (FEET)					
		VISUAL RUNWAY		NON-PRECISION INSTRUMENT RUNWAY			PRECISION INSTRUMENT RUNWAY
					B		
		A	B	A	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
					B		
		A	B	A	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

Easterwood Airport Master Plan Update	FAR PART 77 SURFACES	FIGURE 2-13

Other added measures by ATCT include increasing control tower hours from 8:00 a.m. - 9:00 p.m., to 6:00 a.m. - Midnight when Texas A&M has a home football game, which happens usually 6 or 7 times a year. Very few operations occur during the hours the ATCT is closed. Based on observations made by airport management these are estimated at no more than 10 daily operations.

2.3.2.2 Noise Abatement Procedures

No noise abatement procedures are currently in effect at Easterwood Airport.

2.3.2.3 Aircraft Circulation

The existing taxiway system at Easterwood Airport is not optimal for the efficient movement of aircraft on the ground. Taxiway A and Taxiway B do not meet FAA requirements for runway to taxiway centerline separation at the entrances to Runways 16 and 10, respectively. Therefore, the hold short lines for these taxiways are more than 500 feet from the respective runway ends. This increases the amount of time required to conduct a departure from the runway and can contribute to operational delays. Aircraft ground movement can also be delayed due to the lack of holding bays at the runway ends.

Aircraft ground circulation at Easterwood Airport is impeded during periods when football games are being played at Texas A&M. During these periods, the demand for aircraft parking space on the general aviation ramp can often exceed the capacity of the ramp. Consequently, the secondary runways (Runways 10-28 and 4-22) are used as excess parking space and only the primary runway (Runway 16-34) remains open.

Vehicular traffic on the runways and taxiways are of concern at Easterwood Airport with respect to efficient and safe aircraft movement. However, the airfield pavements provide the only means by which access may be gained to certain areas of the airport since the access road does not traverse the entire perimeter of the airport. A full perimeter access road for service vehicles is scheduled for completion in 2003 and should alleviate the existing situation.

2.3.2.4 Line of Sight Issues

Trees obscure the line of sight from the air traffic control tower to the first 950 feet of the approach end of Runway 4. ATCT is also unable to observe a portion of Taxiway E from 200 feet southwest of Runway 10-28 out to the approach end of Runway 4. It should be noted that the FAA requires that the ATCT have clear line of sight to all operational surfaces controlled by air traffic control.

Clear line of sight is also recommended by the FAA between the ends of intersecting runways and in the runway visibility zone. Trees obscure the line of sight and the visibility zone between Runway 34 and Runway 4. The requirements for the ATCT's line of sight and the runway visibility zone between Runway 34 and Runway 4 will be addressed in the subsequent chapters of this study.

2.4 METEOROLOGICAL DATA

Weather conditions play an important role in determining an airport's capacity and facility requirements. Items of interest are temperature and precipitation, ceiling and visibility, as well as local wind conditions. Temperature information will be used to determine runway length requirements, while precipitation, ceiling, and visibility data will be used to determine the capacity of the existing airfield. Wind data will be used to determine the need for any additional runways.

Temperature and precipitation conditions at Easterwood Airport were analyzed using the National Oceanic and Atmospheric Administration's "Climatography of the United States Report No. 20" for College Station FAA AP, TX, which encompasses the 30-year period from 1951 to 1980. Wind and ceiling/visibility conditions at Easterwood Airport were analyzed using hourly observations collected by the National Climatic Data Center for the period January 1993 through December 2002.

2.4.1 TEMPERATURE AND PRECIPITATION

Temperature extremes do occur at Easterwood Airport. The normal maximum mean temperatures range from a low of 59.0 degrees Fahrenheit (°F) in January to 95.0°F in August, the hottest month of the year. In comparison, the normal mean minimum temperature ranges from 39.3°F to 73.0°F for the months of January and August, respectively.

Precipitation varies throughout the year at Easterwood Airport. August is the driest month with a normal rainfall of 2.3 inches, while September is the wettest month with a normal rainfall of approximately 5 inches. The normal annual average precipitation at Easterwood Airport is 39 inches.

2.4.2 CEILING AND VISIBILITY

The FAA has defined certain limits of ceiling height and visibility limits as visual meteorological conditions (VMC) and instrument meteorological conditions (IMC). These limits affect flight operations by establishing certain rules and procedures for pilots, aircraft and air traffic control. During VMC and IMC, pilots must adhere to visual flight rules (VFR) and instrument flight rules (IFR), respectively. VFR and IFR weather conditions are defined as follows:

- Visual Flight Rules (VFR) Weather: The weather where the cloud base is equal to or greater than 1,000 feet AGL and visibility is equal to or greater than 3 statute miles.

- Instrument Flight Rules (IFR) Weather: The weather where the cloud base is less than 1,000 feet but more than 200 feet AGL and visibility is less than 3 statute miles but more than ½ mile.

- Below IFR Weather: Whenever the cloud ceiling or visibility is less than IFR weather, an airport is usually closed. A few larger airports have instrumentation allowing specially equipped aircraft to land in low ceiling/visibility conditions.

Weather information obtained from the National Climatic Data Center in Asheville, North Carolina covered 76,351 weather observations at Easterwood Airport for the 10-year period, January 1993 to December 2002. This data was analyzed for both ceiling/visibility and wind direction. The analysis of the ceiling/visibility data revealed that VFR weather occurs in the Easterwood Airport area 90.2 percent of the time, IFR weather occurs 8.1 percent of the time, and 1.7 percent of the time the weather is below the airport's operating minimums.

2.4.3 WIND ANALYSIS

Winds in the vicinity of Easterwood Airport are predominantly from the north-northwest and south-southeast. **Figures 2-14, 2-15,** and **2-16** illustrate the percentage of observations, by direction, during all-weather, VFR, and IFR conditions. As the figures indicate, winds are primarily from the north-northwest and south-southeast.

In addition to annual wind conditions, monthly wind conditions at Easterwood Airport were examined. **Figure 2-17** provides an illustration of All-Weather wind conditions by month. It should be noted that there is significant variation in the direction of the winds from month to month during certain times of the year. During the months of May through August, winds are primarily from the south-southeast. The months of December, January, and February indicate wind observations mostly from the north-northeast.

An analysis of the wind coverage provided by the existing runway system is provided in **Table 2.12.** Wind coverage indicates the percentage of time that crosswind components are within an acceptable velocity. The primary runway at an airport should be oriented as closely as practical with the direction of the prevailing winds, providing the largest wind coverage for a given maximum crosswind component. For the purpose of runway wind analyses, a crosswind component can be defined as the wind that occurs at a right angle to the runway centerline. Crosswind components of 10.5, 13, and 16 knots were used for analyzing the runway system at Easterwood Airport. These components were used because they are the velocities specified for runways having airport reference codes (ARC) of: A-I and B-I; A-II and B-II; and A-III, B-III, and C-I through D-III, respectively. A detailed discussion of airport reference codes will be provided in Section 4 of this study. The wind roses for All-Weather conditions, VFR, and IFR are presented in **Figures 2-18, 2-19,** and **2-20,** respectively.

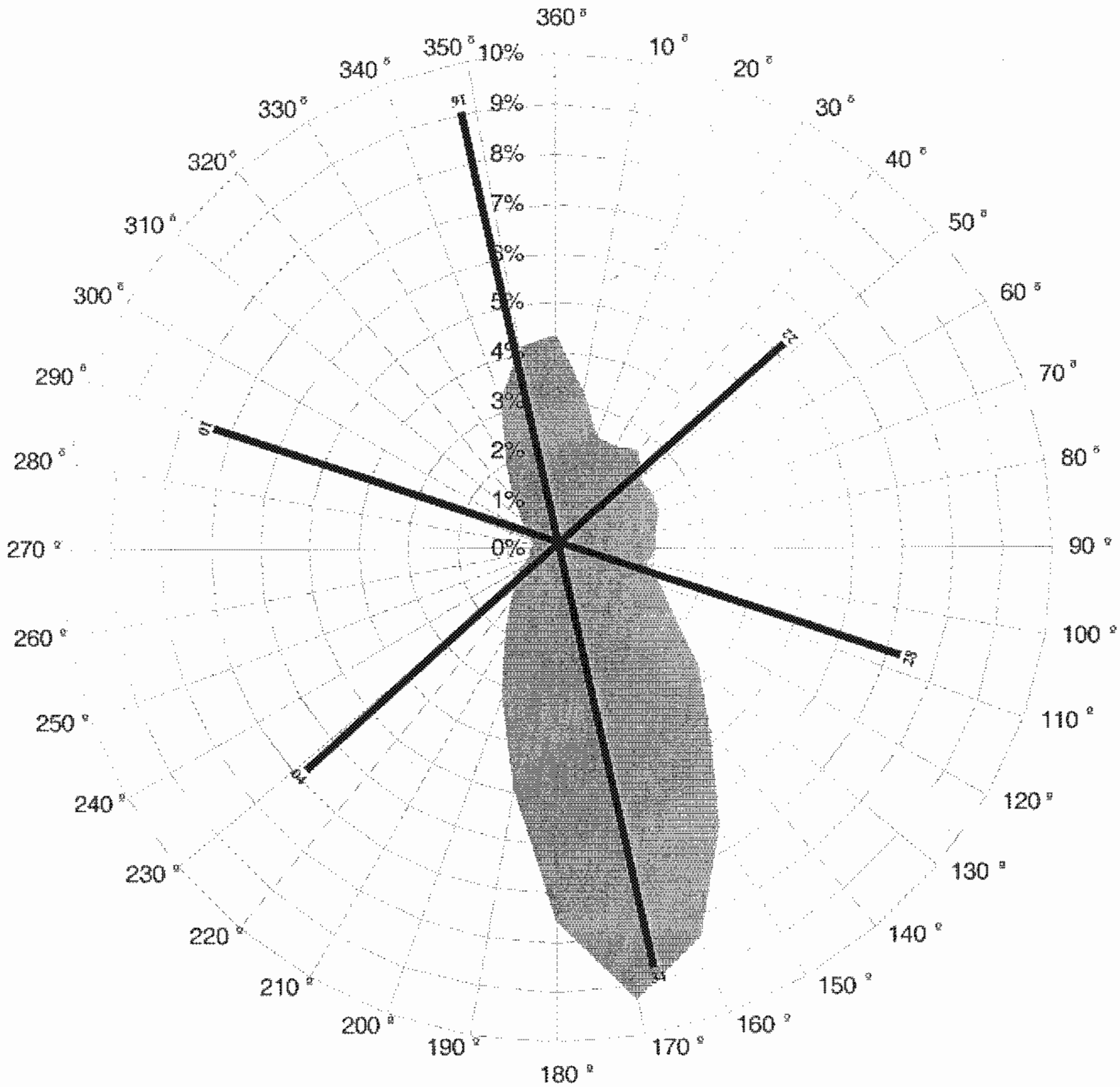
FAA guidelines recommend that an airport's runway system provide wind coverage of 95 percent. If wind coverage is less than 95 percent, FAA guidelines recommend the construction of additional runways. The all-weather wind rose indicates that Runway 16-34 at Easterwood Airport provides wind coverage of more than 98 percent with a 10.5 knot crosswind component. Under the same conditions, Runway 10-28 provides wind coverage of 89.2 percent and Runway 4-22 provides wind coverage of 89.8 percent. Therefore, additional runways are not justified on the basis of wind coverage.

Table 2.12 Wind Coverage			
Weather Condition	**Wind Component**		
	10.5 Knots	**13 Knots**	**16 Knots**
Runways 16-34, 10-28 & 4-22			
All Weather	99.9%	100%	100%
VFR	99.9%	100%	100%
IFR	99.9%	100%	100%
Runways 16-34 & 10-28			
All Weather	99.3%	99.9%	99.9%
VFR	99.3%	99.9%	99.9%
IFR	99.2%	99.8%	99.9%
Runways 16-34 & 4-22			
All Weather	99.5%	99.9%	99.9%
VFR	99.5%	99.9%	99.9%
IFR	99.5%	99.9%	99.9%
Runways 10-28 & 4-22			
All Weather	94.2%	98.6%	99.8%
VFR	93.9%	98.5%	99.8%
IFR	95.9%	99.0%	99.8%
Runway 16-34			
All Weather	98.3%	99.3%	99.9%
VFR	98.3%	99.4%	99.9%
IFR	97.9%	99.1%	99.8%
Runway 10-28			
All Weather	89.2%	94.7%	99.2%
VFR	88.9%	94.6%	99.2%
IFR	91.7%	95.9%	99.3%
Runway 4-22			
All Weather	89.8%	94.9%	99.2%
VFR	89.5%	94.8%	99.1%
IFR	92.26%	96.2%	99.5%

Station: CLL
Period: 1993-2002

Total Number of Observations: 76,351

Sources: NOAA National Climatic Data Center, 2003.
URS Corporation analysis, 2003.

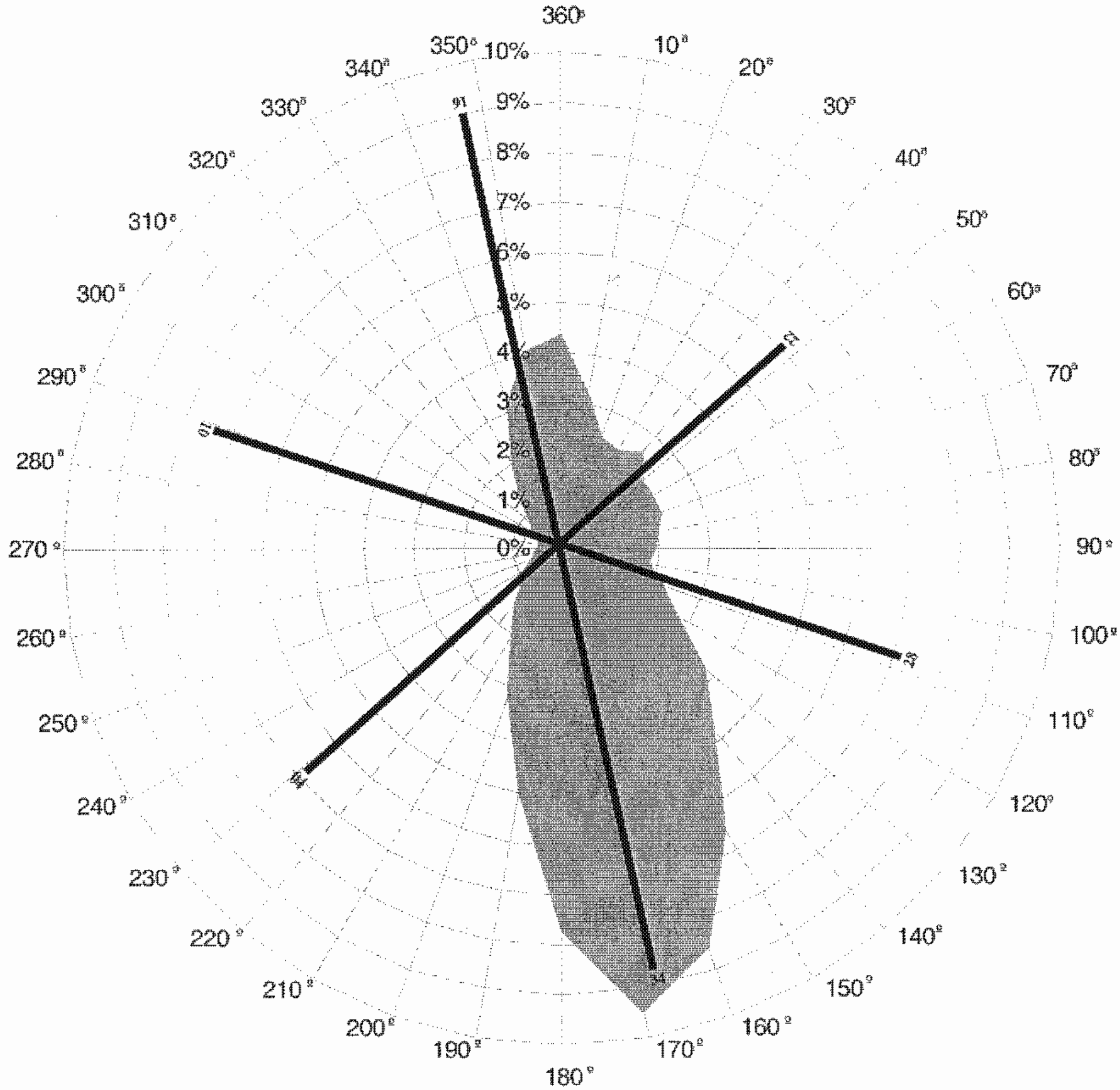


Source: NOAA National Climatic Data Center
Station: 72244, College Station, Texas
Period of Record: 1993 -2002
Compiled by URS Corporation, 2003

Wind Data depicted relative to true north (NAD83)
Runway 16 Orientation 168° 53' 05"
Runway 34 Orientation 348° 53' 14"
Runway 10 Orientation 108° 47' 24"
Runway 28 Orientation 288° 47' 52"
Runway 04 Orientation 049° 43' 30"
Runway 22 Orientation 229° 44' 22"

Note:
This graphic depicts the percentage of time that the wind was recorded from each compass heading (excluding calm conditions) during the period 1993 to 2002.

Easterwood Airport Master Plan Update	ANNUAL ALL WEATHER WIND PERSISTENCY CHART	FIGURE 2-14



Source: NOAA National Climatic Data Center
Station: 72244, College Station, Texas
Period of Record: 1993 –2002
Compiled by URS Corporation, 2003

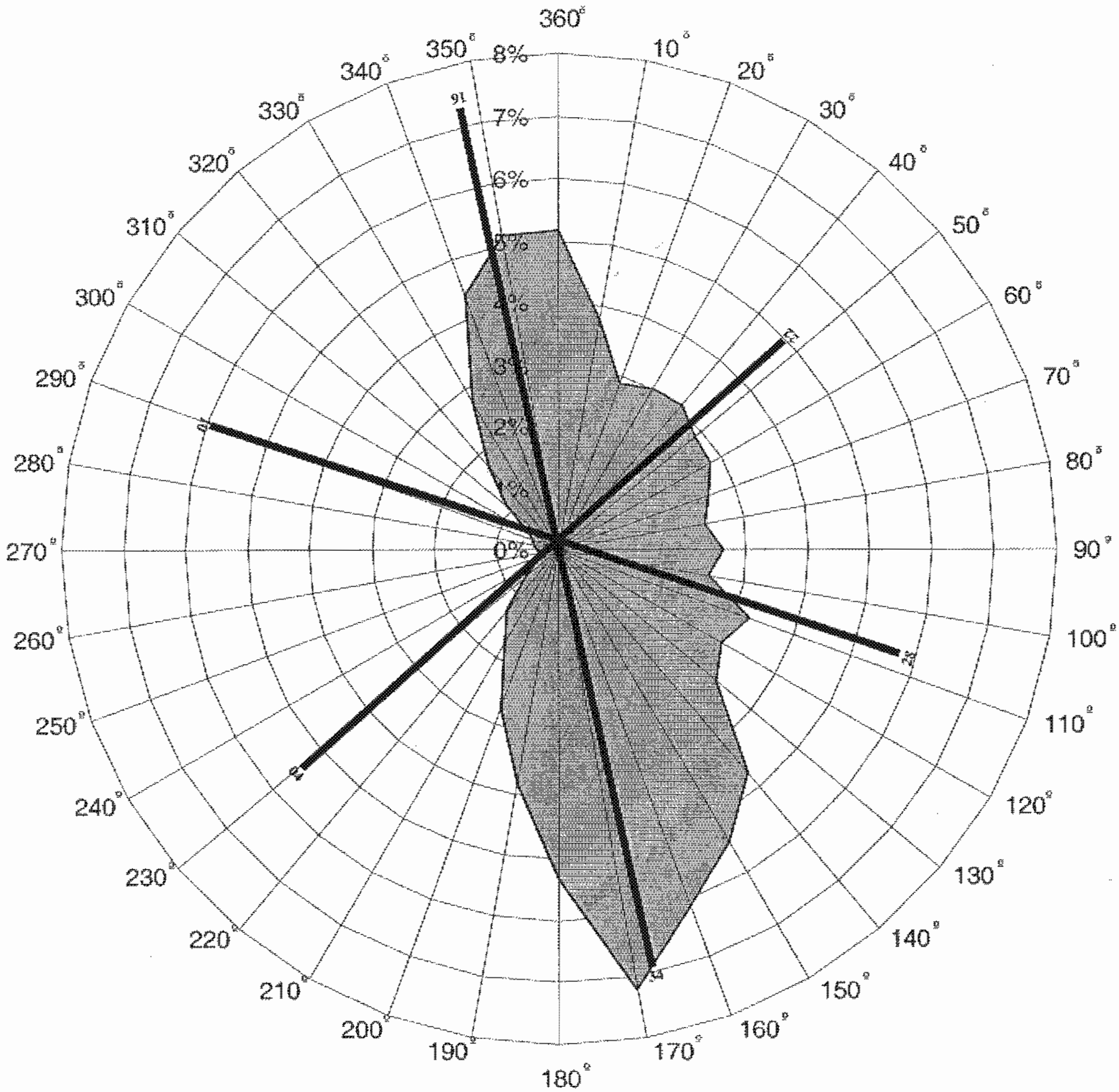
Wind Data depicted relative to true north (NAD83)
Runway 16 Orientation 168° 53' 05"
Runway 34 Orientation 348° 53' 14"
Runway 10 Orientation 108° 47' 24"
Runway 28 Orientation 288° 47' 52"
Runway 04 Orientation 049° 43' 60"
Runway 22 Orientation 229° 44' 22"

Note:
This graphic depicts the percentage of time that the wind was recorded from each compass heading (excluding calm conditions) during the period 1993 to 2002.

Easterwood Airport Master Plan Update

ANNUAL VFR WIND PERSISTENCY CHART

FIGURE 2-15



Source: NOAA National Climatic Data Center
Station: 72244, College Station, Texas
Period of Record: 1993 –2002
Compiled by URS Corporation, 2003

Wind Data depicted relative to true north (NAD83)
Runway 16 Orientation 168° 53' 06"
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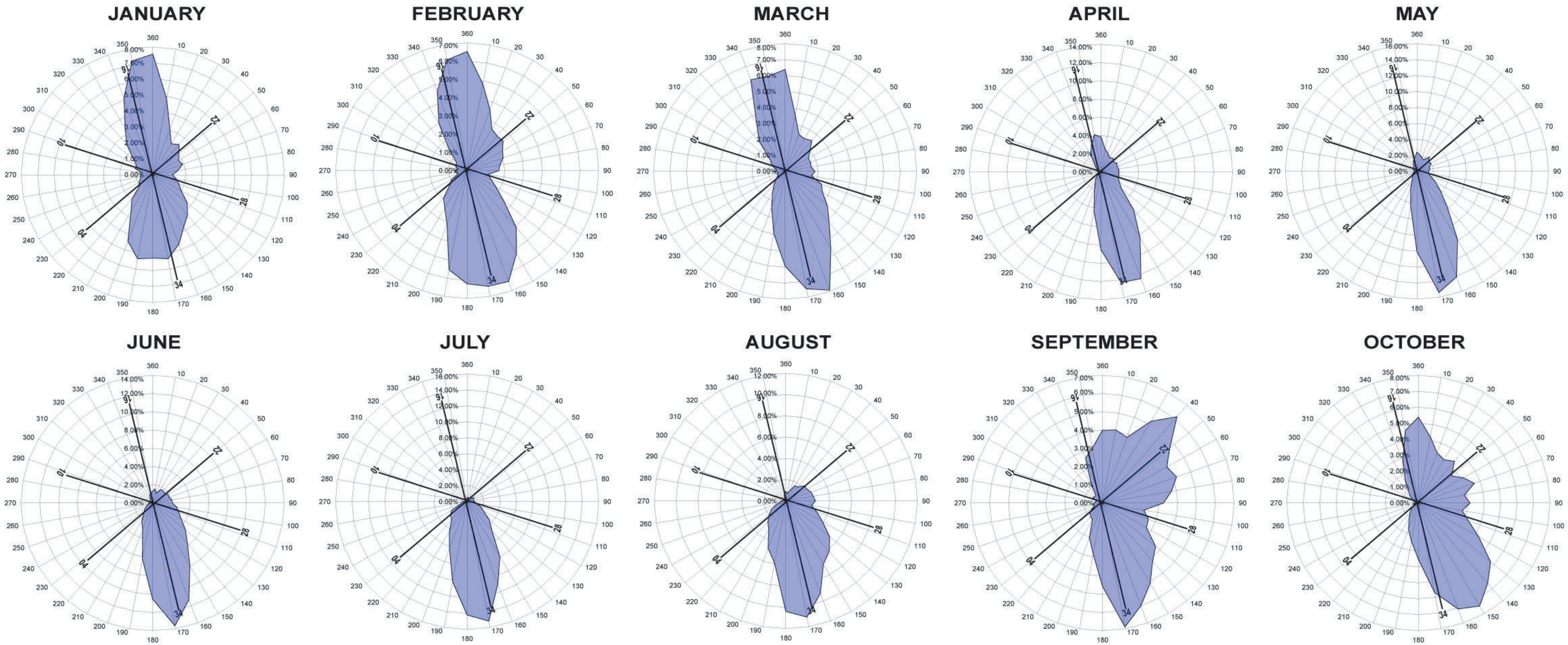
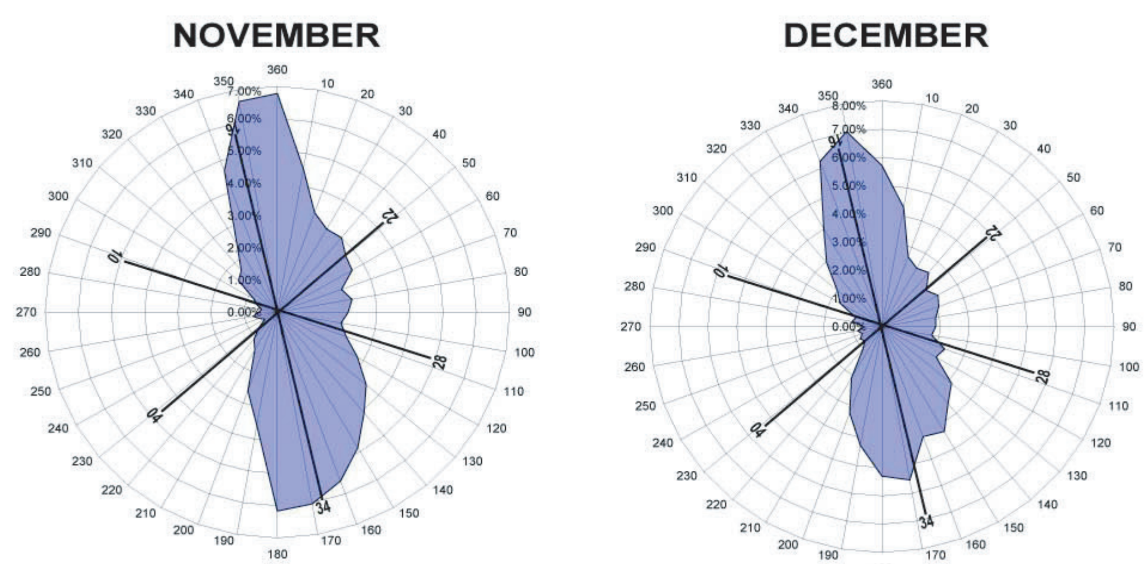
Runway 28 Orientation 288° 47' 52"
Runway 04 Orientation 049° 43' 60"
Runway 22 Orientation 229° 44' 22"

Note:
This graphic depicts the percentage of time that the wind was recorded from each compass heading (excluding calm conditions) during the period 1993 to 2002

Easterwood Airport Master Plan Update	ANNUAL IFR WIND PERSISTENCY CHART	FIGURE 2-16





Source: NOAA National Climatic Data Center
Station: 72244, College Station, Texas
Period of Record: 1993 –2002
Compiled by URS Corporation, 2003

Wind Data depicted relative to true north (NAD83)
Runway 16 Orientation 168 53' 06''
Runway 34 Orientation 348 53' 14''
Runway 10 Orientation 108 47' 24''
Runway 28 Orientation 288 47' 52''
Runway 04 Orientation 049 43' 60''
Runway 22 Orientation 229 44' 22''

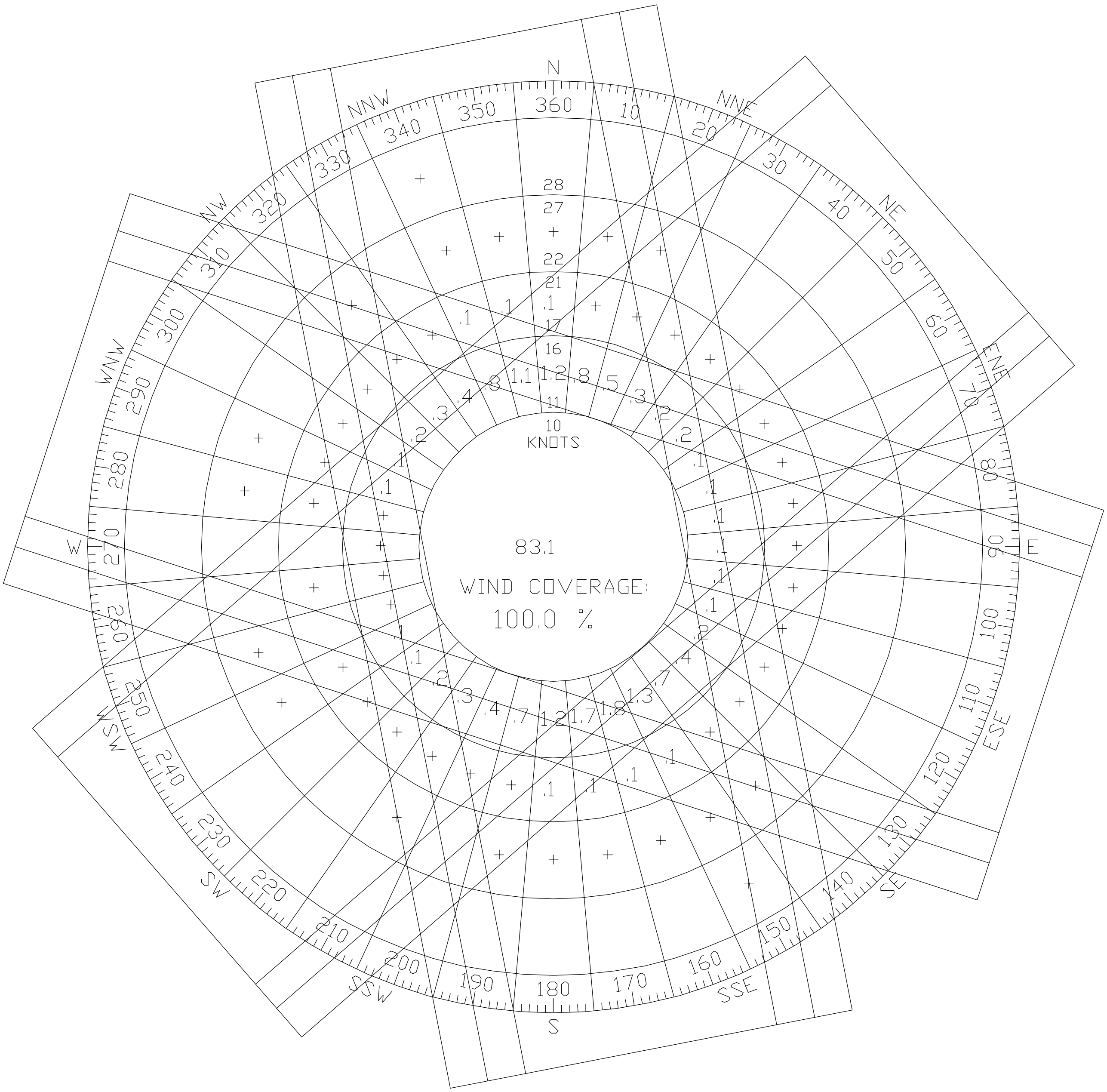
Note:
This graphic depicts the percentage of time that the wind was recording from each compass heading (excluding calm conditions) during the period 1993 to 2002.

Easterwood Airport Master Plan Update

ANNUAL ALL WEATHER WIND PERSISTENCY CHART BY MONTH

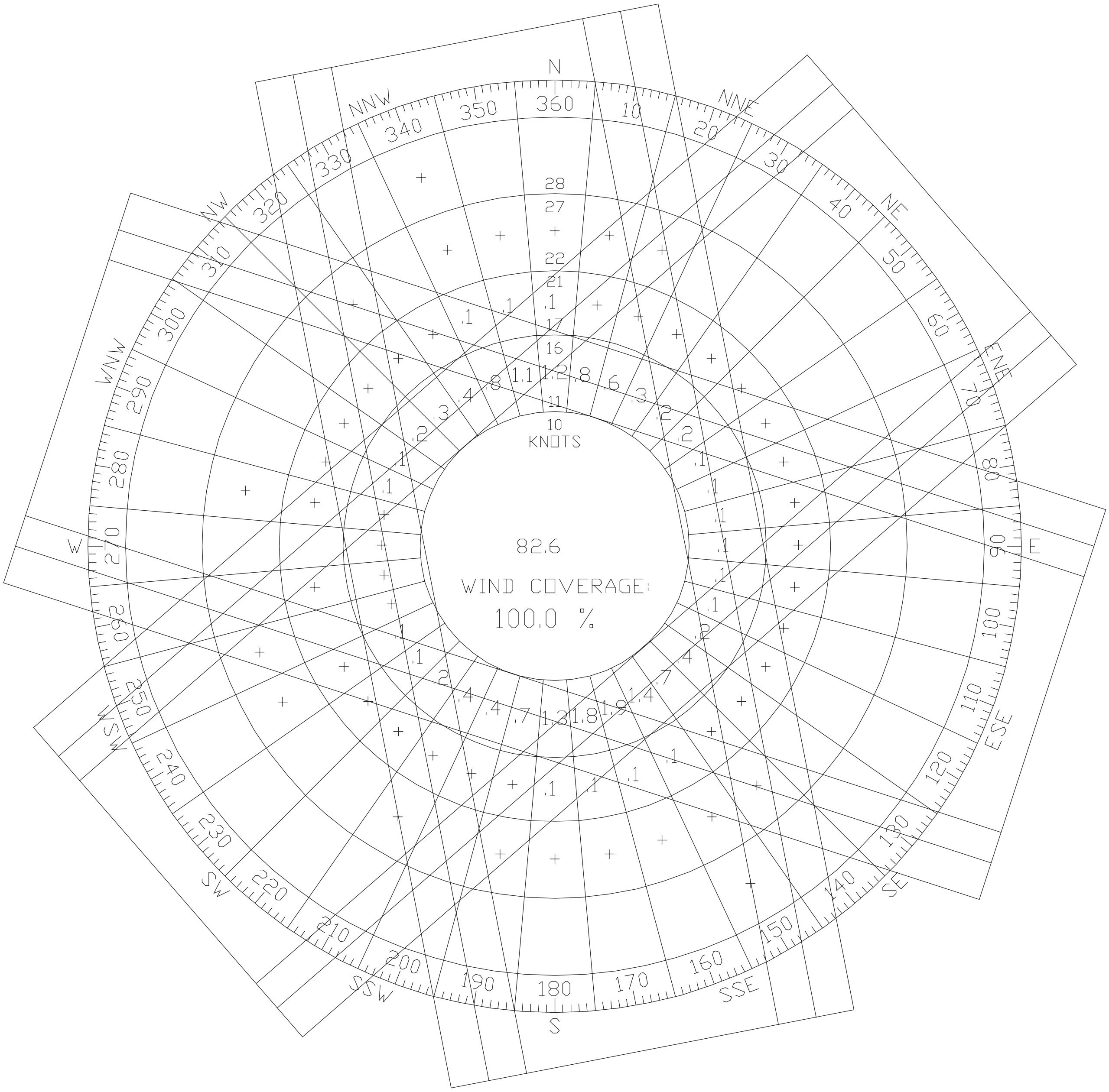
FIGURE

2-17



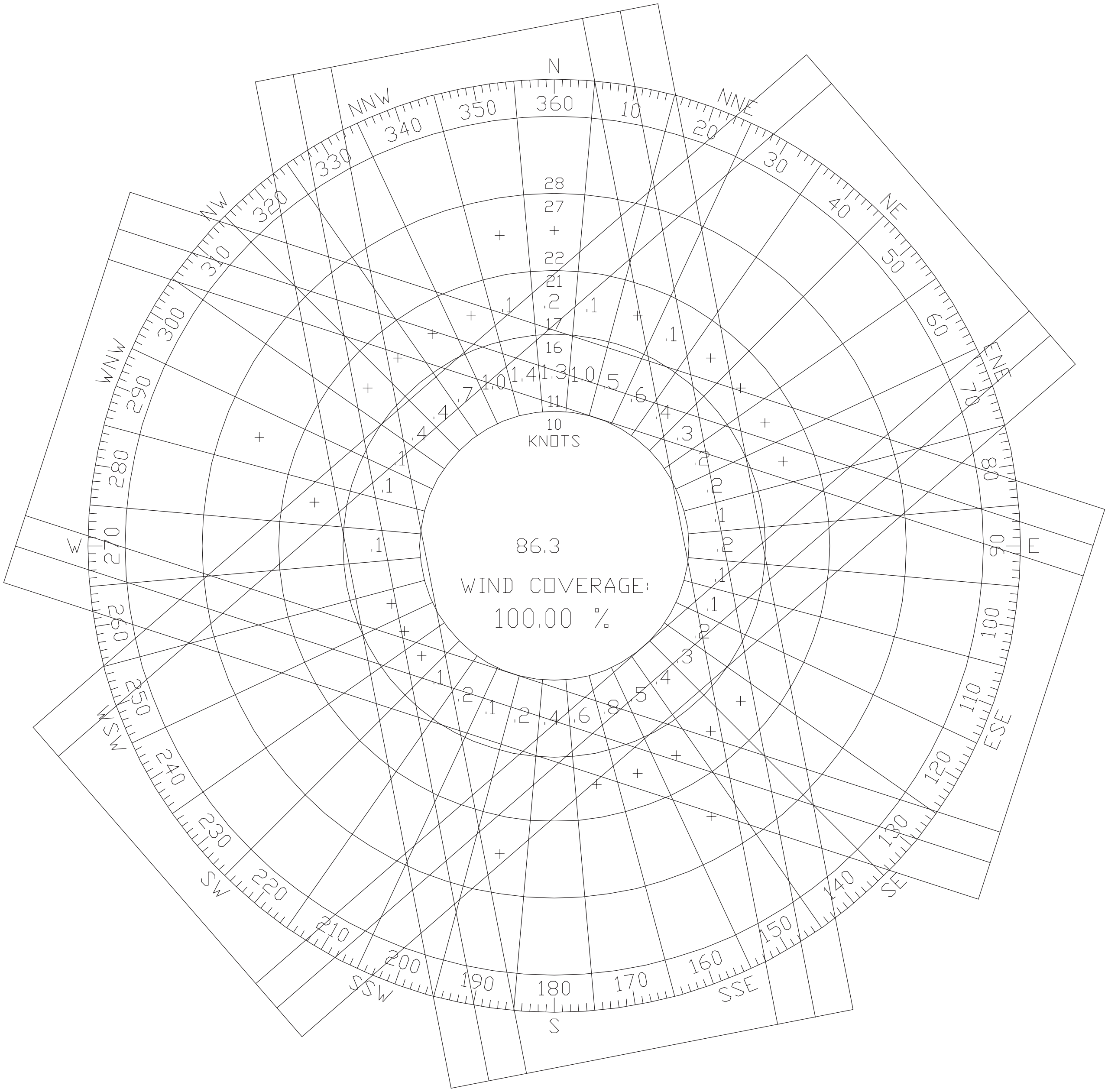
Station: CLL
Period: 1993-2002
Total Number of Observations: 76,351
Source: NOAA NCDC, 2003

Easterwood Airport Master Plan Update	ALL WEATHER WIND ROSE	FIGURE 2-18



Station: CLL
Period: 1993-2002
Total Number of Observations: 76,351
Source: NOAA NCDC, 2003

Easterwood Airport Master Plan Update	VFR WIND ROSE	FIGURE 2-19



Station: CLL
Period: 1993-2002
Total Number of Observations: 76,351
Source: NOAA NCDC, 2003

Easterwood Airport Master Plan Update	IFR WIND ROSE	FIGURE 2-20

2.5 SURVEY OF OTHER AIRPORTS

There are other private and public airports in the vicinity of Easterwood Airport that primarily provide general aviation services. This survey encompasses surrounding airports within a 40-nautical-mile radius of Easterwood Airport.

The closest public use airport to Easterwood Airport is Coulter Field in Bryan, Texas. Coulter Field is located approximately three miles northeast of the City of Bryan and approximately 8 nautical miles to the northeast of Easterwood Airport. Commercial passenger service is not provided at Coulter Field; however, air cargo services have been provided at Coulter Field on a fairly regular basis. The 2000-2025 Metropolitan Transportation Plan for Bryan-College Station, states that in 1999 Coulter Field served a contract carrier site for United Parcel Service (UPS) with approximately five weekly area cargo flights. These flights were conducted by Martinair under contract by UPS to carry express freight and mail. The primary aircraft used in providing service was the Cessna Caravan, which is a light single-engine aircraft capable of transporting payloads of up to 2,500 pounds. According to the FBO at Coulter Field, air cargo service by Martinair/UPS ended during the last week of December 2002.

Coulter also serves general aviation activity within the Bryan/College Station metropolitan area. Coulter Field has a single 4,000-foot by 75-foot paved asphalt runway. Refer to **Table 2.13** for a detailed listing of surrounding airports and the services they offer as well as their relative distance to Easterwood Airport. The information in **Table 2.13** was derived from the Houston Sectional Aeronautical Chart, FAA - National Aeronautical Charting Office and URS Corporation analysis, 2003.

2.6 UTILITY SYSTEMS

Easterwood Airport uses five primary utilities, which include electric, water, sanitary sewer, telephone, and natural gas services. Utility information presented in this section was gathered from Texas A&M Facility and Planning Department's utility distribution maps compiled from a series of studies and drawings dated November 2001.

2.6.1 ELECTRICAL SERVICE

Airport electric service is provided by the A&M System. Both aerial and underground lines supply all of the facilities on the airport. The McKenzie Terminal is supplied from a line that runs from Research Parkway and across FM 2818 to the terminal area. Power lines that run along FM 2818 and George Bush Drive supply the general aviation area. The new general aviation area on the west side of Runway 16-34 is supplied by lines that run along Nuclear Science Road and by underground lines that run across the airfield just south of Taxiway C1.

Table 2.13
Survey of Other Airports

Airport[1]	Distance/Direction From Easterwood Airport[2]	Longest Runway/ Lighting[2]	General Aviation Services[2]	Number of Annual Operations[3]	Based Aircraft[3]	ATCT[3]
Coulter	8 NM/northeast	4,000 feet/ Medium Intensity	1 FBO	GA -15,000 Cargo/Air Taxi - None recorded in FAA TAF or Form 5010-1	53	None
Texas A&M (Private)	7 NM/northwest	7,000 feet	Private	None recorded	9	None
Madisonville	29 NM/northeast	3200 ft. Medium Intensity	None	GA - 600	2	None
Navasota	19 NM/southeast	3,200 feet/ Medium Intensity	None	GA - 1,800	6	None
Flying C (Private)	15 NM/southeast	2,600 feet/None	Private	None recorded	1	None
Brenham	22 NM/south	5,500 feet/ Medium Intensity	1 FBO	GA - 9,600 Military - 50	26	None
Caldwell	18 NM/southwest	3,200 feet/ Low Intensity	None	GA - 3,600	12	None
Hearne	21 NM/northwest	4,000 feet/ Medium Intensity	Self-Service Fuel Only	GA - 5,400	17	None

Sources: [1] Houston Sectional Aeronautical Chart, FAA - National Aeronautical Charting Office.
[2] URS Corporation analysis, 2003.
[3] FAA Form 5010: Airport Master Record, January, 2003.

2.6.2 WATER SERVICE

The airport receives its potable water from the A&M System through a 16-inch water main that runs along FM 2818. McKenzie Terminal is served by a 16-inch water main that runs from FM 2818 across to the terminal area. The general aviation and support facilities are served separately by different lines. Most line sizes noted were 2- to 8-inch service lines.

2.6.3 SEWER SERVICE

The sewer services on Easterwood Airport are provided by the A&M System with an 18-inch line that runs along FM 2818 and 10-inch lines that runs from the passenger and general aviation terminal areas. In addition, a Lift Station with a 4-foot line lies between FM 2818 and George Bush Drive just east of the general aviation terminal area.

2.6.4 TELEPHONE SERVICE

Telephone services at Easterwood Airport are provided by the A&M System.

2.6.5 NATURAL GAS SERVICE

The A&M System provides natural gas service to Easterwood Airport through 6-inch distribution lines that run along FM 2818 and George Bush Drive.

2.7 SURROUNDING LAND USE

Areas surrounding Easterwood Airport lie within the City of College Station, City of Bryan, and their respective Extra-Territorial Jurisdiction (ETJ) limits. Local land use data was obtained through Geographical Information Systems (GIS) drawings, aerial photography, and documentation provided by City of College Station Development Services and the City of Bryan Planning Services. The land uses identified in the airport's previous master plan were reviewed for consistency of information. In addition, a windshield survey was conducted on February 6, 2003, to verify land uses in the vicinity of the runway approaches to Easterwood Airport.

2.7.1 EXISTING LAND USE PATTERNS

Figure 2-21 illustrates the existing generalized land uses surrounding Easterwood Airport. As shown in this figure, most of the land to the north, northeast, east, and southwest of the airport is owned by the A&M System. A brief description of land uses surrounding Easterwood Airport is provided in the following sections.

2.7.1.1 North

A mixture of land uses lie to the north of Easterwood Airport. The land uses adjacent to the airport, north of FM 60 and west of FM 2818 are a mixture of vacant, agricultural, and commercial area. The land adjacent to the airport north of FM 60 and east of FM 2818 is owned by the A&M System. Land farther north of this area is a mixture of public/institutional, single and multi-family, and vacant land uses.

2.7.1.2 South

Land use south of Easterwood Airport is a mixture of agricultural, residential, and vacant areas. Land adjacent to the airport property line is owned by the A&M System. Land uses further south of the airport, within the ETJ limits of the city of College Station, include agricultural and single-family residential areas interspersed with vacant areas. A low-density residential area with single-family homes situated along Hopes Creek Road lies under the approach to Runway 34.

2.7.1.3 East

The A&M System owns the majority of the land immediately adjacent to and further east of the airport. Land uses south of West George Bush Drive and west of Wellborn Road is a mixture of multi- and single-family residential, commercial, and vacant areas.

2.7.1.4 West

Land use west of the airport is a mixture of single-family residential, vacant, agricultural, commercial, and institutional areas. The A&M System owns the land adjacent to the airport's property line. Further west, the majority of the land is vacant interspersed with agricultural, commercial, and institutional areas. Single-family residential land uses are concentrated along River Road and Lightsey Lane.

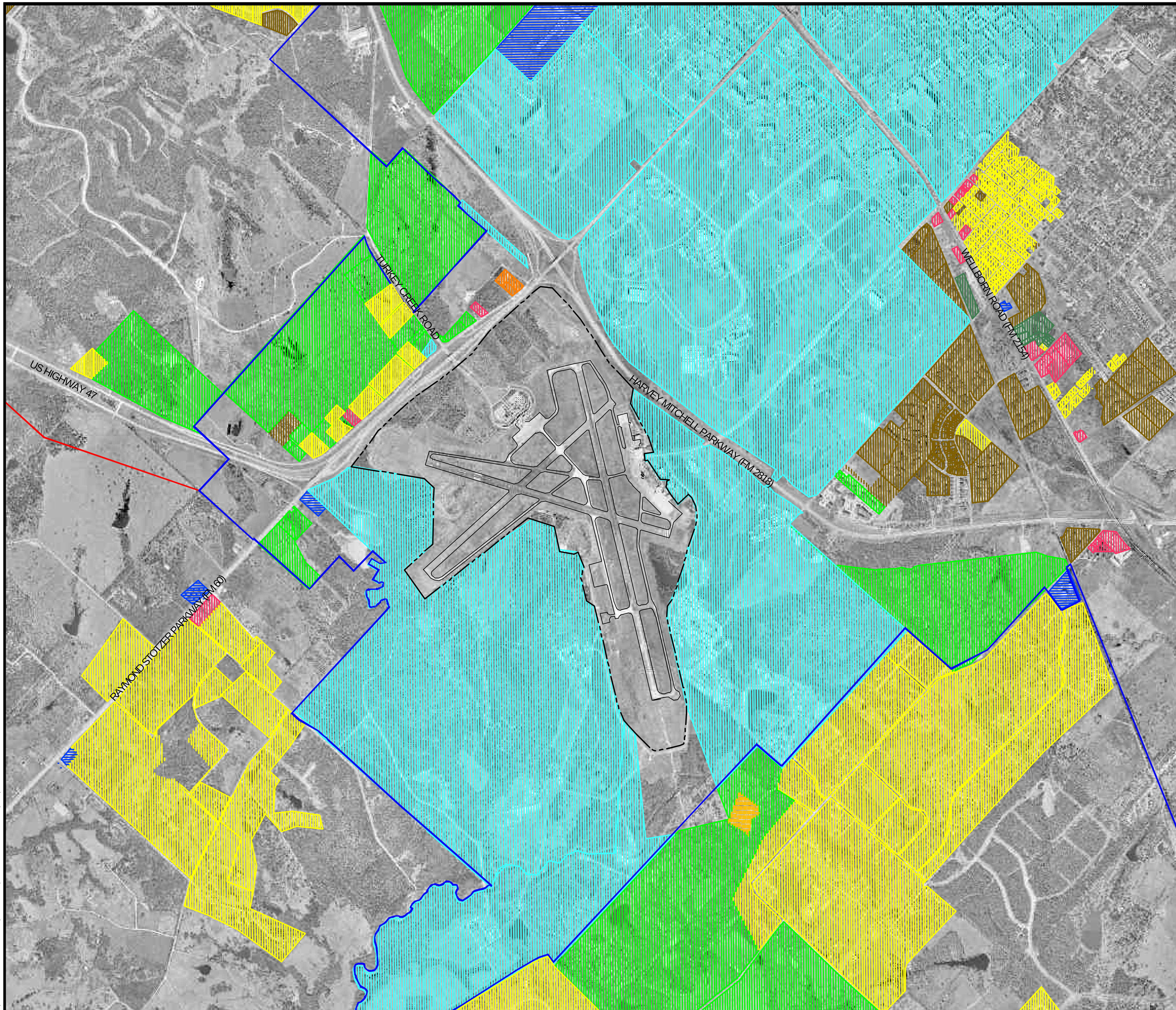
2.7.2 LAND USE CONTROLS AND FUTURE LAND USES

Land use controls in the vicinity of Easterwood Airport are provided by the goals, policies and ordinances of the City of College Station and the City of Bryan. The Comprehensive Plans for both cities provide guidance concerning future land use and development in the communities. One of the goals of the City of College Station is to identify the most appropriate land use for all undeveloped parcels within its City and its ETJ limits, and use its development powers (including zoning and capital improvement programs) to guide the locations of desired development. The City of Bryan's Comprehensive Plan includes a Future Land Use Plan that provides guidance for public and private decision-making about future land use and development in the community.

The City of College Station's land use plan, 1995 to 2015, recommends redevelopment in areas around the Texas A&M Campus. The land use plan indicates that areas south and west of the airport are part of the City of College Station's ETJ and assigned to single-family, low-density residential uses. These areas lie beneath the approaches to Runway 34 and Runway 4.

A review of the zoning map for the City of Bryan shows that an area northwest of Easterwood Airport is zoned Planned Development (PD). This area lies east of State Highway 47, west of Turkey Creek Road and north FM 60. The City of Bryan future land use plan, 2000 to 2020, indicates that planned development for this area includes a golf course and low and high-density residential areas, light commercial, retail, and mixed use areas. This area lies beneath the approach to Runway 10.

These future land uses will be further evaluated with respect to land use compatibility in subsequent sections of this study.



LEGEND

- AIRPORT PROPERTY
- CITY OF COLLEGE STATION CITY LIMITS
- CITY OF BRYAN CITY LIMITS

LAND USE

- AGRICULTURAL/RURAL
- COMMERCIAL/RETAIL
- INDUSTRIAL
- MIXED USE
- MULTI-FAMILY RESIDENTIAL
- PARKS/RECREATIONAL
- PUBLIC/INSTITUTIONAL
- SINGLE FAMILY RESIDENTIAL
- UNIVERSITY
- VACANT

Sources:
1. City of College Station Land Use Plan, 1995 - 2015.
2. City of Bryan Land Use Plan, 2000 - 2020.
3. US Geological Survey Aerial Mapping, 1995.
4. URS Corporation, 2003.

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GRAPHIC SCALE IN FEET

FIGURE 2-21

EXISTING LAND USE

Easterwood Airport Master Plan Update

J:\COLLEGE STATION TX\EXHIBITS\FIG 2-21.DWG 07/06/04 15:54

SECTION 3 FORECASTS OF AVIATION DEMAND

3.1 INTRODUCTION

This section presents forecasts of aviation demand at Easterwood Airport through the year 2022. These forecasts provide an indication as to whether new airport facilities or improvement of existing facilities is warranted. In addition, the forecasts provide information concerning the timing for any new or improved facilities. Ideally, facilities will be developed at the time they are required, thereby avoiding the costs associated with building too late or too early.

Forecasts of passenger enplanements (i.e., the number of people that board scheduled commercial aircraft) will be used in subsequent sections of this report to estimate future demand for passenger handling facilities, such as airport roadways, automobile parking, ticket counters, baggage carousels, etc. Likewise, forecasts of aircraft operations will be used to determine the future demand for airfield facilities, such as runways, taxiways, parking aprons, and fueling facilities. The forecasts presented in this section were prepared on the basis of historical annual activity through 2002 and monthly activity through February of 2003. Historical data was subsequently updated through calendar year 2003 in Section 3.5 where possible.

It should be noted that forecasting consists of the educated estimates regarding future activity levels. While past trends and current industry events provide clues regarding future levels of activity, the actual level of passengers, and aircraft operations that will occur at Easterwood Airport are unknown. Thus, the forecasts presented on the following pages should be reviewed with this fact in mind.

3.2 AIRPORT SERVICE AREA

An airport service area is the geographic region from which an airport derives the majority of its users. It is important to define an airport's service area before attempting to prepare forecasts because the socioeconomic data needed to prepare the forecast should be representative of the same geographic area. Items considered when defining an airport service area include roadway access, the location of competing airports, the relative strength of air service provided at competing airports, and other appropriate factors.

For the purpose of this master plan, the airport service area for Easterwood Airport is considered to encompass all of Brazos County and portions of the surrounding counties of Robertson, Burleson, Madison, and Grimes as shown in **Figure 3-1**. These surrounding counties are included because it is likely that some passengers at Easterwood Airport are from the cities of Hearn, Madisonville, Caldwell, Navasota, and other nearby towns.

This definition of the airport's service area does not mean that all of the residents located within this area will use Easterwood Airport instead of competing airports in Austin and Houston. It does mean that the majority of local originating passengers at Easterwood Airport reside within this geographic area.

3.3 SOCIOECONOMIC REVIEW

Local demographics typically play a large role in the demand for air transportation. Therefore, an examination of local socioeconomic conditions was undertaken to determine whether current trends in social and economic indicators show a stronger or weaker demand for air transportation services in the future. As previously noted, Easterwood Airport is a primary commercial airport and serves the citizens of the Bryan-College Station Metropolitan Statistical Area (MSA), which includes all of Brazos County, and portions of the surrounding counties. The following local influences have resulted in economic growth in the Bryan-College Station MSA.

- The City of Bryan is the County seat for Brazos County and helps contribute to the overall growth of the city and immediate area. Bryan enjoyed rapid growth between the 1960s and 1980s due to the continued development of university-related businesses including defense electronics, high-tech manufacturing, and agribusiness.

- The City of College Station likewise has experienced significant growth and has recently surpassed the City of Bryan in total population. The growth of the city is tied to a great extent to the growth of Texas A&M University (Texas A&M). The city boasts higher educational attainment levels and lower unemployment rates than the State of Texas or the United States.

- Due to significant changes on the Texas A&M campus in the 1960s and 1970s such as desegregation, the integration of women, and non-compulsory membership in the Corps of Cadets, the enrollment has increased extensively allowing for growth and further development.

- The 1990s saw continued growth in the area due to increased growth of Texas A&M and Blinn College, the emergence and expansion of business, industry and tourism related to Texas A&M. Despite recent economic slowing, population trends appear to be continuing in this pattern.

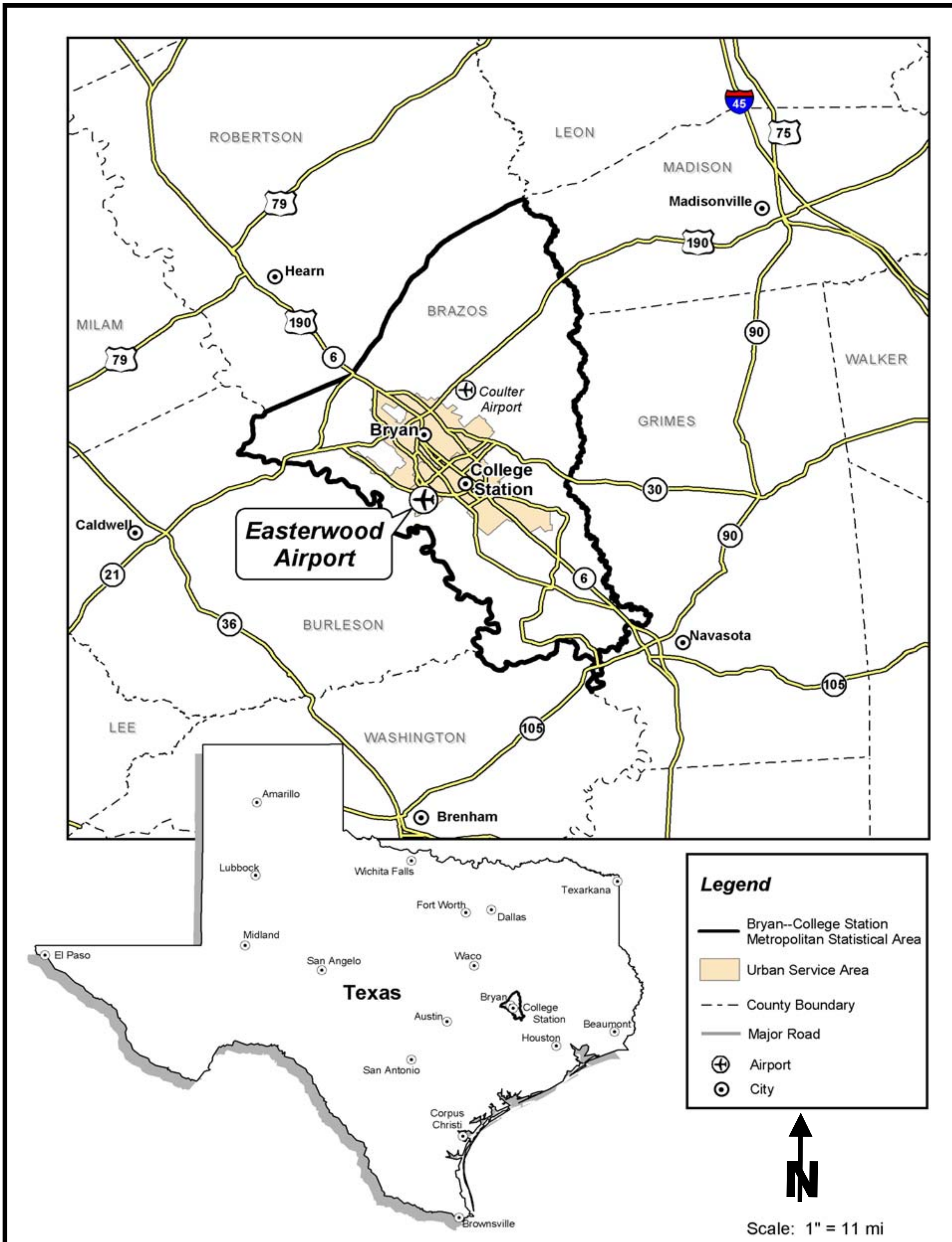
The following review of socioeconomic indicators reflects these local influences. Historical and forecast data was compiled for the following indicators:

- Population

- Employment

- Per Capita Personal Income

Where available, data is presented for the National, State, and Bryan-College Station MSA levels.



Easterwood Airport Master Plan Update

AIRPORT SERVICE AREA

FIGURE 3-1

3.3.1 POPULATION

The Bryan-College Station MSA's geographic situation in Central Texas will continue to play an important role in the future of the Brazos Valley. Bryan-College Station is within approximately 180 miles or a 3-hour drive of 80 percent of the State's population. For the period 1990-2000, the population of the state of Texas increased nearly 23 percent, placing it among the fastest growing state populations. Over the same period the Bryan-College Station population increased approximately 25 percent. This increase was significantly higher than most other small metropolitan markets in Texas, with the exception of border markets, and inline with the increases experienced in major metropolitan markets such as Houston and San Antonio. The average annual growth rate for the Bryan-College Station MSA population has been approximately 2.26 percent from 1990 to 2000.

The population of an area as recorded by the U.S. Census Bureau includes all persons residing in the area, regardless of nationality and immigration status. **Table 3.1** presents decennial population levels and Average Annual Compound Growth Rates (AACGR) in the Bryan-College Station MSA, State of Texas, and the United States during the period 1970 to 2000. Forecasted population levels for the years 2005, 2010, and 2020 are also presented with the corresponding AACGR.

The U.S. Census Department predicts that the population of the Nation and the State of Texas will grow at rates of approximately 0.83 percent and 1.44 percent, respectively, by the year 2020. According to the Texas State Population Estimates and Projections Program, the population of the Bryan-College Station MSA is expected to grow at an average annual growth rate (AAGR) of 1.06 percent by the year 2020.

Table 3.1
Historical and Forecast Population

Year	United States	Texas	Bryan/College Station MSA
Historical[1]			
1970	203,302,031	11,198,655	57,978
1980	226,542,199	14,225,513	93,588
1990	248,709,873	16,986,510	121,862
2000	281,421,906	20,851,820	152,415
Forecast[2]			
2005	286,549,000	22,489,182	160,550
2010	298,710,000	24,178,507	169,599
2020	324,927,000	27,738,378	188,052
Average Annual Compound Growth Rates			
1970-1980	1.09%	2.42%	4.90%
1980-1990	0.94%	1.79%	2.68%
1990-2000	1.24%	2.07%	2.26%
2000-2020	0.72%	1.44%	1.06%

Sources:
[1] U.S. Census, 2000.
[2] U.S. Data - U.S. Census, 2000.
Texas and MSA Data - Texas State Data Center and Office of the State Demographer, 0.5 Scenario.

3.3.2 EMPLOYMENT

This section addresses employment In the Bryan-College Station MSA with comparisons to state and national levels. Employment can be measured in various ways. Statistics on the distribution of employment, unemployment rates and a listing of major employers in the Bryan-College Station MSA are presented in **Table 3.2, Table 3.3, and Table 3.4,** respectively.

Table 3.2 presents the distribution of employment, by sector, in non-farm occupations in the Bryan-College Station MSA versus the state of Texas and the United States. The table reveals the distribution of employment in the Bryan-College Station MSA is similar to the distribution in Texas and the United States, with two exceptions. The percentage of Bryan-College Station MSA workforce employed in the manufacturing sector is lower then the corresponding percentages for Texas and the U.S. Conversely, the percentage of workforce employed in the government sector is more than double the corresponding percentage for Texas and the U.S. This is likely due to the impact of Texas A&M as the largest employer in the MSA.

Table 3.2
Employment Distribution by Sector (Non-Farm Employment)

Sector	USA	Texas	Bryan-College Station MSA
Agricultural Services, Forestry and Fishing	1.32%	1.27%	1.05%
Mining	0.48%	1.92%	1.27%
Construction	5.84%	6.77%	5.27%
Manufacturing	11.62%	9.42%	6.65%
Transportation and Public Utilities	5.02%	5.81%	2.27%
Wholesale Trade	4.61%	4.93%	1.96%
Retail Trade	16.64%	16.75%	17.69%
Finance, Insurance, and Real Estate	8.21%	8.48%	5.86%
Services	32.41%	30.35%	26.03%
Government	13.84%	14.30%	31.96%

Source: Bryan-College Station Economic Development Corporation, compiled by the Texas A&M Real Estate Center.

Unemployment levels for the Bryan-College Station MSA are lower than those of the State of Texas and the United States. Data presented in **Table 3.3** indicates the unemployment rate in the MSA has decreased significantly from 1990 to 2000 in the MSA, the State of Texas, and the United States. The data also shows the unemployment rates for the United States and the state of Texas have returned to at or above 1990 levels, probably due to the recent economic recession, while the unemployment level for the MSA has increased only slightly. This is likely a by-product of the primary employers in the MSA being education and government related, as shown in **Table 3.4**.

Table 3.3 Unemployment Levels			
Year	**USA**	**Texas**	**Bryan-College Station MSA**
1990	5.6%	6.3%	5.3%
2000	4.0%	4.2%	1.5%
2002	5.8%	6.3%	2.1%

Source: U.S Department of Labor, Bureau of Labor Statistics, 2002.

Table 3.4 Major Employers in the Bryan-College Station MSA			
Rank	**Company**	**Industry**	**Number of Employees**
1	Texas A&M University System	Education	12,000
2	Bryan Independent School District	Education	1,868
3	Sanderson Farms	Manufacturing	1,857
4	St. Joseph Hospital	Medical	1,170
5	City of Bryan	Government	859
6	College Station Independent School District	Education	800
7	Brazos County	Government	796
8	Universal Computer Systems	Manufacturing	750
9	City of College Station	Government	636
10	Wal-Mart Supercenter - Bryan	Retail	600

Source: Bryan-College Station Economic Development Corporation, compiled by the Texas A&M Real Estate Center.

3.3.3 PER CAPITA PERSONAL INCOME

An additional major factor in determining demand for air transportation is income. Per Capita Personal Income (PCPI) reflects the average annual monetary wage per head of household. High per capita income in an area is a good indicator for greater commercial and general aviation demand because higher income populations are more likely to travel, own and fly aircraft. Past trends show that the Bryan-College Station MSA area has experienced growth of per capita income that has followed closely the State and even slightly exceeded the national growth level since 1990. These trends are shown in **Table 3.5**.

The PCPI of Bryan-College Station MSA had increased 52 percent from 1990 through 2000 compared to a 57 percent increase for the state of Texas and a 51 percent increase for the United States, over the same period. In 2000, Bryan-College Station MSA had a PCPI of $20,033. This PCPI is 68 percent of the national average of $29,469. It is expected the growth for the Nation, State, and Bryan-College Station MSA will continue over the planning period. The lower PCPI for the Bryan-College Station MSA, verses the state and national levels, would be an indicator of lower demand for air travel than the national and state demand levels.

Table 3.5 Historical Per Capita Income			
Year	**USA**	**Texas**	**Bryan-College Station MSA**
1970	$4,095	$3,646	$2,936
1980	$10,183	$9,957	$7,174
1990	$19,572	$17,446	$13,204
2000	$29,469	$27,752	$20,033
Average Annual Compound Growth Rates			
1970-1980	9.5%	10.5%	9.3%
1980-1990	6.7%	5.7%	6.2%
1990-2000	4.1%	4.7%	4.2%

Source: Bureau of Economic Analysis, Regional Accounts Data, Table CA1-3, May 2002.

Note: Income presented in current dollars.

3.3.4 SUMMARY

The socioeconomic data presented on the preceding pages provides positive, neutral, and negative implications for future passenger growth at Easterwood Airport. A summary of these items is provided below.

Population growth in the Bryan-College Station MSA is projected to be faster than population growth in the United States, but slower than population growth in the State of Texas. In addition, the data indicates that population in the MSA will grow at a slower rate than it has in the past. Since population growth is one indicator of passenger enplanements, the population data supports a slower grow rate for passenger enplanements in the future.

Employment data for the Bryan-College Station MSA has positive implications for passenger growth. A high percentage of employment in the MSA is related to the government and educational sector, which typically offers more stability than other sectors. Unemployment rates for the MSA are significantly lower than the state or national levels.

Per capita income for the Bryan-College Station MSA is lower than per capita income for the United States and the State of Texas. However, the data indicates that the rate of income growth in the MSA was essentially the same as it was at the state and national level. Therefore, per capita income data for the Bryan-College Station MSA suggests a lower overall propensity to use air travel, but the rate of growth should be the same as the state and national level. This data has neutral implications for passenger enplanement growth at Easterwood Airport.

3.4 OVERVIEW OF ECONOMIC AND WORLD EVENTS AND INDUSTRY TRENDS

The challenges currently facing the aviation industry are unprecedented and most experts agree that the industry is in the midst of a crisis. Several major carriers are currently in, or very close to, bankruptcy. Passenger enplanements are significantly lower than recent years in every category of traffic and prospects for the near-term future are uncertain. Reasons for the dismal state of affairs include the 2001 economic recession, the September 11th terrorist attacks, the war in Iraq, and a number of other issues. All of these factors have the potential to affect future passenger demand at Easterwood Airport. A brief summary of these issues is presented in the following paragraphs.

3.4.1 ECONOMIC AND WORLD EVENTS

3.4.1.1 Economic Recession

The United States entered its 10th economic recession since World War II in the first quarter of 2001. The recession lasted through the third quarter of the same year. Economic growth since the recession has been erratic with growth of Gross Domestic Product ranging from a high of 5 percent in the first quarter of 2002 to a low of 1.3 percent in the second quarter of 2002. For the calendar year 2002, GDP growth was 2.4 percent compared to 0.3 in 2001 and 3.8 percent in 2000. Projections for economic growth in 2002 vary depending upon the duration of the war in Iraq, with many economists projecting slow growth for the first two quarters of the year.

3.4.1.2 September 11th Terrorist Attacks

The aftermath of the September 11, 2001 terrorist attacks, with respect to the aviation industry, has been decreased passenger demand and significantly higher costs to the airlines. Passenger enplanements have not yet rebounded to the levels experienced prior to the attacks and the latest FAA projections indicate that passenger enplanements will not return to pre-September 11th levels until 2006. Security-related costs have imposed significant new costs on airlines including mandates for the installation of new cockpit doors. These costs along with higher costs for labor and fuel have resulted in severe financial losses for most major airlines in the United States. As a result of the lower passenger levels and higher costs, many airlines have reduced their schedules and in many instances have substituted service by their code share regional partners for mainline service.

3.4.1.3 Middle East Hostilities

As of April 2003, the war in Iraq is continuing and has had a broad affect across the aviation industry. Nearly all airlines have experienced decreases in passengers and have cut capacity in response. The Air Transport Association described the impact of the war as follows in a March 26, 2003 press release:

> "In the week preceding the war, traffic moderated slightly. Following the March 16 Azores Summit (between U.S. President Bush and British Prime Minister Tony Blair), however, demand dropped at a pace not seen since the aftermath of the Sept. 11 attacks. Traffic for the week ended March 23 fell 10 percent, led by a 25 percent drop in the Atlantic, a 13 percent drop in the Pacific, and an 8 percent drop in Latin markets. Domestic traffic also fell 7 percent.
>
> Advance bookings for the next 60 to 90 days suggest no relief in sight. Domestic bookings are down more than 20 percent, Atlantic down more than 40 percent, Latin off more than 15 percent and Pacific more than 30 percent. Airlines have reported that on some days cancellations are exceeding bookings."

Obviously, the war will have an affect on passenger enplanements for calendar year 2003. How significant the affect is will depend upon the duration and intensity of the war. Data for the period following the 1991 Gulf War suggest that passenger levels will rebound to pre-war levels within six months of the war's end.

3.4.1.4 Impact on Passenger Enplanements

According to the FAA, passenger enplanements declined nationally during 2001 and 2002. Passenger enplanements decreased 1.8 percent from 2000 to 2001 and decreased an estimated 8.2 percent from 2001 to 2002. The impact of economic and world events on passenger enplanements in 2003 is not yet known. However, passenger levels for the first six months are likely to show further decline as a result of continued economic weakness and the war in Iraq.

3.4.2 INDUSTRY TRENDS

As a result of, and in response to, recent world and economic events, the aviation industry is undergoing numerous changes. These changes include the continued growth of low cost carriers, the expanded use of regional jets, continued use of the hub and spoke system, and the expansion of security procedures. These issues are briefly explored in the following paragraphs, and their potential ability to positively or adversely affect future passenger enplanement levels at Easterwood Airport is discussed.

3.4.2.1 Growth of Low Cost Carriers

Low cost airlines such as Southwest Airlines, JetBlue Airlines, Air Trans, and American Trans Air have continued to gain market share in recent years as business travelers seek less expensive alternatives. Low cost carrier service is available at nearby markets such as Austin and Houston, as well as more distant markets such as Dallas/Fort Worth. The proportion of travelers in the Bryan-College Station market that use low cost air carriers at these surrounding markets instead of service at Easterwood Airport is not known. However, on the basis of data at similar markets, there is a high potential for significant diversion of air passengers in the Bryan-College Station market.

This factor would tend to indicate slower growth in future years as low cost carriers in surrounding markets capture a greater share of the market. However, this may be mitigated somewhat as traditional mainline carriers seek to reduce air fares in order to stimulate passenger demand.

3.4.2.2 Introduction of Regional Jets

Regional jets are defined as jet aircraft accommodating 35 to 100 passengers. These aircraft have been acquired by commuter airlines to replace their turboprop aircraft that typically provide connecting service to mainline carriers at hub airports. The significance of these aircraft to a market such as College Station is that these aircraft provide a superior level of customer service and convenience in comparison to the turboprop aircraft they replace. Passengers typically rank regional jet aircraft much higher in terms of comfort due to their low noise and vibration levels in the cabin as well as the fact that many of these aircraft are boarded via loading bridges while the turboprop aircraft they are replacing were boarded via the ramp. Thus, the passenger is provided with weather protection while boarding the aircraft.

As a result of this higher comfort and convenience level, airlines are finding that regional jet aircraft are stimulating traffic in markets that previously were only served by turboprop aircraft. This indicates that certain passengers preferred to drive to the connecting hub airport rather than use turboprop aircraft.

Continental Express began regional jet flights at Easterwood Airport in the fall of 2002. These flights were operated with a combination of Embraer EMB-145 regional jets that have 50 seats and EMB-135 regional jets that have 37 seats. It is anticipated that American Eagle Airlines will likewise shift to regional jet aircraft at some point in the future. One note of caution should be sounded on this issue. Continental Airlines has recently selected certain cities in its commuter operation to revert to service with turboprop aircraft. It is possible that Easterwood Airport could lose existing regional jet service as a result of this decision. In conclusion, it is anticipated that the operation of regional jets at Easterwood Airport will be a positive factor for future passenger growth. If regional jets are withdrawn from the market, it can be expected to have a negative impact on future passenger levels.

3.4.2.3 Continued Use of Hub and Spoke Networks

Nearly all major airlines in the United States use a hub and spoke route network whereby aircraft from various destinations (the spokes) are flown to a single airport (the hub) in order to transfer passengers with common destinations to an outbound aircraft. Aircraft arrive and depart the hub airport at a similar time to enable passengers to transfer from one aircraft to another. This type of route network enables passengers from a market such as College Station to reach a greater number of destinations, at a greater frequency, than would be possible without such a network.

Although airlines are currently experiencing severe financial distress, none have indicated, to date, that the prevailing hub and spoke network will be dismantled. Some airlines, such as American, have instituted hub reforms that seek to improve the efficiency of their hubs by spreading out demand, but the basic structure of the hub and spoke network remains unchanged.

This means that future air service patterns at Easterwood Airport are likely to continue to consist of commuter airlines that provide connections to nearby major hubs such as Houston and Dallas/Fort Worth. Service to independent locations is unlikely to generate sufficient passengers to be economically viable. This factor indicates that there are few opportunities for additional passenger service in the College Station market.

3.4.2.4 Increased Security Procedures

In the aftermath of September 11, 2001, the FAA implemented stricter security procedures that increased the amount of time required for passenger screening. As a result, passengers needed to allow additional time before scheduled departure time for passing through security. This additional time was a significant factor for short trips because travel by car became an even more viable alternative.

In addition to the time factor, certain parties complained of the “hassle factor” associated with commercial air transportation, especially when secondary gate screening was being conducted. However, many of these complaints have since subsided and security delays no longer appear to be a significant issue with regard to decreasing travel demand. Although aviation security has been, and continues to be, a major issue in the aviation industry, passenger screening does not appear to have a negative effect on passenger levels as in the months ensuing the September 11th terrorist attacks.

3.4.2.5 Impact on Passenger Enplanements

The effect of industry trends on future passenger levels at Easterwood Airport is summarized below:

- **Growth of Low-Cost Carriers** – While this factor was clearly a negative for passenger growth at Easterwood Airport on a historical basis, this is less clear with respect to future passenger levels. Financial restructuring of traditional mainline carriers should enable them to provide air fares that are more competitive with low cost carriers. Low cost carriers at alternate airports such as Houston and Austin will continue to draw a percentage of passengers from the Easterwood Airport service area.
- **Introduction of Regional Jets** – This factor appears to be a positive one for future passenger levels at Easterwood Airport. Increased customer acceptance and satisfaction with regional jets as compared to turboprop aircraft should be a stimulus for future passenger growth at Easterwood Airport. Loss of existing regional jet operations would be a negative factor.
- **Continued Use of Hub and Spoke Networks** – This factor has mixed implications for future passenger levels at Easterwood Airport. On the positive side, the continuation of the traditional hub and spoke networks will provide the College Station market with access to the large hubs at Dallas/Fort Worth and Houston, thereby increasing passenger access to a large number of final domestic and international destinations. On the negative side, the hub network limits the number of destinations that could be considered viable for air service from the College Station market.
- **Increased Security Procedures** – This factor was clearly a negative one for a period after the September 11th terrorist attacks. However, these procedures appear to be functioning more smoothly at this time even with the introduction of explosive detection screening for all checked baggage. Thus, it does not appear at this point in time that increased security procedures will have a net positive or adverse affect on future passenger levels at Easterwood Airport.

3.5 HISTORICAL AVIATION ACTIVITY

A key factor in attempting to predict future trends affecting passenger levels and aircraft operations at Easterwood Airport is understanding and analyzing current and past trends at the airport. Therefore, this section examines and documents those trends and provides the basis for the forecasts presented in the following section. Historical data was obtained from airport management records, air traffic control records, and the FAA. An assessment of passenger activity is presented first, followed by an assessment of aircraft operations and based aircraft.

3.5.1 PASSENGER ENPLANEMENTS

The FAA defines passenger enplanements as revenue passengers who board an aircraft. **Table 3.6** and **Figure 3-2** shows the total number of passenger enplanements for the years 1980 through 2002 at Easterwood Airport. This information was obtained from the FAA Terminal Area Forecast (TAF) for Easterwood Airport for the years 1981 through 1989 and airport management records for the years 1990 through 2003. From 1981 to 1999, passenger enplanements at Easterwood Airport grew at approximately 5 percent per year, from almost 36,000 to above 94,000. Since 1999, passenger enplanements experienced a downward trend of approximately 6 percent per year, from the 1999 level of approximately 94,000 to approximately 68,000 for the year 2003.

Table 3.6
Historical Scheduled Passenger Enplanements

Year	Number of Enplanements	Percent Change
1981	32,788	-
1982	31,649	-3%
1983	30,950	-2%
1984	62,482	102%
1985	40,563	-35%
1986	37,141	-8%
1987	37,473	1%
1988	62,815	68%
1989	68,686	9%
1990	79,101	15%
1991	77,758	-2%
1992	83,641	8%
1993	85,925	3%
1994	87,494	2%
1995	85,223	-3%
1996	86,057	1%
1997	93,977	9%
1998	92,130	-2%
1999	94,414	2%
2000	91,628	-3%
2001	86,162	-6%
2002	78,433	-9%
2003	67,874	-13%

Sources: FAA TAF 2002 Scenario, March 2003, for years 1981 to 1989.
Easterwood Airport Records, for years 1990 to 2003.
Note: TAF data is presented in fiscal years. Airport records are presented in calendar years.

Over the past decade, Easterwood Airport has been continuously serviced by scheduled airlines such as American Airlines' partner, American Eagle, and Continental Airlines' partner, Continental Express. These airlines have conducted a majority of activities with aircraft that have less than 60 seats, such as the Saab 340, the ATR-42, and the Embraer EMB-135. Atlantic Southeastern Airlines (ASA) operated at Easterwood Airport until service was terminated at the end of 1995.

3.5.2 MONTHLY PASSENGER DISTRIBUTION

Table 3.7 and **Figure 3-3** presents monthly passenger enplanement data at Easterwood Airport from 1998 through 2002. Enplanements tend to peak during the months of March, April, and May and during the months of October and November. This pattern could result from student activity related to spring break at Texas A&M and the local school system, and to the fall football season at Texas A&M. The peak month accounted for an average of approximately 9.8 percent of annual passenger enplanements through the years 1998 to 2002.

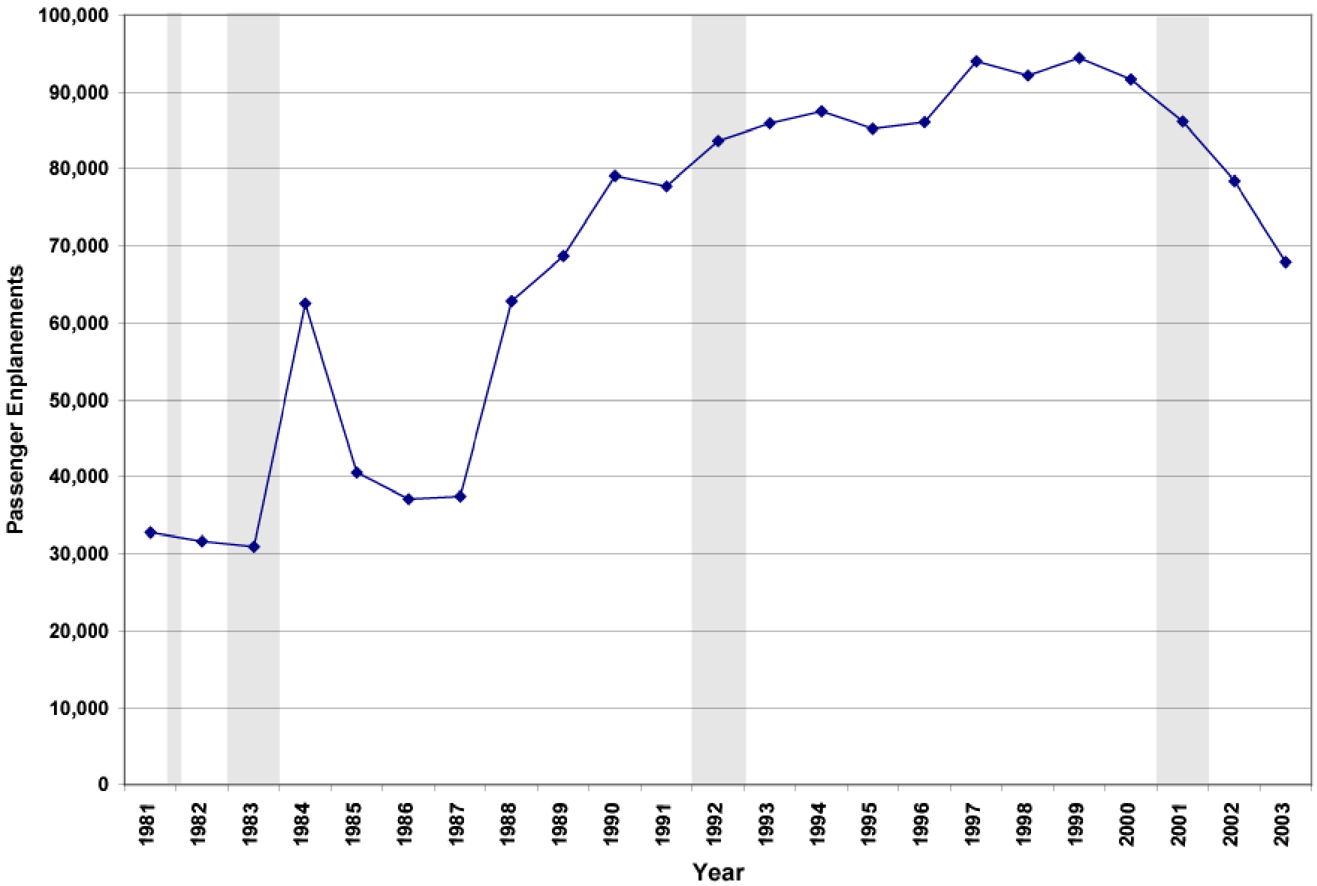
Table 3.7
Historical Monthly Enplanements

Month	1998	Percent of Year	1999	Percent of Year	2000	Percent of Year	2001	Percent of Year	2002	Percent of Year
January	6,198	6.7%	7,435	7.9%	6,720	7.3%	5,989	7.0%	5,519	7.0%
February	6,847	7.4%	6,803	7.2%	6,901	7.5%	6,348	7.4%	6,208	7.9%
March	**8,705**	**9.4%**	8,430	8.9%	8,428	9.2%	8,208	9.5%	6,806	8.7%
April	8,112	8.8%	8,098	8.6%	7,608	8.3%	7,910	9.2%	6,911	8.8%
May	8,144	8.8%	7,956	8.4%	7,959	8.7%	**8,870**	**10.3%**	**7,707**	**9.8%**
June	7,511	8.2%	7,416	7.9%	7,462	8.1%	7,692	8.9%	6,606	8.4%
July	7,664	8.3%	7,634	8.1%	6,933	7.6%	7,225	8.4%	6,307	8.0%
August	7,787	8.5%	7,501	7.9%	7,376	8.0%	7,792	9.0%	6,251	8.0%
September	6,800	7.4%	7,576	8.0%	7,202	7.9%	4,717	5.5%	5,699	7.3%
October	7,566	8.2%	**8,912**	**9.4%**	**9,158**	**10.0%**	7,397	8.6%	7,034	9.0%
November	8,574	9.3%	8,840	9.4%	8,507	9.3%	7,097	8.2%	7,147	9.1%
December	8,222	8.9%	7,813	8.3%	7,374	8.0%	6,917	8.0%	6,238	8.0%

Source: Easterwood Airport, Management Records, compiled by URS Corporation, 2003.
Note: Bold type indicates peak month.

3.5.3 PASSENGER ENPLANEMENT MARKET SHARE BY AIRLINE

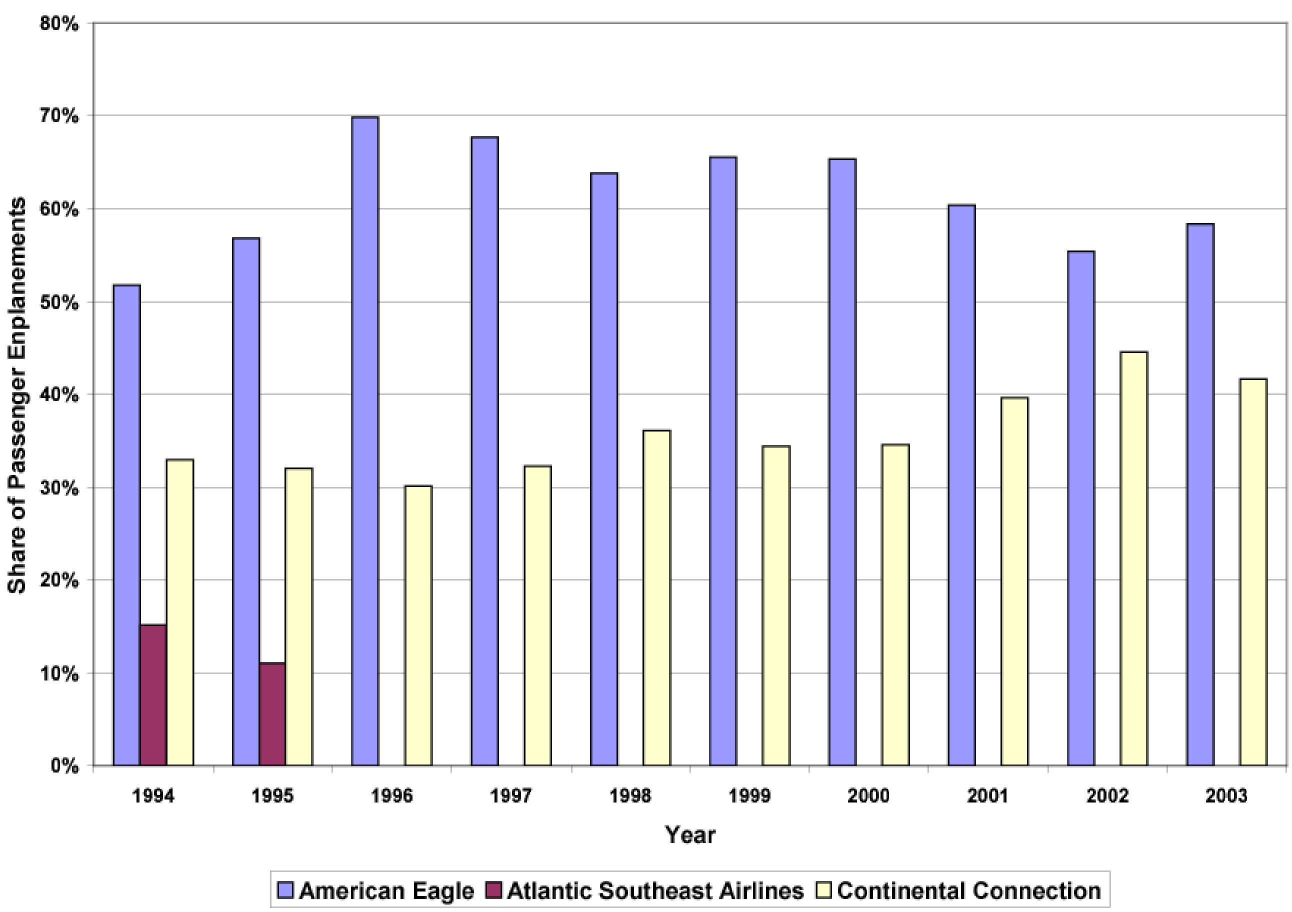
Figure 3-4 illustrates the percentage of passenger enplanements carried by each airline at Easterwood Airport. American Eagle has historically captured the majority of passenger enplanements, reaching a peak of almost 70 percent in 1996. Recent trends indicate the passenger enplanement market share for Continental Express is increasing, approaching 45 percent during 2002.



Note: Vertical shading indicates periods of economic recession.

Easterwood Airport Master Plan Update	HISTORICAL PASSENGER ENPLANEMENTS (1981-2003)	FIGURE 3-2

Easterwood Airport Master Plan Update	MONTHLY PASSENGER ENPLANEMENTS (1998-2002)	FIGURE 3-3



Easterwood Airport Master Plan Update	**PASSENGER ENPLANEMENT MARKET SHARE (1994-2003)**	**FIGURE 3-4**

3.5.4 ORIGIN AND DESTINATION MARKETS

Table 3.8 and **Table 3.9** present the top twenty Origin and Destination (O&D) markets for Easterwood Airport for the years 1991 and 2001, with the corresponding passenger counts, percent of total O&D passengers, average fare, and average yield for each of these markets. **Table 3.9** also indicates the percent of change from 1991 O&D passenger enplanement counts to the 2001 levels. The exclusion of George Bush Intercontinental Airport (IAH) from the 2001 top 20 O&D markets (it dropped to 47th), brings into question the method of recording and reporting O&D passenger data. The data, except for the exclusion of IAH, is as expected, with Dallas/Fort Worth the leading O&D destination and the primary U.S. metropolitan areas well represented and in most cases increasing the total number of O&D passengers for these locations, even with an overall decrease in O&D passengers over this period.

The top five destinations outside of Texas are Washington D.C., New York City, Chicago, Denver, and Atlanta. Of these destinations, Washington D.C. (through Baltimore/Washington International Airport), Chicago (through Midway Airport), and Atlanta are served via non-stop flights by low cost carriers from either Austin's Bergstrom International Airport or Houston's Hobby Airport. Thus, Easterwood Airport does have some competition from low cost carriers at alternate airports. However, this is mitigated somewhat by the fact that non-stop service is somewhat limited and service via Houston is from the Hobby Airport which is farther away from College Station than George Bush Intercontinental Airport.

3.5.5 HISTORICAL ANNUAL AIRCRAFT OPERATIONS

The FAA defines an aircraft operation as either an arrival or a departure. Under this definition, an aircraft "touch and go" is considered two operations, since the aircraft conducts a landing and a takeoff during the maneuver. This section includes a breakdown of the historical operations.

Historical aircraft operations at Easterwood Airport have been recorded in the FAA Terminal Area Forecast (TAF), FAA 5010 Form, and Air Traffic Control Tower (ATCT) activity logs. All three of these data sources reflect the same historical trend for aircraft operations at the Easterwood Airport, although there are slight differences in the three sets of records. Historical operations documented by the FAA TAF were used for this review for the years of 1980 through 1989 and Easterwood Airport Management Records were used for years 1990 through 2002. When logging this data, the TAF and Airport Management Records separate the annual operations into the following six categories:

- Itinerant Air Carrier
- Itinerant Commuter/Air Taxi
- Itinerant General Aviation
- Itinerant Military
- Local General Aviation
- Local Military

Table 3.8 1991 Top 20 Origin and Destination Markets					
Destination Airport		Total Outbound O&D Passengers			
		O&D Passengers	As % of CLL Total	Average Fare USD$	Avg. Yield (cents/mi)
CLL TOTAL		**75,760**		**$150.20**	**17.5**
Dallas, Texas		**11,390**	**15.03%**		
Dallas/Ft Worth Intl	TX	11,390	15.03%	83.67	51.2
Houston		**5,680**	**7.50%**		
George Bush Intl	TX	5,570	7.35%	54.27	72.4
Hobby Airport	TX	110	0.15%	50.82	53.7
Washington DC		**3,630**	**4.79%**		
Baltimore/Wash Intl	MD	730	0.96%	204.97	14.8
Ronald Reagan Intl	DC	2,400	3.17%	230.94	17.4
Dulles Intl	DC	500	0.66%	163.43	12.5
Chicago, Illinois		**2,950**	**3.89%**		
O'Hare Intl	IL	2,900	3.83%	158.31	16.0
Chicago Midway	IL	50	0.07%	135.84	14.1
New York City		**2,510**	**3.31%**		
La Guardia	NY	1,280	1.69%	239.59	15.6
Newark Intl	NY	1,180	1.56%	243.82	16.2
John F Kennedy	NY	50	0.07%	243.72	15.7
Denver Intl	CO	2,020	2.67%	189.81	21.7
Amarillo	TX	1,970	2.60%	81.31	17.1
Lubbock Intl	TX	1,640	2.16%	83.18	18.7
Wm B Hartsfield	GA	1,460	1.93%	195.47	22.6
Logan Intl	MA	1,310	1.73%	243.35	14.2
McCarran Intl	NV	1,280	1.69%	109.17	8.9
Los Angeles Intl	CA	1,270	1.68%	198.85	14.0
San Francisco Intl	CA	1,190	1.57%	198.10	11.9
Philadelphia Intl	PA	1,160	1.53%	266.11	18.4
Will Rogers World	OK	1,120	1.48%	88.58	25.6
Lambert-St Louis	MO	1,120	1.48%	112.24	15.5
Tulsa	OK	1,120	1.48%	87.34	21.5
Kansas City Intl	MO	1,080	1.43%	117.54	18.4
El Paso Intl	TX	920	1.21%	102.05	14.2
Midland Intl	TX	910	1.20%	99.26	21.0
TOTAL Top 20 O&D Passengers		45,730	60.36%		

Source: DOT, Air Passenger Origin-Destination Survey, reconciled to Schedules T-100 and 298C T-1.

Table 3.9 2001 Top 20 Origin and Destination Markets						
Destination Airport		Total Outbound O&D Passengers				% Change From 1991
		2001 O&D Passengers.	As % of CLL Total	Average Fare USD$	Avg. Yield (cents/mi)	
CLL TOTAL		**73,320**		**$179.67**	**17.9**	**-3.22%**
Dallas, Texas		**7,210**	**9.83%**			**-36.70%**
Dallas/Ft Worth Intl	TX	7,080	9.66%	93.63	56.8	-37.84%
Love Field	TX	130	0.18%	126.07	43.4	-
Washington DC		**4,440**	**6.06%**			**22.31%**
Baltimore/Wash Intl	MD	1,610	2.20%	198.63	14.9	120.55%
Ronald Reagan Intl	DC	1,990	2.71%	247.33	18.6	-17.08%
Dulles Intl	DC	840	1.15%	235.19	18.0	68.00%
New York City		**2,690**	**3.67%**			**7.17%**
La Guardia	NY	1,430	1.95%	260.02	17.0	11.72%
Newark Intl	NY	1,120	1.53%	237.82	15.8	-5.08%
John F Kennedy	NY	140	0.19%	213.89	13.9	180.00%
Chicago, Illinois		**2,610**	**3.56%**			**-11.53%**
O'Hare Intl	IL	2,530	3.45%	178.27	18.2	-12.76%
Chicago Midway	IL	80	0.11%	163.79	17.1	60.00%
Denver Intl	CO	2,130	2.91%	180.92	21.1	5.45%
Wm B Hartsfield	GA	2,090	2.85%	153.45	18.5	43.15%
Seattle/Tacoma Intl	WA	1,530	2.09%	229.45	12.2	115.49%
Orlando Intl	FL	1,490	2.03%	164.27	16.4	86.25%
Logan Intl	MA	1,320	1.80%	240.77	14.1	0.76%
Los Angeles Intl	CA	1,300	1.77%	214.87	14.9	2.36%
Moisant Intl	LA	1,280	1.75%	93.76	23.3	42.22%
Kansas City Intl	MO	1,250	1.70%	162.33	24.8	15.74%
Philadelphia Intl	PA	1,200	1.64%	208.28	14.4	3.45%
Lindberg Field	CA	1,200	1.64%	213.34	15.8	66.67%
Lambert-St Louis	MO	1,200	1.64%	134.61	18.1	7.14%
Amarillo	TX	1,180	1.61%	134.79	26.7	-40.10%
Lubbock Intl	TX	1,140	1.55%	115.79	24.3	-30.49%
Albuquerque Intl	NM	1,110	1.51%	147.47	19.0	50.00%
San Francisco Intl	CA	1,040	1.42%	285.82	17.2	-12.61%
McCarran Intl	NV	1,030	1.40%	165.07	13.1	-19.53%
TOTAL Top 20 O&D Passengers		38,440	52.43%			-4.50%

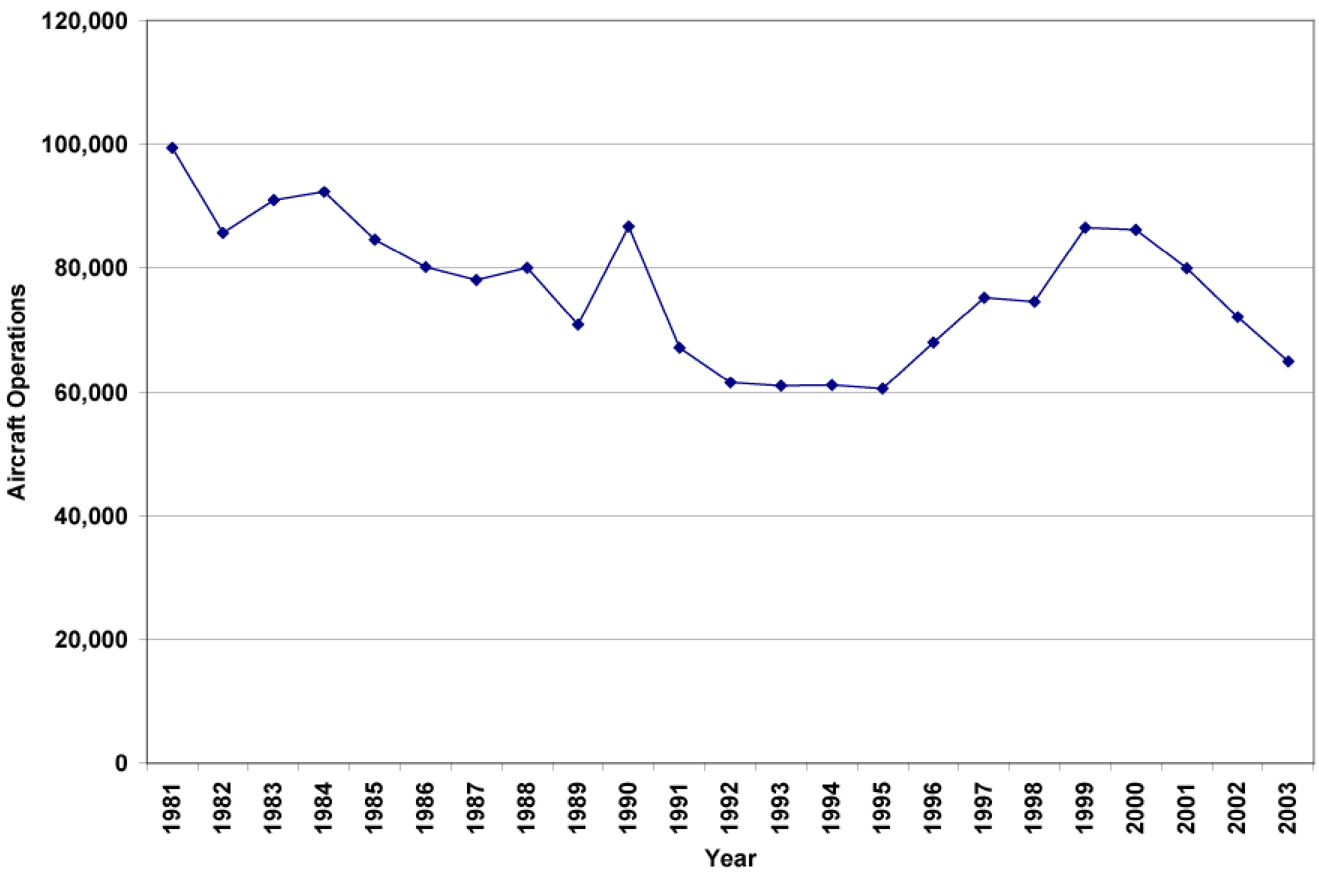
Source: DOT, Air Passenger Origin-Destination Survey, reconciled to Schedules T-100 and 298C T-1.

Table 3.10 and **Figure 3-5** present historical total aircraft operations for Easterwood Airport from 1981 through 2003. Unlike passenger enplanements, aircraft operations at Easterwood Airport have shown a slight negative trend since 1981, decreasing approximately 29 percent since 1981 and almost 16 percent since 1999. This translates to an average annual negative growth rate of approximately 1.7 percent from 1980 to 2003. On an optimistic note, aircraft operations grew at an average annual rate of 1.9 percent over the ten years, from 60,986 operations in 1993 to 72,126 operations in 2002.

Table 3.10 Historical Total Aircraft Operations		
Year	**Number of Operations**	**Percent Change**
1981	99,440	-
1982	85,716	-14%
1983	90,964	6%
1984	92,342	2%
1985	84,640	-8%
1986	80,164	-5%
1987	78,093	-3%
1988	80,072	3%
1989	70,896	-11%
1990	86,768	22%
1991	67,153	-23%
1992	61,533	-8%
1993	60,986	-1%
1994	61,099	0%
1995	60,542	-1%
1996	68,012	12%
1997	75,250	11%
1998	74,613	-1%
1999	86,575	16%
2000	86,228	-0%
2001	79,999	-7%
2002	72,126	-10%
2003	64,966	-10%

Sources FAA TAF 2002 Scenario, March 2003, for years 1981 to 1989.
Easterwood Airport Records, for years 1990 to 2003.

Note: TAF data is presented in fiscal years. Airport records are presented in calendar years.



Easterwood Airport
Master Plan Update

TOTAL HISTORICAL AIRCRAFT OPERATIONS (1981-2003)

FIGURE

3-5

Table 3.11 presents annual aircraft operations, by operational categories, for the years 1981 through 2003. Both Itinerant and local operations are listed in this table.

Table 3.11
Historical Aircraft Operations by Operational Category

Year	Itinerant Operations				Local Operations		Total
	Air Carrier	Commuter	General Aviation	Military	General Aviation	Military	
1981	8	8,955	50,204	2,031	37,312	930	99,440
1982	1	7,531	42,751	3,039	32,717	677	85,716
1983	14	8,204	46,783	3,459	29,837	2,667	90,964
1984	11	8,608	50,886	3,516	26,967	2,354	92,342
1985	12	8,409	48,420	3,514	22,702	1,583	84,640
1986	13	9,808	43,214	3,391	22,182	1,556	80,164
1987	20	8,668	39,383	4,386	22,342	3,294	78,093
1988	28	11,261	38,152	5,187	20,467	4,977	80,072
1989	29	12,350	32,000	4,669	15,657	6,191	70,896
1990	26	14,198	35,884	3,982	26,543	6,135	86,768
1991	17	13,948	30,359	3,432	14,643	4,754	67,153
1992	31	14,698	27,194	4,416	10,501	4,693	61,533
1993	18	13,896	27,946	4,720	9,710	4,696	60,986
1994	32	12,852	26,076	4,580	12,290	5,269	61,099
1995	60	11,169	25,876	5,440	12,514	5,483	60,542
1996	66	9,083	28,899	6,073	18,453	5,438	68,012
1997	87	8,481	31,323	5,516	24,100	5,743	75,250
1998	114	9,135	30,603	8,468	18,485	7,808	74,613
1999	76	8,820	34,903	9,816	23,546	9,414	86,575
2000	197	8,261	34,573	9,770	23,377	10,050	86,228
2001	148	8,006	31,505	10,699	20,399	9,242	79,999
2002	93	6,330	28,900	10,675	17,130	8,998	72,126
2003	50	5,633	26,524	10,792	15,367	6,600	64,966

Sources FAA TAF 2002 Scenario, March 2003, for years 1981 to 1989.
Easterwood Airport Records, for years 1990 to 2003.

Note: TAF data is presented in fiscal years. Airport records are presented in calendar years.

3.5.6 AIR CARRIER OPERATIONS

For traffic count purposes, an air carrier aircraft is defined as having a maximum passenger seating capacity of more than 60 seats. Historically, most scheduled passenger service at Easterwood Airport has been provided by commuter aircraft of less than 60 seats. Thus, air carrier operations at Easterwood Airport primarily consist of charter service, for activities such as Texas A&M Athletic Department activities. Historical air carrier operations are presented in **Table 3.11**.

3.5.7 COMMUTER OPERATIONS

Commuter operations at Easterwood Airport consist of service by American Eagle to Dallas-Ft. Worth International Airport and Continental Express to George Bush Intercontinental Airport.

Commuter operations have decreased approximately 42 percent since 1981, an average annual decrease of almost 2.5 percent. Historical commuter operations are presented in **Table 3.11**.

3.5.8 GENERAL AVIATION OPERATIONS

General aviation includes all segments of the aviation industry with the exception of commercial air service and military operations. Typical general aviation activities include pilot training, corporate and pleasure flying. Operations are conducted by single- and multi-engine piston aircraft, turboprop and turbojet aircraft, and helicopters.

General aviation operations are recorded as local or itinerant. Local operations are primarily those arrivals or departures performed by aircraft remaining in the airport traffic pattern, and are most often associated with training activity and flight instruction. Itinerant operations are arrivals or departures other than local operations, performed by either based or transient aircraft.

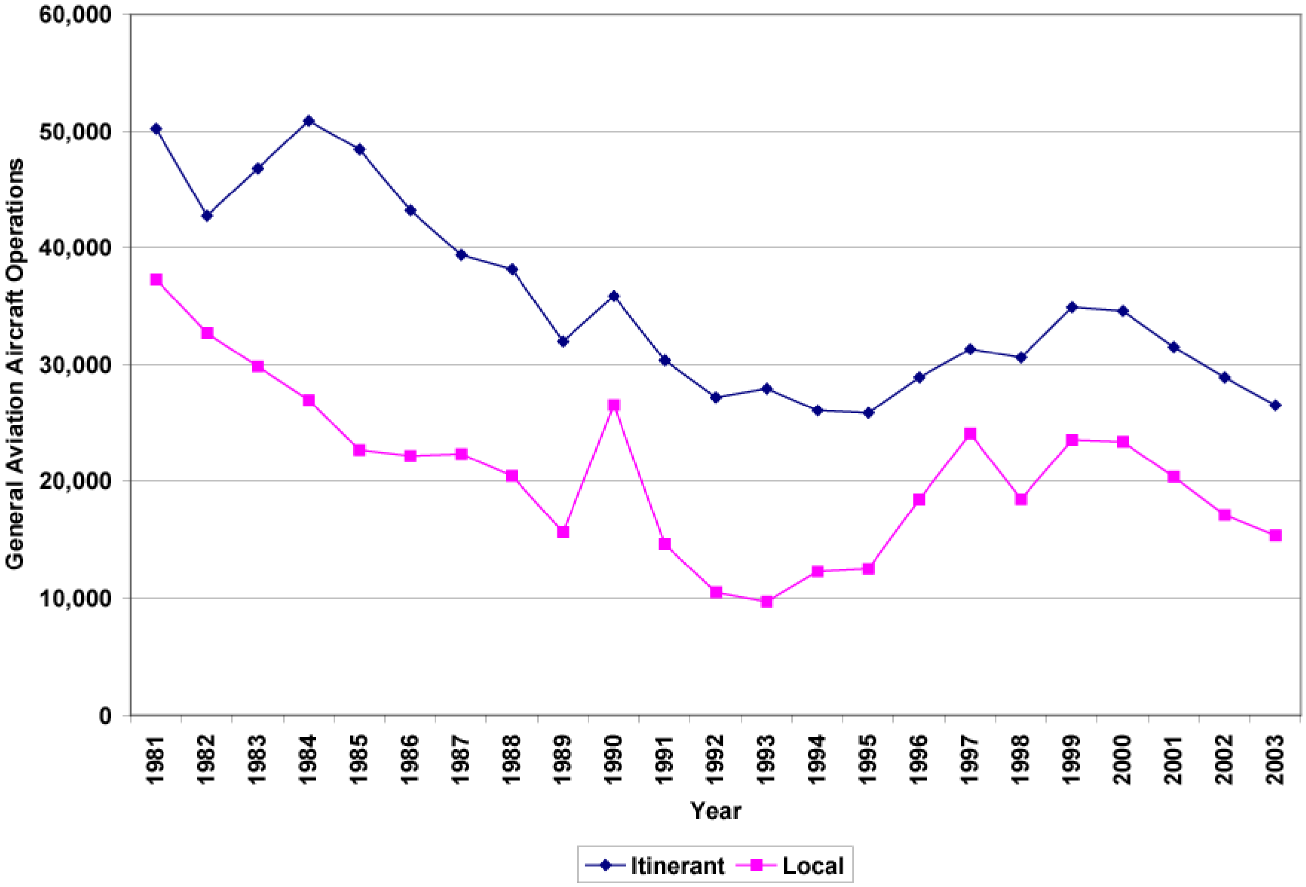
Table 3.11 and **Figure 3-6** presents historical general aviation operations separated into itinerant and local operations. On average, since 1981 itinerant general aviation operations have accounted for 63 percent of general aviation activity at Easterwood Airport. General aviation activity decreased from 1981 through the early 1990s. Since that time, operations have experienced an upward trend although a decline began again in 2000.

3.5.9 MILITARY

Military operations at Easterwood Airport have fluctuated since 1981, peaking in 1983, 1989, and again in 2001. Alternately, troughs in military aircraft operations occurred in 1982, 1986, and again in 1991. Overall, military activity increased from 2,031 in 1981 to 10,792 itinerant operations in 2003, and from 930 local operations in 1981 to 8,998 in 2002. This translates to an average annual compound growth rate of 7.8 percent and 11 percent, respectively. According to air traffic control personnel, military operations at Easterwood Airport consist primarily of training aircraft, such as the T-1, T-6, T-38, T-34, T-45 and a number of U.S Army helicopters. Historical military operations are in **Table 3.11**.

3.5.10 INSTRUMENT OPERATIONS

Instrument operations include arrivals or departures of aircraft operating in accordance with an IFR flight plan or an operation where IFR separation between aircraft is provided. The number of instrument operations is used as the basis for determining an airport's eligibility for certain air traffic control services and facilities. Historical instrument operations, by category, are presented in **Table 3.12**. As the table indicates, annual instrument operations have been fairly consistent during recent years averaging around 22,000 or roughly one-quarter to one-third of total operations at the airport.



Easterwood Airport Master Plan Update	HISTORICAL LOCAL & ITINERANT GENERAL AVIATION OPERATIONS (1981-2003)	FIGURE 3-6

Table 3.12 Historical Annual Instrument Operations					
Year	**Air Carrier**	**Air Taxi**	**General Aviation**	**Military**	**Total**
1990	26	14,109	9,212	2,593	25,940
1991	18	13,906	8,518	2,335	24,777
1992	31	14,701	7,822	2,560	25,114
1993	19	13,815	8,147	2,474	24,455
1994	32	12,745	7,758	2,512	23,047
1995	60	10,880	6,546	3,103	20,589
1996	64	8,721	6,493	3,426	18,704
1997	60	7,624	6,687	3,094	17,465
1998	95	8,991	7,643	4,897	21,626
1999	76	8,642	7,829	5,674	22,221
2000	195	8,191	8,081	6,198	22,665
2001	147	7,805	7,800	6,571	22,323
2002	92	6,318	7,495	6,470	20,375
2003	52	5,627	6,773	5,554	18,006

Source: FAA, Office of Aviation Policy and Plans, Air Traffic Activity Data System. Compiled by URS, 2003.

3.5.11 INSTRUMENT APPROACHES

Instrument approaches consist of an approach to an airport by an aircraft on an IFR flight plan when the visibility is less than 3 miles or the ceiling is at or below the minimum initial approach altitude. In other words, instrument approaches consist of operations that are using electronic navigational aids to reach the airport during poor weather conditions as opposed to aircraft that are flying practice instrument approaches for flight training purposes during good weather conditions. The number of annual instrument approaches is used as the basis for determining an airport eligibility for certain types of electronic navigation aids

Accurate historical instrument approach data can be difficult to determine. Two sources of data were consulted for Easterwood Airport. The first source was the FAA's Air Traffic Activity Data System (ATADS). The second source was the FAA's Terminal Area Forecast. Since the FAA lists ATADS as the official source of historical air traffic operations for center, airport, instrument and approach counts, the data derived from the ATADS web site was used.

Table 3.13 presents historical instrument approaches for 1994 through 2003. The data indicates that the number of historical instrument approaches has varied significantly from year to year. In fact, the variations are so significant that the completeness and accuracy of the data is questionable.

Table 3.13 Historical Annual Instrument Approaches					
Year	**Air Carrier**	**Air Taxi**	**General Aviation**	**Military**	**Total**
1994	1	65	54	30	150
1995	5	47	54	19	125
1996	9	135	166	90	400
1997	82	94	195	35	406
1998	16	169	270	147	602
1999	9	67	90	24	190
2000	0	13	12	0	25
2001	5	386	551	304	1,246
2002	4	365	531	134	1,034
2003	4	324	545	197	1,070

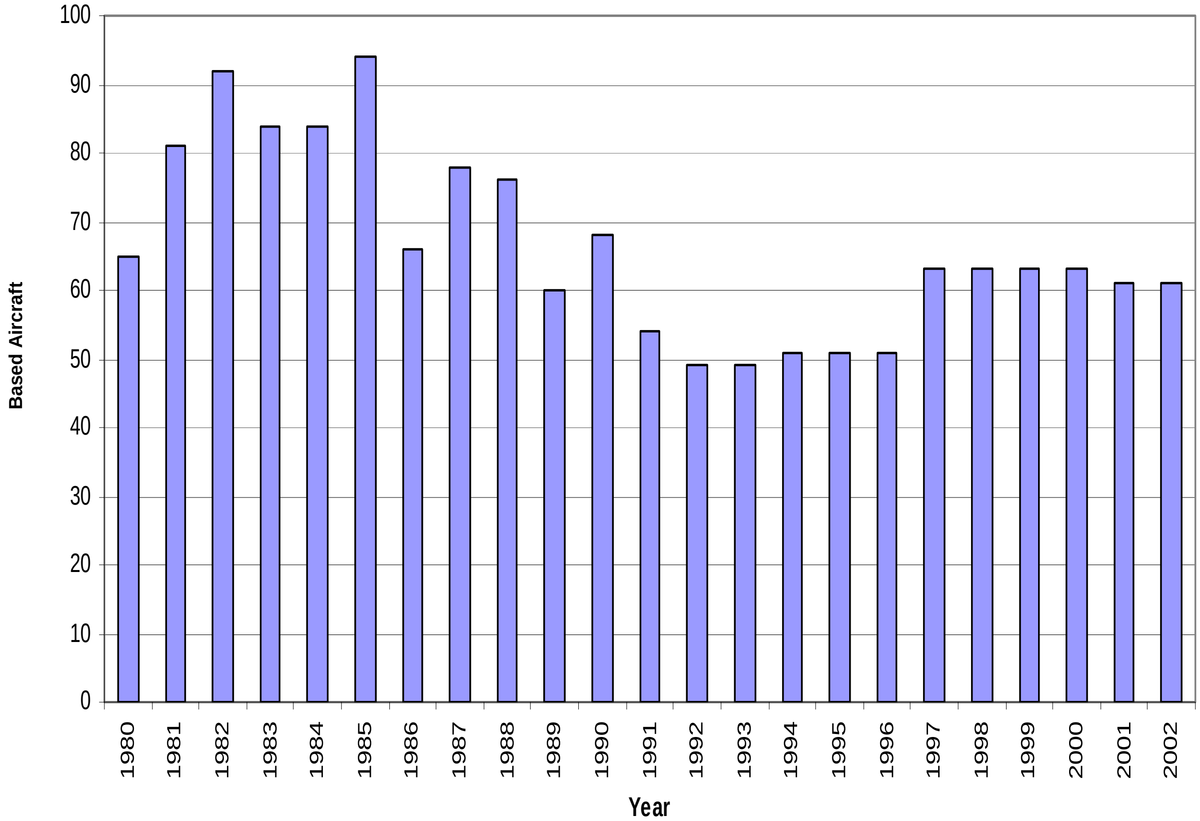
Source: FAA, Office of Aviation Policy and Plans, Air Traffic Activity Data System. Compiled by URS, 2003.

3.5.12 BASED AIRCRAFT

Table 3.14 and **Figure 3-7** present historical based aircraft levels at Easterwood Airport from 1980 through 2002. As indicated, the number of based aircraft varies from year to year, from a high of 92 aircraft in 1982 to a low of 49 aircraft in 1992 and 1993.

Table 3.14 Historical Based Aircraft		
Year	**Number of Aircraft**	**Percent Change**
1980	65	-
1981	81	25%
1982	92	14%
1983	84	-9%
1984	84	0%
1985	94	12%
1986	66	-30%
1987	78	18%
1988	76	-3%
1989	60	-21%
1990	68	13%
1991	54	-21%
1992	49	-9%
1993	49	0%
1994	51	4%
1995	51	0%
1996	51	0%
1997	63	24%
1998	63	0%
1999	63	0%
2000	63	0%
2001	61	-3%
2002	61	0%

Source: FAA TAF 2002 Scenario, March 2003.



Easterwood Airport
Master Plan Update

HISTORICAL BASED AIRCRAFT (1980-2002)

FIGURE
3-7

3.6 AVIATION FORECASTS

This section presents forecasts of passenger enplanements, aircraft operations, and based aircraft. Forecasts from other studies and independent sources are also presented to provide a point of reference from which to compare the updated forecasts.

3.6.1 FORECASTING METHODOLOGIES

Methodologies commonly used for forecasting include regression analysis, trend analysis, and market share analysis. All of these methodologies are based on the premise that historical trends or relationships can be used to predict future levels of activity. A description of each methodology is provided as follows:

- **Regression Analysis:** This method projects aviation activity (the dependent variable) on the basis of one or more economic indicators such as population, per capita income, employment, gross national product, or other socioeconomic factors (the independent variables). Historical values for both the dependent and independent variables are tested using a correlation analyses to determine whether a relationship exists. If a significant relationship is found, it can be used to forecast future aviation activity on the basis of the relationship continuing into the future and a forecast of the independent variable from other sources.

- **Trend Analysis:** This type of analysis is one of the simplest forecasting techniques. The method fits growth lines to historical data and extends them into the future. This methodology assumes that the same factors affecting aviation activity in the past will continue to do so in the future.

- **Market Share Analysis:** This analytical tool involves a review of the historical activity levels at the airport as a percentage share of a larger market. For instance, the number of based aircraft at the airport is compared to the total number of based aircraft in the region, state, or nation. This share factor is compared to forecasts of the larger areas to determine the likely future activity levels at the airport.

These three analytical techniques assume that previous relationships will continue to exist in the future. Consequently, these methods do not allow for the effects of more aggressive marketing, increased service levels, or other changes occurring independently of past relationships. To counter this weakness, the second phase of forecasting involves applying professional judgment. During this phase, decisions are made about the validity of forecasts resulting from the analytical analyses. Intangible factors are then considered when developing a preferred forecast.

3.6.2 PASSENGER ENPLANEMENTS

A forecast of passenger enplanements is needed to size a variety of facilities at the airport including access roadways, the passenger terminal, automobile parking, etc. The following paragraphs provide an overview of forecasts previously prepared for Easterwood Airport followed by updated forecasts.

3.6.2.1 Previous Forecasts of Passenger Enplanements

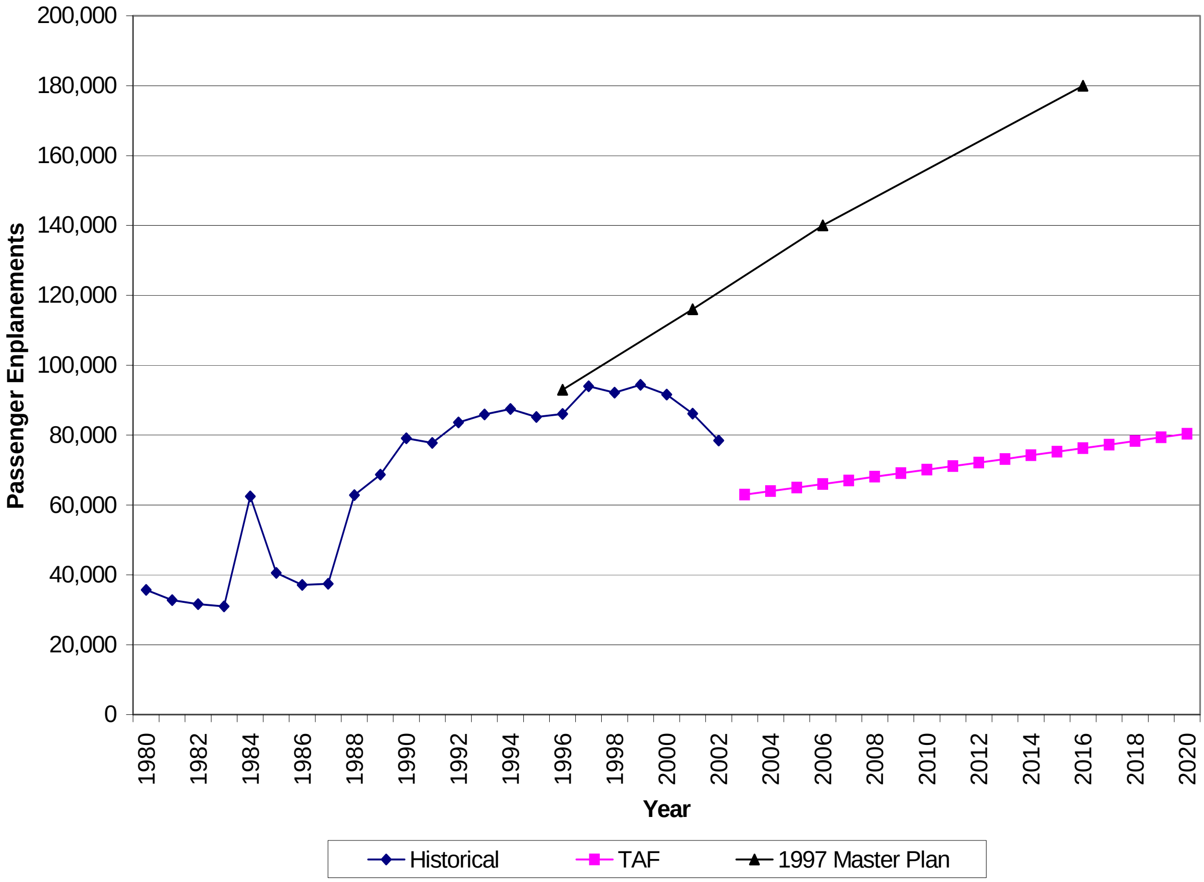
Previous forecasts of passenger enplanements at Easterwood Airport were obtained from two independent sources. These sources include the Terminal Area Forecast prepared by the FAA and the 1997 Easterwood Airport Master Plan Update prepared by Carter and Burgess. **Figure 3-8** presents these forecasts along with historical passenger enplanements at Easterwood Airport from 1980 through 2002.

- **FAA Terminal Area Forecast, 2002**: The FAA publishes a forecast referred to as the Terminal Area Forecast (TAF) that contains activity projections through 2020 for all airports include in the National Plan of Integrated Airport Systems. The most recent TAF was released in March 2003. That forecast did not account for events such as the war in Iraq and current restructuring in the airline industry. Consequently, the FAA issued a draft TAF in the fall of 2003 that projects sharply lower future passenger levels at Easterwood Airport as a result of lower passenger levels experienced during the first three quarters of 2003. The draft TAF for Easterwood Airport projects that annual passenger enplanements will grow to only 80,000 in 2020. This represents an average annual growth rate of approximately 0.4 percent.

- **1997 Easterwood Airport Master Plan Update**: The 1997 Easterwood Airport Master Plan Update provided a forecast of passenger enplanements through 2016. A comparison of this forecast to the TAF is presented in **Figure 3-8.** As the figure indicates, there is a wide disparity between the two forecasts. The 1997 master plan update forecast projected that annual passenger enplanements would reach 180,000 by the year 2016. Overall, the forecast estimated that passenger enplanements would grow at an average annual growth rate of 3.4 percent.

3.6.2.2 Updated Forecasts of Passenger Enplanements

Three forecasts of passenger enplanements were prepared using traditional statistical techniques. These forecasts consist of a market share forecast based on Easterwood Airport maintaining a constant share of enplaned passengers in the United States, as well as trendlines based upon the last five years and last ten years of historical passenger enplanements.



Easterwood Airport Master Plan Update	COMPARISON OF PREVIOUS PASSENGER ENPLANEMENTS FORECASTS	FIGURE 3-8

Other statistical techniques such as regression analysis were not used because an examination of the historical relationship between passenger enplanements at Easterwood Airport and historical population and per capita income in the Bryan-College Station MSA reveals there was no relationship between these variables. A comparison of the three forecasts, along with the draft TAF, is shown in **Table 3.15** and **Figure 3-9**.

Table 3.15
Passenger Enplanement Forecasts

Year	Draft TAF	U.S. Market Share	10-Year Trend line	5-Year Trend line
2002	78,432	78,433	78,433	78,433
2007	67,034	94,513	88,804	68,369
2012	72,164	111,406	89,339	54,311
2017	77,294	129,329	89,874	40,252
2022	N/A	148,936	90,409	26,194
Average Annual Compound Growth Rate				
2002-22	0.4%	3.26%	0.71%	-5.34%

Sources: FAA TAF 2002 Scenario, March 2003, FY.
Easterwood Airport Records.

As the table indicates, there is significant disparity between the results of the four forecasts. The five-year trendline forecast shows a continuing decrease of passengers because passengers have been declining at the airport during the last five years. The ten-year trendline indicates very slow, nearly flat, growth, while the market share forecast shows a high growth rate. The FAA's draft TAF projects slow growth at an average annual growth rate of 0.4 percent.

3.6.2.3 Recommended Forecast of Passenger Enplanements

A few conclusions can be drawn from reviewing the forecasts produced for passenger enplanements. First, traditional statistical techniques such as trendline and market share have become significantly less useful in recent years due to the rapid change being experienced in the industry. Relationships that once existed are now less stable and hence, less useful, for forecasting passenger enplanements. In light of this fact, it is deemed appropriate to consider the economic and industry trends described in Section 3.4, as well as other local issues, to arrive at a forecast that is based upon judgment rather than a particular statistical technique.

Section 3.4 discussed several significant economic and industry trends that will affect future passenger levels at Easterwood Airport. Several of these factors have the potential to adversely affect future enplanements at Easterwood Airport. In light of these factors and FAA review, it was concluded that a conservative forecast would be the most appropriate for passenger enplanements at Easterwood Airport.

The FAA requested that the draft Terminal Area Forecast be selected as the preferred forecast. This forecast predicts an average annual growth rate of 0.4 percent. This growth rate is significantly less than the 3.5 percent growth rate forecasted for national enplanements by the FAA.

3.6.3 AIRCRAFT OPERATIONS

This section addresses forecasts of aircraft operations. These forecasts will be used in subsequent sections of the master plan to assess airfield capacity and determine requirements for aprons, hangars, fueling facilities, and other facilities that serve aircraft.

3.6.3.1 Previous Forecasts of Aircraft Operations

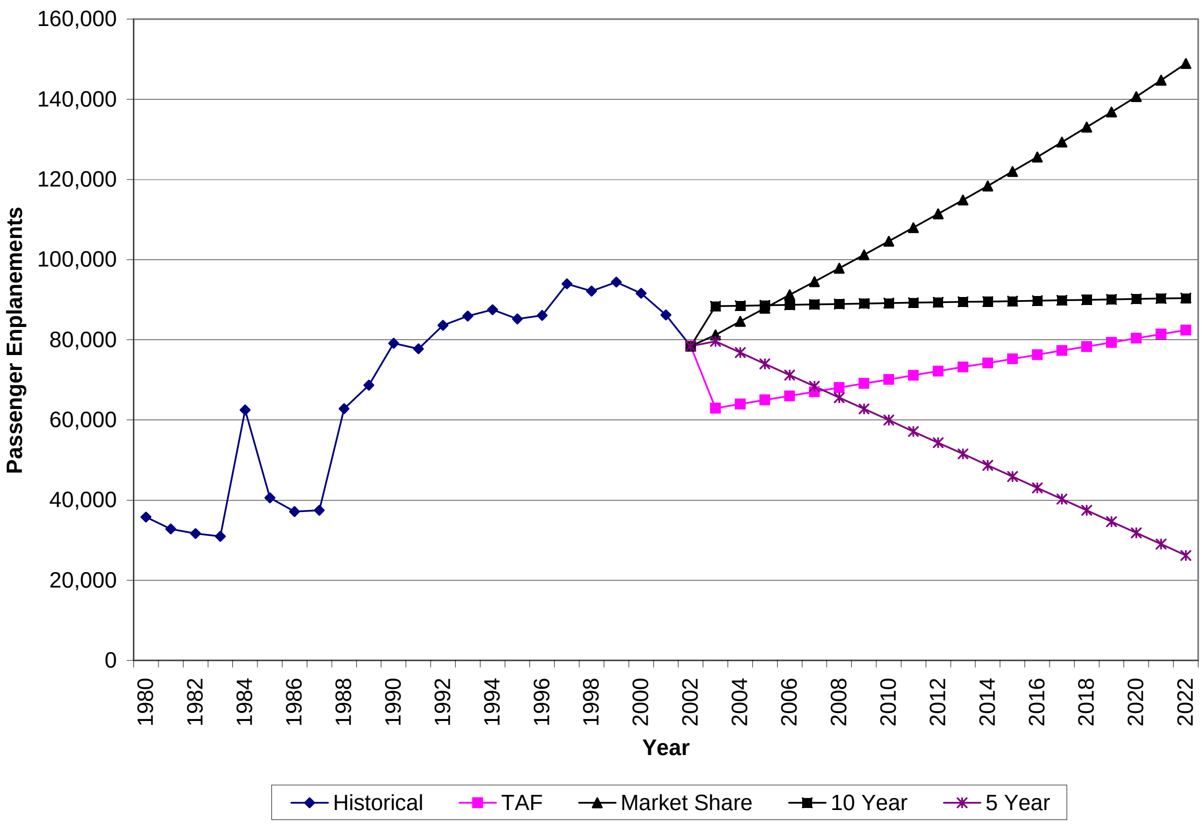
As was done for passenger enplanements, independent forecasts of aircraft operations were obtained and reviewed. These forecasts are described below:

- **FAA Terminal Area Forecast**: The TAF projects that aircraft operations at Easterwood Airport will increase to approximately 82,000 in 2020 from their current level of approximately 72,000 operations in 2002. The average annual growth rate associated with this forecast is 1 percent.

- **1997 Easterwood Airport Master Plan Update**: The 1997 Easterwood Airport Master Plan Update provided a forecast of aircraft operations through 2016. This forecast projected that aircraft operations will increase to approximately 126,000 by 2016. The average annual growth rate associated with this forecast is 3.2 percent. A comparison of this forecast to the TAF is presented in **Figure 3-10**. As the figure indicates, the master plan update forecast is significantly more aggressive than the TAF.

3.6.3.2 Updated Forecast of Airline Operations

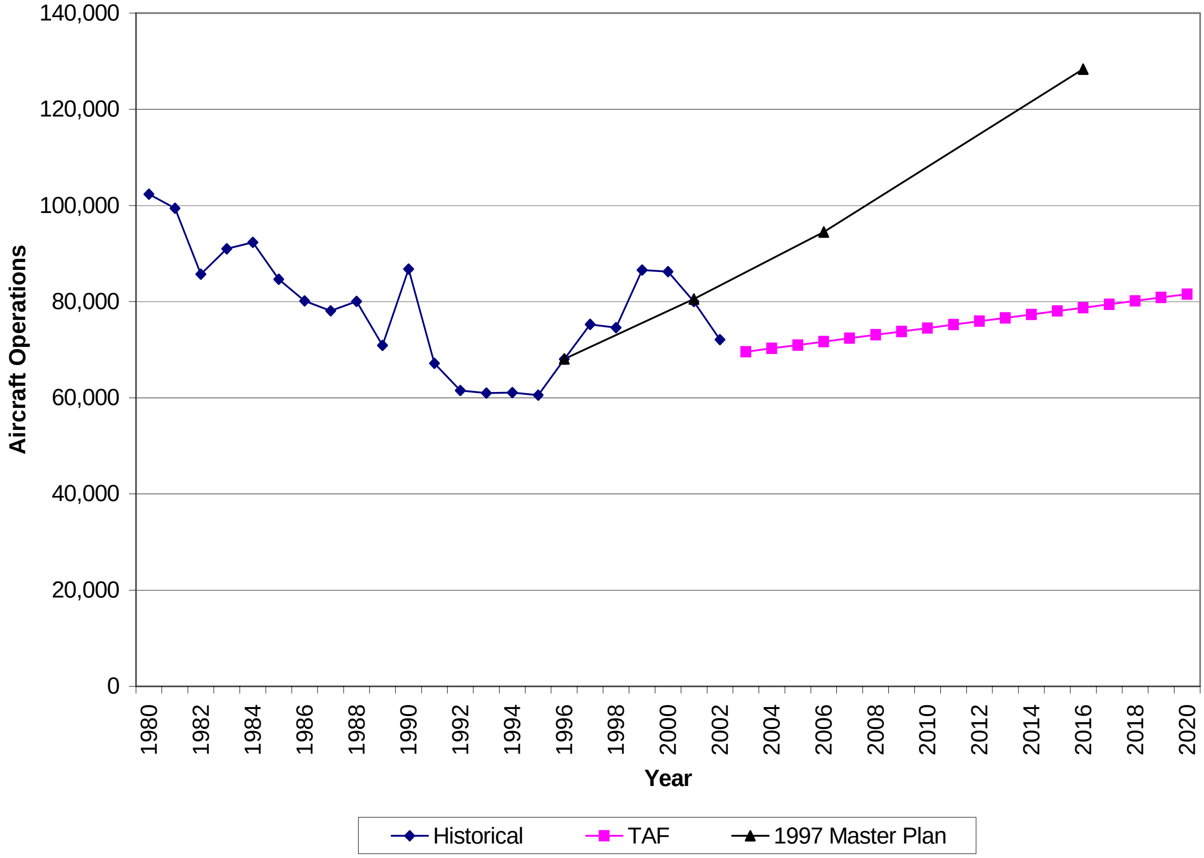
The number of aircraft operations conducted by scheduled airlines at Easterwood Airport is a function of the forecasted number of passengers, the average number of seats per aircraft operation, and the average load factor (i.e., the percentage of seats filled with passengers). An analysis of load factors at Easterwood Airport for 2000, 2001, and 2002 revealed that load factors were very stable from year to year and averaged 54 percent. Load factors for these years were determined by dividing the number of enplaned passengers for each of the three years by the number of scheduled seats for the same period. This methodology contains a small amount of error because it does not account for cancelled flights. However, it is the best measure of load factor that can be readily obtained.



Easterwood Airport Master Plan Update

PASSENGER ENPLANEMENT FORECASTS

FIGURE 3-9



Easterwood Airport Master Plan Update	**PREVIOUS FORECASTS OF AIRCRAFT OPERATIONS**	**FIGURE** **3-10**

The average number of seats per departure was calculated by dividing scheduled seats by scheduled departures during 2000, 2001, and 2002. The results of these calculations indicated that the average seats per departure was 33 in 2000, 35 in 2001, and 38 in 2002. Using these figures and the average load factor as a starting point, a forecast of airline departures was prepared. The resulting forecast is presented in **Table 3.16**. This forecast assumes that the average load factor for all airlines at the airport will remain essentially constant at 54 percent. The forecast also assumes that the number of seats per departure will gradually increase as regional jets with slightly higher seating capacities replace turboprop aircraft. The number of seats per departure is projected to gradually increase from 38 to 44 over the twenty-year duration of the forecast.

Table 3.16
Forecast of Passenger Airline Operations

Year	Enplaned Passengers	Average Seats Per Departure	Load Factor	Average Passengers Per Departure	Estimated Airline Departures	Estimated Airline Operations
2000[1]	91,628	33	54.4%	18	5,123	10,246
2001[1]	86,162	35	54.9%	19	4,520	9,040
2002[1]	78,432	38	53.4%	20	3,875	7,750
2007	67,034	39	54.0%	21	3,183	6,366
2012	72,164	40	54.0%	22	3,341	6,682
2017	77,294	42	54.0%	23	3,408	6,816
2022	82,424	44	54.0%	24	3,469	6,938

Sources: [1] Easterwood Airport Records and Official Airline Guide.
Forecast prepared by URS, 2003.

In addition to operations by scheduled airlines at Easterwood Airport, there are charter and unscheduled operations by air carrier aircraft. Charter operations consist primarily of flights associated with Texas A&M athletics, while unscheduled operations are primarily weather-related diversions of flights scheduled at Houston. A review of historical air carrier operations, previously shown in **Table 3.11**, reveals that air carrier operations have fluctuated from year to year but have been in the range of 100 to 200 annually. To account for operations by air carrier aircraft in the forecast, a value of 200 annual operations has been included in future years.

3.6.3.3 Updated Forecasts of General Aviation

General aviation operations consist of arrivals and departures by aircraft not classified as commercial or military. Forecasts of general aviation operations will be used in subsequent sections to develop estimates of runway capacity and to determine the requirements for various general aviation facilities.

Table 3.17 and **Figures 3-11** and **3-12** present itinerant and local general aviation operations forecasts using typical statistical techniques along with the FAA's TAF. The statistical forecasts consist of a market share of general aviation operations to national levels, and a five-, ten-, and twenty-year trendline for both itinerant and local operational levels.

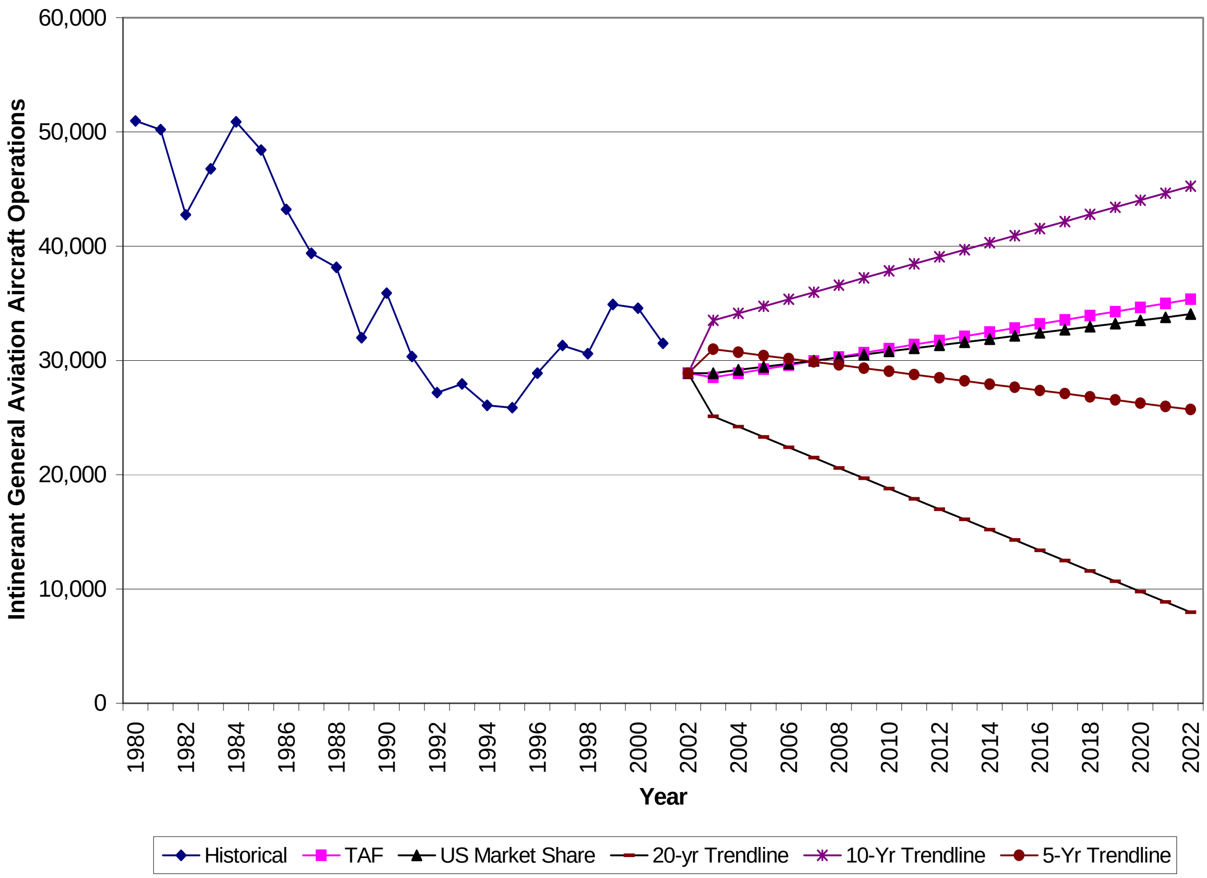
Table 3.17
Itinerant General Aviation Aircraft Operations Forecasts

Year	TAF	U.S. Market Share	20-Year Trend Line	10-Year Trend Line	5-Year Trend Line
2002	28,900	28,900	28,900	28,900	28,900
2007	29,956	29,981	21,501	35,983	29,881
2012	31,755	31,334	16,991	39,075	28,490
2017	33,555	32,688	12,481	42,166	27,098
2022	35,354	34,059	7,971	45,258	25,707
Average Annual Compound Growth Rate					
2002-22	1.0%	0.8%	-6.2%	2.2%	-0.5%
Local General Aviation Aircraft Operations Forecasts					
Year	**TAF**	**U.S. Market Share**	**20-Year Trend Line**	**10-Year Trend Line**	**5-Year Trend Line**
2002	17,130	17,130	17,130	17,130	17,130
2007	19,222	17,645	13,829	29,251	14,899
2012	20,667	18,289	11,699	35,217	10,717
2017	22,112	18,933	9,570	41,184	6,534
2022	23,557	19,583	7,440	47,150	2,352
Average Annual Compound Growth Rate					
2002-22	1.6%	0.6%	-4.0%	5.1%	-9.4%

Sources: FAA TAF, 2002 Scenario, March 2003, FY.
Easterwood Airport Records.

As the table and figures indicate, the statistical forecasts result in widely disparate results that appear to have little validity. A more sensible approach may be to examine the factors currently affecting the general aviation segment and apply some judgment regarding how these factors may influence future activity levels. A review of the historical levels of local and itinerant operations reveals two general trends. The first trend is one of declining operations through the early 1990's. The second trend is one of stabilization then a general growth trend that lasted until 2000. In 2001 and 2002, activity levels again began to decline in concert with declining economic conditions during that period. The broader decline that extended from 1980 through the early 1990's can be traced to cost of ownership and cost of operation issues along with a decline in the production of general aviation aircraft. The growth trend that began in the early 1990 may be due to local flight training as well as favorable economic conditions.

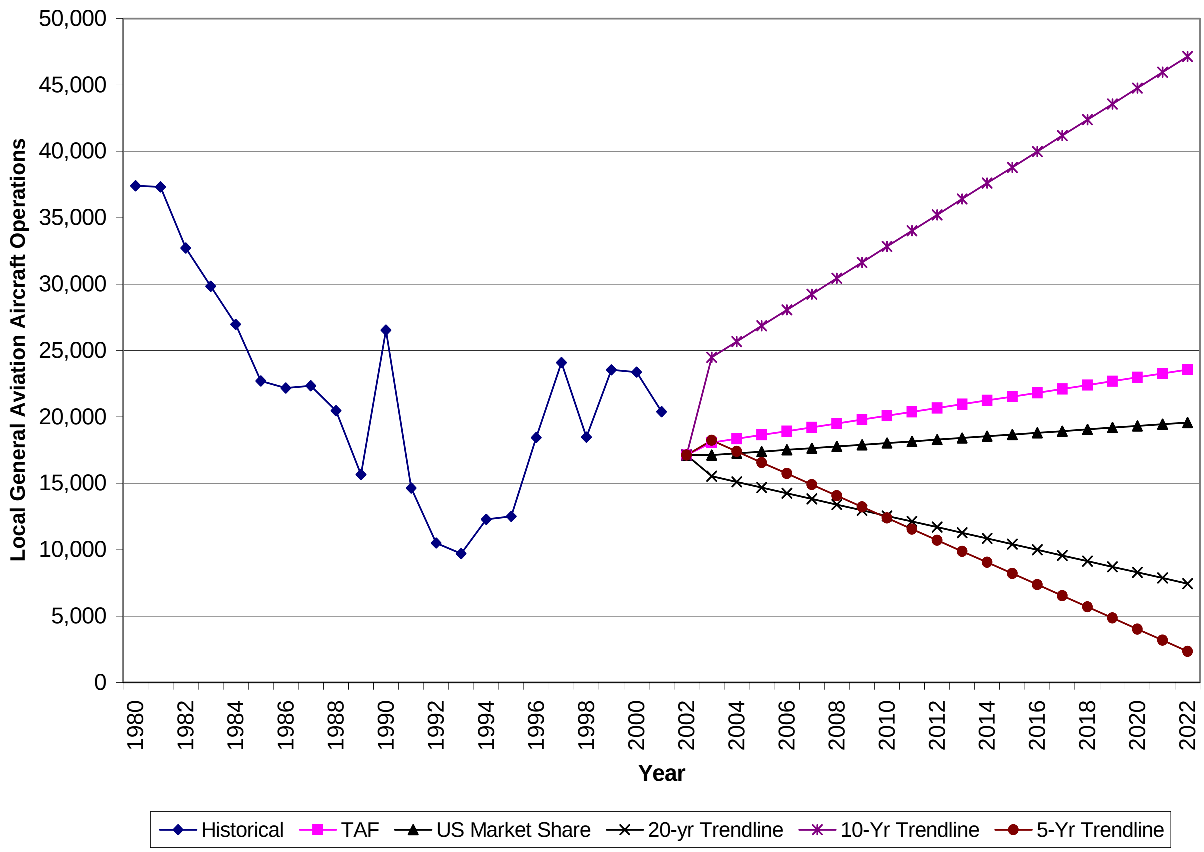
The potential for general aviation operations to increase in future years will be dependent upon the operating decisions of specific businesses at the airport as well as development decisions of the airport. It has been noted that there are not currently additional hangars available for the storage of small general aviation aircraft. Construction of additional hangars, if financially viable, would be an impetus for future growth of general aviation operations at the airport.



Easterwood Airport Master Plan Update

FORECASTS OF ITINERANT GENERAL AVIATION OPERATIONS

FIGURE 3-11



Easterwood Airport Master Plan Update	**FORECASTS OF LOCAL GENERAL AVIATION OPERATIONS**	**FIGURE** **3-12**

In light of the uncertainties surrounding the general aviation sector, it is deemed appropriate to use the FAA's TAF for estimating future levels of general aviation operations. The TAF predicts that itinerant and local operations will increase at 1.2 percent annually through 2020. This growth rate was applied to operations in 2020 in order to extend the forecast through 2022, as shown in **Table 3.17**.

3.6.3.4 Updated Forecast of Military Operations

The number of operations conducted by military aircraft usually depends upon the training requirements of the units using the airport. Consequently, the level of operations varies from year to year with little predictability. It is for that reason that the FAA usually projects military operations at an airport to remain flat or near the most recent historical level throughout the forecasting period. This is also the recommended method to project military aircraft operations at Easterwood Airport. The recommended level of military aircraft operations at Easterwood Airport, throughout the forecast period, is 10,000 itinerant and 8,000 local operations.

3.6.3.5 Forecast of Total Operations

The resulting forecast for total aircraft operations including scheduled passenger airlines, general aviation, and military is presented in **Table 3.18** and **Figure 3-13**.

Table 3.18
Total Forecast of Aircraft Operations

Year	Itinerant Aircraft Operations					Local Aircraft Operations			TOTAL
	Air Carrier	Commuter	General Aviation	Military	Total	General Aviation	Military	Total	
2002	93	6,330	28,900	10,675	45,998	17,130	8,998	26,128	72,126
2007	200	6,366	29,956	10,000	46,522	19,222	8,000	27,222	73,744
2012	200	6,682	31,755	10,000	48,637	20,667	8,000	28,667	77,304
2017	200	6,816	33,555	10,000	50,571	22,112	8,000	30,112	80,683
2022	200	6,938	35,354	10,000	52,492	23,557	8,000	31,557	84,049

Source: URS, 2003.

3.6.3.6 Forecast of Instrument Operations

As noted in Section 3.5.10, historical annual instrument operations at Easterwood Airport have been fairly consistent in recent years at around 22,000 and have averaged 27 percent of total operations. Therefore, future instrument operations at Easterwood Airport are estimated to equal 27 percent of total operations. This results in the forecast shown in **Table 3.19**.

Table 3.19 Forecast of Annual Instrument Operations			
Year	**Total Operations**	**Percentage Used for Forecast**	**Instrument Operations**
2002 (Actual)	72,126	NA	20,375
2007	73,744	27%	19,910
2012	77,304	27%	20,872
2017	80,683	27%	21,784
2022	84,049	27%	22,693

Source: URS, 2003.

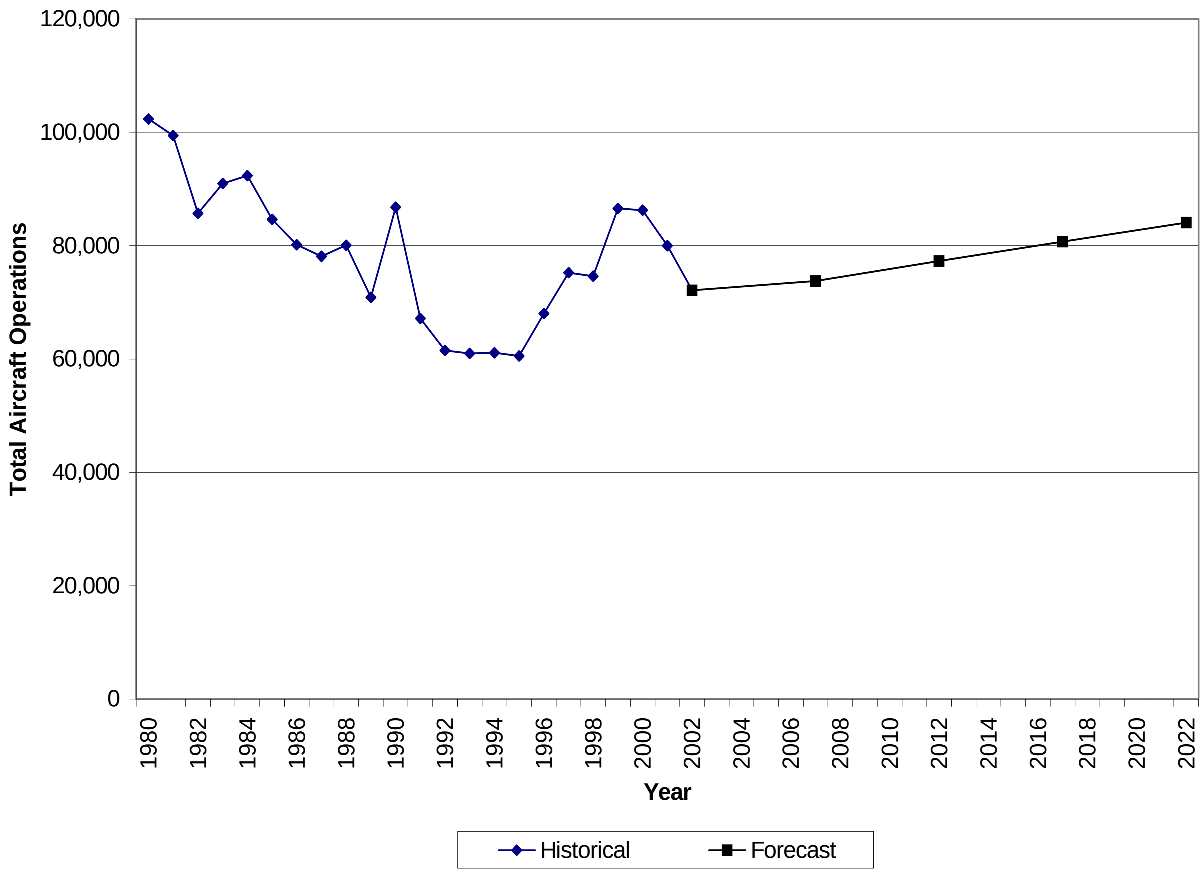
3.6.3.7 Forecast of Instrument Approaches

Historical data on instrument approaches was presented in Section 3.5.11. As was noted in that section, the historical data is inconsistent and no reliable trend could be established. Review of the FAA's Teminal Area Forecast reveals that the FAA projects approximately 1,000 annual instrument approaches throughout the forecast period. This represents approximately 5 percent of annual instrument operations at the airport. Meteorological data presented in Section 2.4.2 indicates that Easterwood Airport operates under IFR conditions approximately 8 percent of the time. Therefore, it is reasonable to expect that instrument approaches would account for between 5 and 8 percent of annual instrument operations.

Using these percentages as the likely low and high boundaries of future instrument approaches, a forecast was generated and is presented in **Table 3.20**. Overall it is projected that annual instrument approaches will be between one and two thousand throughout the forecast period.

Table 3.20 Forecast of Annual Instrument Approaches (AIA)			
Year	**Forecast of Instrument Operations**	**Low-Range AIA Forecast (5 Percent)**	**High-Range AIA Forecast (8 Percent)**
2002 (Actual)	20,375	1,019	1,630
2007	19,910	995	1,592
2012	20,872	1,043	1,669
2017	21,784	1,089	1,742
2022	22,693	1,134	1,815

Source: URS, 2003.



Easterwood Airport Master Plan Update	**FORECAST OF TOTAL AIRCRAFT OPERATIONS**	**FIGURE 3-13**

3.6.4 FORECAST OF BASED AIRCRAFT

Historical levels of general aviation aircraft based at Easterwood Airport were previously presented in **Table 3.14** and **Figure 3-7**. The data indicated that the number of based aircraft fluctuated in the 1980's, but has been relatively stable in recent years. As of 2002, 61aircraft were recorded at the airport.

The FAA's Aerospace Forecast projects the number of active aircraft across the United States. The projection contained in the 2003 forecast estimates that the active fleet of general aviation aircraft will increase at 0.7 annually through the year 2014. However, this growth rate is a composite for the fleet as a whole. Certain types of aircraft and certain parts of the country will experience different rates of growth or even decline as older aircraft are retired.

The FAA forecast notes that growth rates for different categories of aircraft will diverge significantly. In the case of single-engine aircraft, an annual growth of only 0.2 percent is projected. Multi-engine piston aircraft are projected to decline at a rate of 0.2 percent annually. On the other hand, growth of high performance aircraft is expected to be more substantial. The turboprop fleet is projected to grow at an annual rate of 1.5 percent, while the jet fleet is projected to grow at an annual rate of 3.6 percent. The higher growth rate associated with the higher performance aircraft reflects that fact that these aircraft are benefiting from growth of corporate flight departments and fractional ownership programs.

Fractional ownership allows an individual, or corporation, to purchase the right to a certain number of flight hours annually on an aircraft. This allows an individual or corporation the ability to use high performance aircraft at a fraction of the cost associated with purchasing, operating, and maintaining an aircraft. Fractional ownership has become extremely popular with corporations and wealthy individuals that are seeking the benefits of on-demand, point-to-point air service without the traditional costs associated with aircraft ownership.

The FAA forecast also notes that there are a variety of factors affecting the state of general aviation aircraft. A significant factor was the passage of the General Aviation Revitalization Act of 1994. That legislation, passed by the U.S. Congress, limited liability on general aviation aircraft to 18 years. The legislation was judged to be a success since the production of general aviation aircraft has increased since the Act became law. However, the general aviation industry continues to struggle with cost of ownership and cost of operation issues. Specific issues are the price of fuel, price of insurance, and the price and availability of aircraft storage.

Potential sources of additional based aircraft at Easterwood Airport are new businesses or individuals. The likelihood of these events occurring is related to larger economic issues and business decisions. Thus, they cannot be predicted with a high degree of accuracy. Another factor to consider is that the majority of aircraft located at Easterwood Airport are single-engine and multi-engine piston aircraft that are not projected to experience the level of growth that higher performance aircraft are expected to experience. In light of these factors, a conservative forecast of based aircraft is recommended.

The FAA TAF provides a forecast of based aircraft that is based upon an annual growth rate of 0.5 percent. This rate was extended out to the year 2022 to produce a forecast of based aircraft at Easterwood Airport. This forecast is presented in **Table 3.21** along with a breakdown of fleet mix. Historically, the fleet mix of based aircraft at Easterwood Airport has consisted of approximately 73 percent single-engine piston aircraft, 22 percent multi-engine piston aircraft, 2 percent jet and turbojet aircraft, and 3 percent helicopters. This fleet mix has been maintained throughout the forecast period.

Table 3.21
Forecast Based Aircraft

Year	Single Engine Piston	Jet/Turbo Jet	Multi-Engine Piston	Helicopter	Total
2002	46	1	13	1	61
2007	47	1	13	1	62
2012	48	1	13	1	63
2017	50	1	13	1	65
2022	51	1	14	1	67

Source: FAA TAF 2002 Scenario, March 2003, FY.

3.7 FORECAST PEAKING CHARACTERISTICS

Information concerning the peaking characteristics of passenger enplanements and aircraft operations is required to determine the demand for various airport facilities. This information will be used in the demand/capacity analysis presented in the next section. The following definitions were observed in determining and presenting peaking information:

- Peak Month – The month when the greatest number of passenger enplanements or aircraft operations occur.
- Average Day, Peak Month (ADPM) – The average day during the peak month (i.e., the monthly value divided by 30 days).
- Peak Hour – The peak hour during the average day of the peak month.

3.7.1 PEAKING OF PASSENGERS

Forecasts of peak hour enplanements are used to determine the future demand for facilities primarily used by departing passengers, such as ticket counters and departure lounges. The forecast of peak hour deplanements will be used to assess the demand for facilities used by arriving passengers, such as baggage claim facilities. Likewise, the forecasts of total peak hour passengers will be used to determine the future demand for facilities used by passengers arriving and departing at the same time. These facilities include all general circulation areas, rest rooms, concessions, rental car counters, and terminal curb.

A review of the historical passenger levels at Easterwood Airport revealed the monthly distribution of enplanements and deplanements is essentially the same. Therefore, for the purpose of this study, it will be assumed peak month enplanements and peak month deplanement percentages will be the same.

From 1998 to 2002, the peak month for passenger enplanements has averaged 9.8 percent of annual enplanements. Therefore, a factor of 10 percent was applied for estimated future peak month passengers. An assessment of peak hour passengers was conducted by examining a typical weekday flight schedule during the months of January and April of 2003. The assessment revealed that the peak hour accounted for 20 to 25 percent of daily seats on departing aircraft. The higher value of 25 percent was used to project future peak hour enplanements. A forecast of peak hour passenger enplanements was developed using these peaking factors and is shown in **Table 3.22**.

Table 3.22
Peaking Forecasts - Passenger Enplanements

Year	Annual Passenger Enplanements	Peak Month Passenger Enplanements (10 Percent)	Average Day Peak Month Enplanements (30 Days)	Peak Hour Enplanements (25 Percent)
2002	78,432	7,843	261	65
2007	67,034	6,703	223	56
2012	72,164	7,216	241	60
2017	77,294	7,729	258	64
2022	82,424	8,242	275	69

Source: URS, 2003.

3.7.2 PEAKING OF AIRCRAFT OPERATIONS

An analysis of aircraft operations at Easterwood Airport from 1998 through 2002 revealed that the peak month typically accounts for 10 percent of annual operations. The analysis also revealed that the peak month did not consistently occur in the same month from year to year. With respect to hourly peaking, air traffic control tower logs for the month of June 2002 (the peak month) were obtained and analyzed to determine the peak hour. The results of the analysis indicated that the peak hour averaged 17 percent of daily operations during the month. However, peak hours that comprised as much as 29 percent of daily operations were observed. Hourly counts of aircraft operations as high as 66 were noted with several peak hours having more than 50 operations. Thus, a higher peak hour average of 22 percent was used for the analysis. A forecast of peak hour aircraft operations was developed using these peaking factors and is shown in **Table 3.23**.

Table 3.23 Peaking Forecasts - Aircraft Operations				
Year	**Annual Aircraft Operations**	**Peak Month Aircraft Operations (10 Percent)**	**Average Day Peak Month Operations (30 Days)**	**Peak Hour Operations (22 Percent)**
2002	72,126	7,213	240	53
2007	73,744	7,374	246	54
2012	77,304	7,730	258	57
2017	80,683	8,068	269	59
2022	84,049	8,405	280	62

Source: URS, 2003.

3.8 SUMMARY OF FORECASTS

A summary of the forecasts contained in this section is presented in **Table 3.24**.

Table 3.24 Forecast Summary					
Forecast Element	**Year**				
	2002	**2007**	**2012**	**2017**	**2022**
Passenger Enplanements					
Total	78,432	67,034	72,164	77,294	82,424
Peaking Characteristics					
Peak Month	7,843	6,703	7,216	7,729	8,242
Average Day, Peak Month	261	223	241	258	275
Peak Hour, Average Day	65	56	60	64	69
Aircraft Operations					
Itinerant					
Air Carrier	93	200	200	200	200
Commercial	6,330	6,366	9,003	9,195	9,373
General Aviation	28,900	29,956	31,755	33,555	35,354
Military	10,675	10,000	10,000	10,000	10,000
Local					
General Aviation	17,130	19,222	20,667	22,112	23,557
Military	8,998	8,000	8,000	8,000	8,000
Total	72,126	73,744	77,304	80,683	84,049
Peaking Characteristics					
Peak Month	7,213	7,374	7,730	8,068	8,405
Average Day, Peak Month	240	246	258	269	280
Peak Hour, Average Day	53	54	57	59	62
Based Aircraft					
Single Engine Piston	46	47	48	50	51
Multi-Engine Piston	13	13	13	13	14
Jet/Turbo Jet	1	1	1	1	1
Helicopter	1	1	1	1	1
Total	61	62	63	65	67

Source: URS, 2003.

SECTION 4 DEMAND/CAPACITY ANALYSIS AND FACILITY REQUIREMENTS

4.1 INTRODUCTION

Forecasts of aviation demand are presented in the previous section through the year 2022. The forecasts include projections of annual passenger enplanements, aircraft operations, based aircraft, aircraft fleet mix, and peaking characteristics for both passenger enplanements and aircraft operations. Using this information, the capacities of specific components of the airport system such as: the airfield, surrounding airspace, terminal facilities, general aviation facilities and ground access, are evaluated to determine if they are able to accommodate forecasted levels of demand without incurring significant delays or an unacceptable decrease in service levels. If deficiencies are identified, a determination of the approximate size and timing of new facilities is made.

The requirements for any new facilities needed to accommodate projected demand in a safe and efficient manner are also presented in this section. Section 5 examines alternative methods of providing the required facilities identified in this section.

4.2 AIRFIELD

4.2.1 DEMAND/CAPACITY ANALYSIS

The methods used for analyzing airfield capacity are described in FAA Advisory Circular 150/5060-5, entitled "Airport Capacity and Delay." The methodology describes how to measure an airfield's hourly capacity and its annual capacity, which is referred to as annual service volume.

Hourly capacity is defined as the maximum number of aircraft operations that can be accommodated by the airfield system in one hour. It is used to assess the airfield's ability to accommodate peak hour operations.

Annual Service Volume (ASV) is defined as a reasonable estimate of an airport's annual capacity. As the number of annual operations increases and approaches the airport's ASV, the average delay incurred by each operation increases. When annual operations are equal to the ASV, average delay to each operation is approximately one to four minutes depending upon the mix of aircraft using the airport. When the number of annual operations exceeds the ASV, moderate to severe congestion will occur. ASV is used to assess the adequacy of the airfield design, including the number and orientation of runways.

A calculation of the airfield's hourly capacity and annual service volume depends upon a number of factors including the following:

- Meteorological Conditions - The percentage of time visibility or cloud cover are below certain minimums.
- Aircraft Mix - The percentage of operations conducted by different categories of aircraft.
- Runway Use - The percentage of time each runway is used.
- Percent Touch-and-Go - The percent of touch and go operations in relation to total aircraft operations.
- Percent Arrivals - The percent of arrivals in relation to departures during peak hours.
- Exit Taxiway Locations - The number and locations of exit taxiways for landing aircraft.

4.2.1.1 Meteorological Conditions

Meteorological conditions have a significant effect upon runway use, which, in turn, affects an airfield's capacity. During Visual Meteorological Conditions (VMC), runway use is usually determined by the direction of the prevailing winds. During Instrument Meteorological Conditions (IMC), runway use is dictated by the type and availability of instrument approach procedures.

Illustrations of predominant wind conditions during VMC, IMC, and all-weather conditions were previously presented in Section 2 – Airport Inventory. These data, and consultation with air traffic control personnel, indicated Runway 16 is the most commonly used runway end during VMC conditions, while Runway 34 is the most commonly used runway during IMC conditions. It is estimated the airport operates under VMC conditions 90.2 percent of the time, IMC conditions 8.1 percent of the time, and 1.7 percent of the time the weather is below the airport’s operating minimums.

4.2.1.2 Aircraft Mix

Variations in aircraft approach speeds and landing distances affect runway occupancy times, which, in turn, affect airfield capacity. **Table 4.1** summarizes representative aircraft types found in each aircraft classification. Based on historical activity, it is estimated that Class C aircraft comprised approximately 23 percent of the operations, and the remaining operations were conducted by Class A and Class B aircraft. With no regular activity by Class D aircraft, the Mix Index was also calculated at 23 percent, determined by the following equation:

Mix Index = (Class C Operations + (3 * Class D Operations)) / Total Operations

A composite mix index was calculated using the mix index under VMC and IMC and multiplying these indices by the percentage of time VMC and IMC occur at the airport, resulting in a composite mix index of 24 percent. A mix index of 23 percent is used for all the analysis presented herein. The percentage of operations conducted by each class is expected to remain fairly constant throughout the planning period.

Table 4.1
Typical Aircraft Mix

Class	Aircraft Type	
Class A:	Small Single-Engine (Gross Weight 12,500 pounds or less)	
	Cessna 172/182	Mooney 201
Examples:	Beech, Bonanza	Piper Cherokee/Warrior
Class B:	Small, Twin-Engine (Gross weight 12,500 pounds or less)	
	Beech Baron	Mitsubishi MU-2
	Cessna 402	Piper Navajo
	Rockwell Shrike	Cessna Citation I
Examples:	Beechcraft 99	Beech King Air
Class C:	Large Aircraft (Gross Weight 12,500 pounds to 300,000 pounds)	
	Douglas DC-9	Beech 1900
	Boeing 727	Saab 340
	Boeing 737	Aerospatiale ATR 42/72
	Dash-8	Embraer 135/145
Examples:	CRJ-200	Embraer Brasilia
Class D:	Large Aircraft (Gross Weight more than 300,000 pounds)	
	Boeing 767	Airbus A-300/A-310
Examples:	Boeing 777	Douglas DC-8-60/70

Source: URS, 2003.

4.2.1.3 Runway Use

As described in Section 2 - Airport Inventory, the airport has three runways: Runway 16-34, Runway 10-28, and Runway 4-22. Runway 16-34 is the primary runway, while Runways 10-28 and 4-22 are secondary runways. Consultation with air traffic control personnel indicated Runway 16-34 is used approximately 85 percent of the time due to prevailing wind conditions. Runway 10-28 is used 10 percent of the time and Runway 4-22 is used the remaining 5 percent of the time. Utilization of specific runway ends is provided in **Table 4.2**.

Table 4.2
Runway End Utilization

Runway End	Utilization (%)
16	70
34	15
10	5
28	5
4	2
22	3

Source: Easterwood Airport ATC, 2003.

4.2.1.4 Touch-and-Go Operations

A touch-and-go operation occurs when an aircraft lands and takes off without making a full stop. This is usually done for the purpose of practicing landings. Touch-and-go operations do not occupy the runway as long as a full-stop landing or a departure. Therefore, an airfield with a high number of touch-and-go operations can normally accommodate a greater number of operations. Based on a review of air traffic control counts for local operations, touch-and-go activity at Easterwood Airport is estimated to equal approximately 33 percent of total operations.

4.2.1.5 Percentage Arrivals

The number of arrivals as a percentage of total aircraft operations has an important influence on a runway's hourly capacity. For example, a runway used exclusively for arrivals will have a different capacity than a runway used exclusively for departures or a runway used for a mixture of arrivals and departures. In general, the higher the percentage of arrivals, the lower the hourly capacity of a runway. This is because arrivals usually have a longer runway occupancy time than departures. Arrivals were assumed to comprise 50 percent of peak hour operations at Easterwood Airport.

4.2.1.6 Exit Taxiway Locations

Exit taxiways affect airfield capacity because their location along a runway influences runway occupancy times for aircraft. The longer an aircraft remains on a runway, the lower the capacity of the runway. When exit taxiways are properly located, landing aircraft can quickly exit the runway, thereby increasing the runway's capacity.

Runway 16-34 has two exit taxiways on the east side of the runway, in addition to the exit taxiways available at each end of the runway. These exit taxiways are located approximately 2,400 feet and 5,126 feet from the Runway 16 end or 1,875 feet and 4,601 feet from the Runway 34 end. According to FAA criteria, taxiway exits for a runway serving an aircraft mix between 21 and 50 percent (Section 4.2.1.2 noted that the aircraft mix at Easterwood Airport is 23 percent) should be in the range of 3,000 to 5,500 feet from the runway’s threshold for maximum effectiveness at reducing runway occupancy time. Runway 16/34 has only one exit taxiway that is within this range.

Runway 10-28 also has an exit taxiway at each runway end and two additional exit taxiways. The exit taxiways for Runway 10-28 are located approximately 2,600 feet and 4,470 feet from the Runway 10 end, or 690 feet and 2,560 feet from the Runway 28 end. Runway 4-22 also has two exit taxiways in addition to those located at each runway end. These are located approximately 3,149 feet and 3,674 feet from the Runway 4 end or 1,475 feet and 2,000 feet from the Runway 22 end.

4.2.2 CAPACITY ANALYSIS RESULTS

The capacity of the airfield was calculated on both an hourly and annual basis using the methodologies specified in FAA Advisory Circular 150/5060-5. The results of these analyses are presented in the following paragraphs.

4.2.2.1 Hourly Capacity

Hourly capacity values were determined using the following equation:

Hourly capacity of the runway component = C * T * E

C is the base capacity number derived from the hourly airfield capacity graphs contained in the FAA Advisory Circular. These graphs are shown in **Figures 4-1 and 4-2**. The base capacity number is 84 for VMC and 58 for IMC. **T** is the touch and go factor. The touch and go factor is also derived from the capacity graphs using the information presented in Section 4.2.1.4. The T factor is 1.28 for VMC and 1 for IMC. **E** is the exit factor. It is derived from the capacity graphs using the information presented in Section 4.2.1.6. The exit factor is 0.92 for VMC and 0.99 for IMC.

Using the data presented in the preceding sections and the graphs in **Figures 4-1 and 4-2**, it was determined the airfield's hourly capacity during VMC, assuming 50 percent arrivals, is 99 operations (84 * 1.28 * 0.92). It should be noted that this number is highly influenced by the touch-and-go factor of 1.28. If touch-and-go's were not occurring at the airport, the airfield's hourly capacity would be 77 operations (84 * 0.92). Thus, the higher value of 99 operations should be used with some caution. The airfield's hourly capacity during IMC, also assuming 50 percent arrivals, is 57 operations (58 * 1.0 * 0.99). As indicated in **Table 4.3**, the unconstrained forecast of peak hour operations will not exceed 99, or 77, during the planning period. According to hourly operational counts provided by the airport for June 2002, a one-time hourly peak level of 66 operations occurred, although the remaining peak hourly operations never exceeded 55 operations.

Table 4.3
Hourly Airfield Capacity

Year	VMC Hourly Capacity	IMC Hourly Capacity	Unconstrained Forecast Peak Hour Operations
2002	99	57	53
2007	99	57	57
2012	99	57	60
2017	99	57	62
2022	99	57	65

Source: URS, 2003.

Although the airfield's hourly capacity during IMC is less than the forecasted peak hour operations, this is not a constraint because peak hour operations would be lower during IMC. Consequently, hourly capacity of the airfield will be adequate to accommodate projected demand during the study period.

4.2.2.2 Annual Capacity

An airfield's ASV is calculated by determining the following three items:

- The weighted hourly capacity: C,
- The daily demand ratio: D, and
- The hourly demand ratio: H.

The weighted hourly capacity is calculated via a formula considering the hourly capacity values during VMC and IMC as well as the percentage of time each weather condition occurs. The weighted hourly capacity of Easterwood Airport was calculated to be 77 operations (the details of this calculation are presented in Appendix B).

The daily demand ratio is calculated by dividing the annual number of aircraft operations by the average daily operations during the peak month. This calculation (72,126 / 240) results in a daily demand factor of 300 for Easterwood Airport. This value falls within the range of 300 to 320 listed in the FAA advisory circular as being typical daily demand factors for an airport with a mix index between 21 and 50. As presented in Section 4.2.1.2, Easterwood Airport has a mix index of approximately 23 percent.

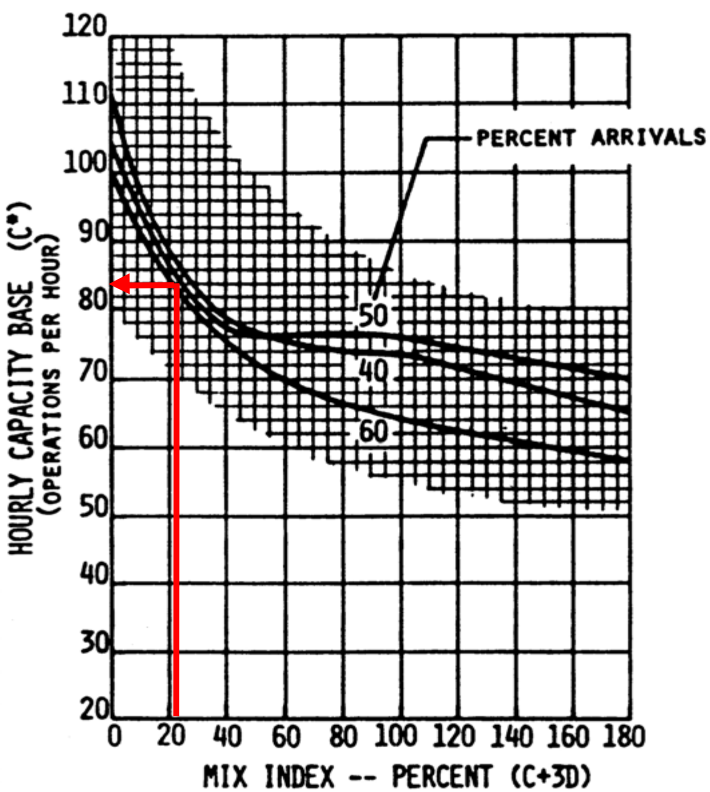
The hourly demand ratio is calculated by dividing the average daily operations during the peak month by the average peak hour operations during the peak month. This calculation (240 / 53) results in a daily demand factor of approximately 5 for Easterwood Airport. This ratio is much lower than the range of 10 to 13 listed in the FAA advisory circular as being typical hourly demand ratios for an airport with a mix index between 21 and 50. The reason that this ratio is significantly lower at Easterwood Airport is because Easterwood Airport has a very high peak hour that accounts for approximately 22 percent of average daily operations during the peak month.

Using the values derived, the ASV for Easterwood Airport is presented in the following equation:

$$\text{ASV} = \text{C (66)} * \text{D (300)} * \text{H (5)} = 99{,}000 \text{ operations}$$

The result of the equation is an unrealistically low ASV for a multi-runway airfield. According to the FAA *Advisory Circular 150/5060-5, Airport Capacity and Delay*, a typical ASV range for multi-runway airfield is approximately 200,000 to 265,000. If a more realistic H value of 10-13 were used in the equation, an ASV in the range of 198,000 to 257,000 is derived.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

Percent Touch & Go	Mix Index--Percent (C+3D)	TOUCH & GO FACTOR T
0	0 to 180	1.00
1 to 10	0 to 70	1.03
11 to 20	0 to 70	1.10
21 to 30	0 to 40	1.17
31 to 40	0 to 10	1.28
41 to 50	0 to 10	1.36

C* x T x E = Hourly Capacity

EXIT FACTOR E

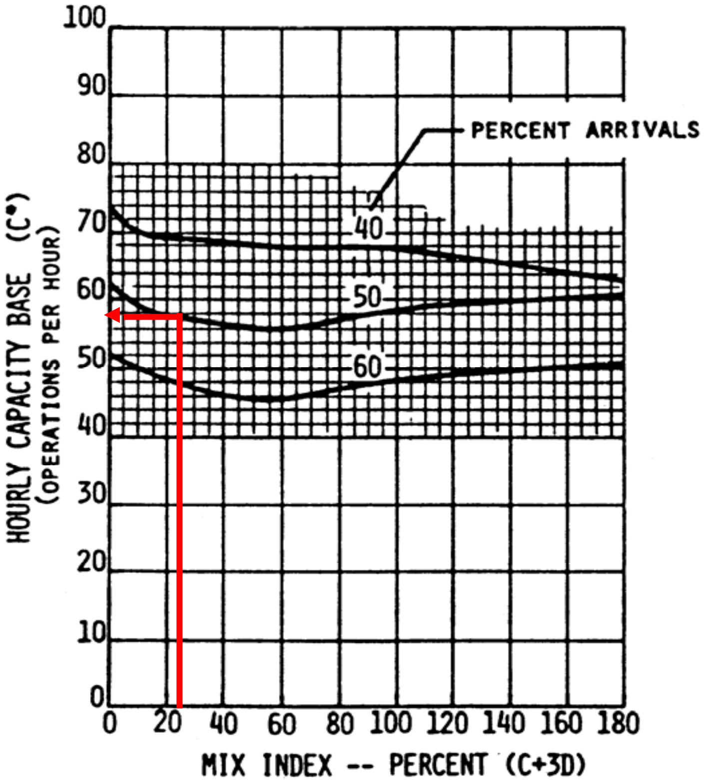
To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits (N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index--Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.81	0.88	0.95	0.78	0.86	0.94	0.74	0.85	0.93
21 to 50	3000 to 5500	0.91	0.92	0.97	0.87	0.92	0.99	0.75	0.87	0.98
51 to 80	3500 to 6500	0.94	0.96	1.00	0.77	0.89	0.97	0.72	0.82	0.91
81 to 120	5000 to 7000	0.96	0.97	1.00	0.81	0.88	0.93	0.80	0.87	0.92
121 to 180	5500 to 7500	0.99	1.00	1.00	0.84	0.94	0.97	0.85	0.94	0.97

FIGURE 3-28. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 44,50 FOR VFR CONDITIONS.

HOURLY CAPACITY BASE C*



TOUCH & GO FACTOR T

T = 1.00

C* x T x E = Hourly Capacity

EXIT FACTOR E

To determine Exit Factor E:

1. Determine exit range for appropriate mix index from table below
2. For arrival runways, determine the average number of exits(N) which are: (a) within appropriate exit range, and (b) separated by at least 750 feet
3. If N is 4 or more, Exit Factor = 1.00
4. If N is less than 4, determine Exit Factor from table below for appropriate mix index and percent arrivals

Mix Index--Percent (C+3D)	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.98	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00
21 to 50	3000 to 5500	0.92	0.99	1.00	0.91	0.99	1.00	0.92	1.00	1.00
51 to 80	3500 to 6500	0.91	0.98	1.00	0.90	0.97	1.00	0.92	0.99	1.00
81 to 120	5000 to 7000	0.94	0.98	1.00	0.91	0.97	1.00	0.91	0.97	1.00
121 to 180	5500 to 7500	0.95	1.00	1.00	0.92	0.99	1.00	0.91	0.99	1.00

FIGURE 3-50. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 44,50,56 FOR IFR CONDITIONS.

An ASV of 230,000 is a reasonable estimate for an intersecting multi-runway system such as exists at Easterwood Airport. Therefore, that value will be used in this demand/capacity analysis. This value is also consistent with the value derived in the previous master plan update.

As shown in **Table 4.4**, the airport's projected ASV exceeds the projected annual aircraft operations throughout the study period by a wide margin. Therefore, it can be concluded that the existing airfield has adequate capacity to accommodate projected annual aircraft operations.

Table 4.4
Comparison of ASV and Annual Demand

Year	Forecasted Aircraft Operations	Estimated ASV	Forecasted Operations as a Percentage of ASV
2002	72,126	230,000	31 %
2007	78,121	230,000	34 %
2012	81,795	230,000	35 %
2017	85,224	230,000	37 %
2022	88,663	230,000	38 %

Source: FAA Advisory Circular 150/5060-5, Airport Capacity and Delay.
URS 2003.

4.2.2.3 Delay Analysis

Delay is defined as the difference between constrained and unconstrained operating time, or as the difference between the actual time required for an aircraft to perform an operation, either an arrival or a departure, and the time required for the same operation, assuming no interaction with other aircraft. On the basis of visual observations and consultation with air traffic control personnel, very little delay occurs at Easterwood Airport. However, an analysis of aircraft delay was performed using FAA Airport Design software. The analysis indicated that operational delay at Easterwood Airport is approximately 6 to 18 seconds per operation at current activity levels, and is expected to increase to approximately 12 to 24 seconds per operation with activity levels predicted for 2022. These levels of delay are insignificant and indicate that aircraft delay will not be a problem throughout the study period.

4.2.3 FACILITY REQUIREMENTS

4.2.3.1 Design Criteria

To properly and consistently plan future facilities, design criteria must be identified and applied. Airport design criteria are specified by the airport reference code that consists of two components. The first component is the aircraft approach category. This component is related to the approach speed of aircraft and provides information on the operational capabilities of aircraft using the airport. The second component is the airplane design group. This component is related to the wingspan of the aircraft and provides information regarding the physical characteristics of aircraft using the airport. **Table 4.5** provides a listing of the approach categories and design groups.

Table 4.5 Airport Design Criteria	
Aircraft Approach Category	
Category	**Approach Speed**
A	Less the 91 Knots
B	91 to 120 Knots
C	121 to 140 Knots
D	141 to 165 Knots
E	166 Knots or Greater
Airplane Design Group	
Group	**Wing Span**
I	Up to 48 Feet
II	49 to 78 Feet
III	79 to 117 Feet
IV	118 to 170 Feet
V	171 to 213 Feet
VI	214 Feet or Greater

Source: FAA Advisory Circular 150/5300-13, *Airport Design*, September 29,1989.

Aircraft Approach Category

A review of aircraft presently using, and forecasted to use, Easterwood Airport reveals the aircraft in approach category C (i.e., approach speed of 121 knots or more but less than 141 knots) regularly use the airport. This includes the Embraer EMB-135 and EMB-145 and certain business jets, as well as aircraft that are typically used for charter operations at the airport such as the 727, 737 and the 757. Therefore, approach category C will be used to plan future airfield facilities associated with Runways 16-34 and 10-28. Runway 4-22 is strictly for visual flight rule (VFR) operations of general aviation aircraft. Therefore, approach category B will be used for any future airfield planning associated with this runway.

Airplane Design Group

Although larger air carrier aircraft, such as the Boeing 737 and 757, use Easterwood Airport on an occasional basis, the Saab 340 is anticipated to be the largest aircraft in terms of wingspan to regularly use Easterwood Airport in the future.[1] This aircraft has a wingspan of approximately 70 feet, which places it within design group II (i.e., a wingspan of 49 feet up to but not including 79 feet).

Although the design criteria indicate Easterwood Airport should use design group II for planning purposes, it is the policy of Texas A&M to use design group III criteria to accommodate larger air carrier aircraft that use the airport on a charter basis. Many of these aircraft operations support the University's nationally prominent intercollegiate athletic program. In addition,

[1] The FAA defines regular use as a minimum of 500 operations by a single type of aircraft.

Easterwood Airport accommodates numerous air carrier aircraft that are diverted from George Bush Intercontinental Airport in Houston due to poor weather. These aircraft also require facilities that are designed to group III standards. Therefore, future facilities associated with Runways 16-34 and 10-28 will be designed to meet group III standards. Future facilities associated with Runway 4-22 will be designed to meet design group II standards, because the runway is limited to smaller general aviation aircraft having wingspans of less than 79 feet.

Airport Reference Code

The airport reference code is determined by combining the aircraft approach category letter with the airplane design group number. Consequently, the airport reference code at Easterwood Airport for Runway 16-34 and Runway 10-28 is C-III, and for Runway 4-22 is B-II. This is consistent with the airport reference codes identified in the previous master plan update issued in 1997.

4.2.3.2 Runway Safety Areas

Runway safety areas (RSA) are defined by the FAA as "surfaces surrounding a runway that are prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway." Runway safety areas consist of a relatively flat graded area free of objects and vegetation that could damage aircraft. According to FAA guidance, the RSA should be capable, under dry conditions, of supporting aircraft rescue and fire fighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft.

Table 4.6 presents the FAA standards for the RSA dimensions at Easterwood Airport in comparison to their existing dimensions.

Table 4.6
Runway Safety Area Criteria

	FAA Standard		Existing Dimensions	
Runway	Length (Feet Beyond Runway End)	Width (Feet, Centered On Runway Centerline)	Length	Width
16	1,000	500	850-1,000	500
34	1,000	500	1,000	500
10	1000	500	1,000	500
28	1000	500	330	500
04	300	150	300	150
22	300	150	300	150

Source: FAA AC 150/5300-13
Easterwood Airport

The existing RSA for Runway 16-34 meets FAA standards except for a small area traversed by a perimeter road at its northeast corner. The perimeter road was constructed in 2003 and could not be located outside of the RSA due to grade limitations and right-of-way requirements for FM

2818. The location of the perimeter road relative to the Runway 16-34 RSA is depicted in **Figure 4-3**.

The existing RSA for Runway 10-28 meets FAA standards except for the portion beyond the approach end of Runway 28. The FAA standard is for the RSA to extend 1,000 feet beyond the runway. However, the existing RSA does not meet grade requirements due to a steep decline and is traversed by Nuclear Science Road as depicted in **Figure 4-3**. A survey of the RSA within the approach to Runway 28 was conducted in 2003 by KSA Engineers. The survey, depicted in **Figure 4-4**, reveals that the existing RSA meets FAA grade standard for approximately 330 feet beyond the runway end. Beyond that point, the grade drops off sharply until it meets Nuclear Science Road and then drops off again on the east side of the road.

As a result of recent grading work on the approach end of Runway 22 that was done in conjunction with the construction of the perimeter road, the RSA for Runway 4-22 meets FAA standards. Options for bringing the airport's RSA's into compliance with FAA standards will be addressed in Section 5 – Alternatives.

4.2.3.3 Runway Object Free Area

In addition to the RSA, an object free area (OFA) is also defined around runways in order to enhance the safety of aircraft operations. The FAA defines OFA's as an area cleared of all objects except those that are related to navigational aids and aircraft ground maneuvering. However, unlike the runway safety area, there is no physical component to the object free area. Thus, there is no requirement to support an aircraft or emergency response vehicles.

The OFA dimensions for runways serving aircraft in approach categories C-III (i.e., Runways 16-34 and 10-28) is a width of 800 feet and a length that extends 1,000 feet beyond the runway end. The OFA dimensions for runways serving aircraft in approach category B-II (i.e., Runway 4-22) is a width of 500 feet and a length that extends 300 feet beyond the runway end.

Review of **Figure 4-3** reveals that the OFA's associated with Runways 16-34 and 10-28 do not meet FAA standards, while the OFA associated with Runway 4-22 meets FAA standards. Trees along the south side of Runway 10-28 and within the approach to Runway 28 violate the clearance standards. Likewise, the perimeter road at the north end of Runway 16-34 and Nuclear Sciences Road at the south end of Runway 16-34 also violate the clearance standards. Options for bringing the OFA into conformance with FAA standards will be addressed in Section 5 – Alternatives.

4.2.3.4 Runway Separation Standards

Separation standards indicate the distance various facilities such as taxiways, aprons, and other operational areas must be located from runways. These standards ensure aircraft can safely operate on both areas simultaneously without fear of collision. These standards also ensure no part of an aircraft on a taxiway penetrates the runway safety area or obstacle free zone.

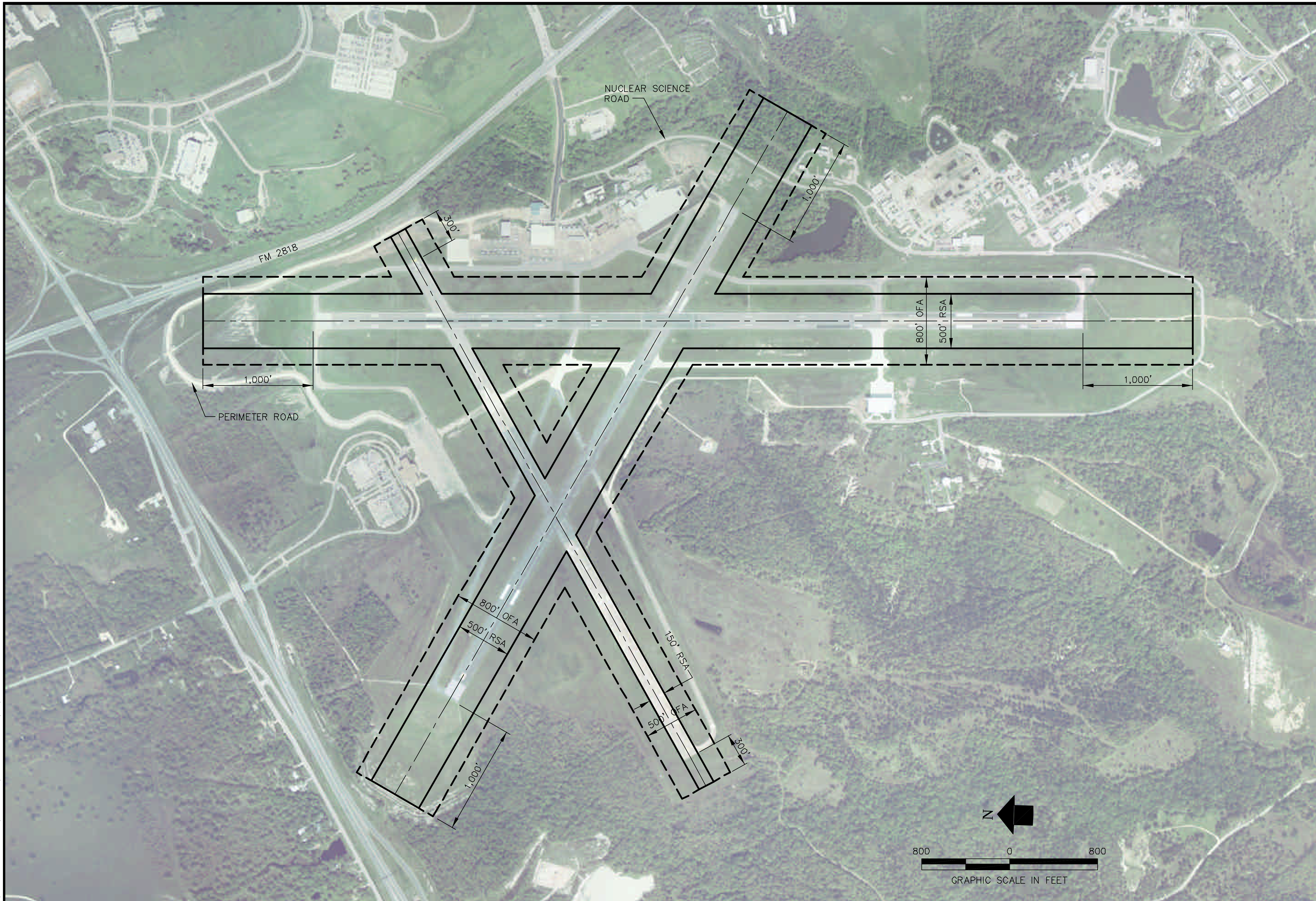
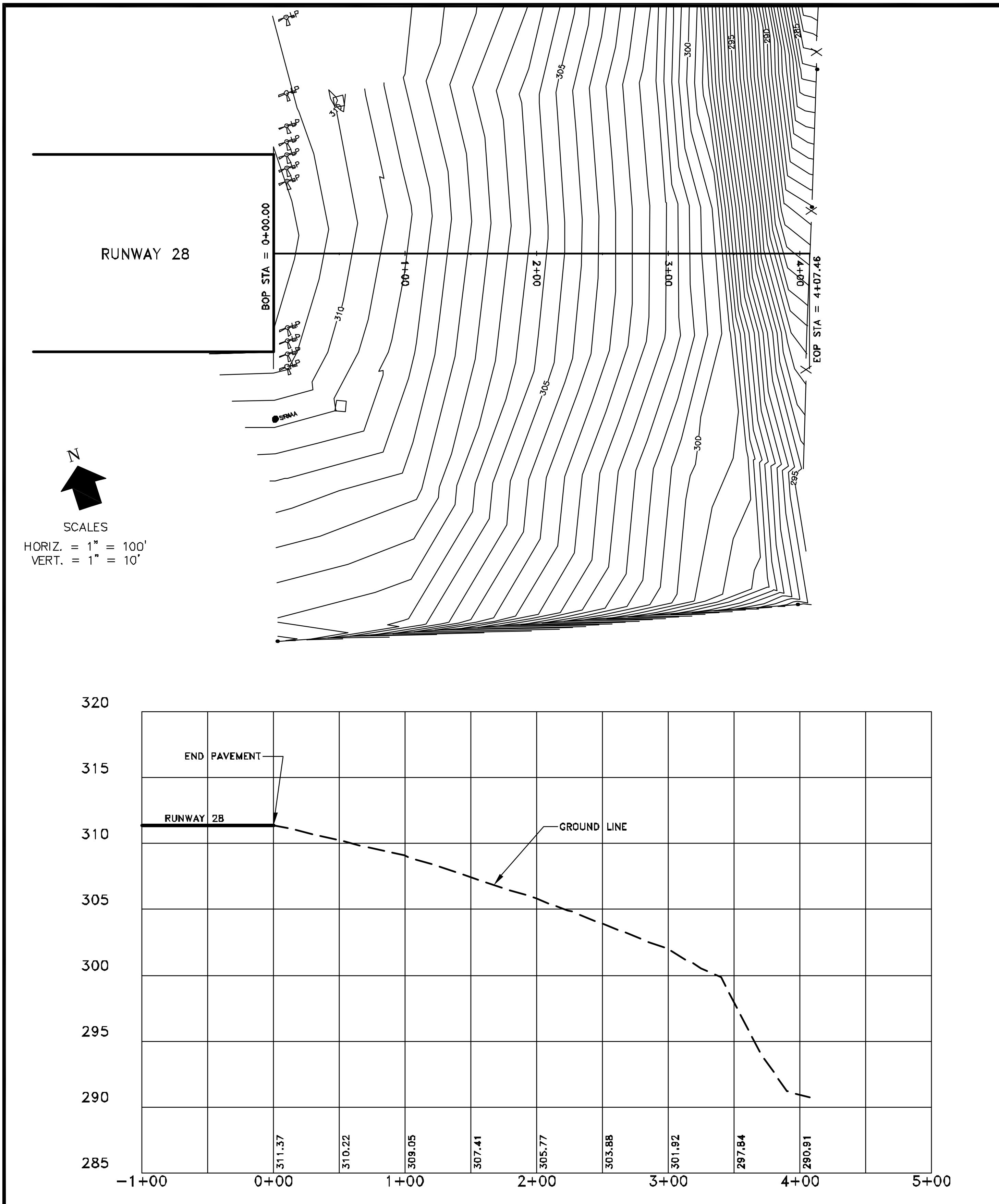


FIGURE 4-3

RUNWAY SAFETY AREA AND OBJECT FREE AREA STANDARDS

Easterwood Airport Master Plan Update

J:\COLLEGE STATION TX\INVENTORY\FIG 4-3.DWG 07/29/03 10:41



J:\COLLEGE STATION TX\INVENTORY\FIG 4-4.DWG 07/29/03 10:43

Easterwood Airport Master Plan Update	KSA ENGINEERS SURVEY OF RUNWAY 28 RSA	FIGURE 4-4

The runway centerline to taxiway centerline separation standard for a C-III runway (i.e., Runway 16-34 and Runway 10-28) is 400 feet. The runway centerline to taxiway centerline separation standard for a B-II visual runway (i.e., Runway 4-22) is 240 feet.

A review of the taxiway system reveals that there are a few locations that do not meet FAA standards. These locations include a portion of Taxiway B near the approach to Runway 10, a portion of Taxiway A near the approach to Runway 16, and a portion of Taxiway C between Runway 10-28 and Taxiway C-1. The separations of these portions of taxiways from the adjacent runway are all less than the FAA standard of 400 feet. Options for addressing these deficiencies will be addressed in Section 5 - Alternatives.

4.2.3.5 Number of Runways

The number of runways required at an airport depends upon factors such as wind coverage and capacity requirements. Wind coverage indicates the percentage of time the crosswind components are below an acceptable velocity. The FAA recommends an airport provide wind coverage of at least 95 percent. This means the runway is able to accommodate aircraft operations within their limits of crosswind performance 95 percent of the time. If an airport does not provide the recommended wind coverage, additional runways should be considered.

A review of wind coverage calculations previously presented in **Table 2.12** indicates the airfield's three-runway system provides 99 percent wind coverage using a 10.5-knot crosswind component during VMC, IMC, and all-weather conditions. Furthermore, Runway 16-34 used in conjunction with either Runway 10-28 or Runway 4-22 also provides in excess of 95 percent wind coverage using a 10.5-knot crosswind component during VMC, IMC, and all-weather conditions. Thus, on the basis of wind coverage, the existing airfield is adequate.

In addition to wind coverage, the required number of runways depends upon capacity requirements. The results of the demand/capacity analysis indicate the existing runway system will provide adequate airfield capacity on an hourly and annual basis throughout the study period. Therefore, based on both wind coverage and capacity requirements, the existing runway system will be adequate to serve the future needs of the airport.

4.2.3.6 Runway Length

Runway length requirements at Easterwood Airport were determined through a combination of methodologies including the following:

- FAA "Airport Design" computer program Version 4.2
- Use of Takeoff Runway Length Curves contained in the Airport Planning Manuals for the EMB-135 and EMB-145 regional jets and the Boeing 757
- Takeoff Performance Tables for the Boeing 757

The Airport Design program provides general guidance that is based upon a variety of aircraft, while the Takeoff Runway Length Curves and Takeoff Performance Tables provide more specific guidance for a particular type of aircraft. These methodologies and the results are described in the following paragraphs.

Airport Design Computer Program, Version 4.2

The FAA's Airport Design computer program considers the following items:

- Airport elevation
- Mean daily maximum temperature of the hottest month
- Maximum difference in runway centerline elevation
- Length of haul for airplanes of more than 60,000 pounds
- Pavement conditions (wet or dry)

Information relevant to Easterwood Airport for the above items was entered into the program. The results of the program are specified for aircraft of more than 60,000 pounds and aircraft of less than 60,000 pounds. The category of aircraft less than 60,000 pounds is further subdivided by size and approach speed.

Groups of aircraft are specified by using either 75 percent or 100 percent of the fleet. **Table 4.7** lists some of the aircraft types that comprise 75 percent and 100 percent of the fleet. Gross takeoff weight is specified by using either 60 percent or 90 percent of the useful load.

Table 4.7
Aircraft Fleet

Manufacturer	Model
Large aircraft less than 60,000 pounds that comprise 75 percent of the fleet include the following:	
Gates Lear Jet	Lear Jet (20, 30 & 50 series)
Rockwell International	Sabreliner (40, 60, 75, & 80 series)
Cessna	Citation (II & III)
Dassault Brequet	Falcon (10, 20, & 50 series)
British Aerospace	HS-125 (400, 600, &b 700 series)
Israel Aircraft Ind.	1124 Westwind
Large aircraft less than 60,000 pounds that comprise 100 percent of the fleet include the aircraft listed above and the following:	
Canadair	Challenger 601
Dassault Brequet	Falcon (900 series)
Grumman	Gulfstream (I-IV)
Lockhead	Jetstar

Source: URS, 2002.

The results of the runway length analysis using the Airport Design Program methodology are presented in **Table 4.8**. FAA criteria specify that the runway length requirements for an airport such as Easterwood Airport be determined using the "75 percent fleet at 60 percent useful load" unless a critical aircraft having a greater requirement can be identified. As the table indicates, a runway length of 5,500 feet is required. For aircraft greater than 60,000 pounds, the required runway length is 5,120 feet based on a haul length of 500 miles and 6,970 feet based upon a haul length of 1,500 miles. A haul length of 500 miles was selected because it is the minimum used by the program and is sufficient to reach Dallas, which is currently the farthest scheduled destination from Easterwood Airport. A haul length of 1,500 miles was selected because it is sufficient to reach nearly all destinations on the west and east coasts of the continental United States that are likely to be served by charter operations.

Table 4.8
Runway Length Analysis

Category	Recommended Runway Length (Feet)[1]
Aircraft of 60,000 Pounds or Less	
75% of these aircraft at:	
60% useful load	5,500
90% useful load	7,430
100% of these aircraft at:	
60% useful load	6,000
90% useful load	9,550
Aircraft more than 60,000 pounds[1]	
500 mile haul	5,120
1,500 mile haul	6,970

Source: FAA Advisory Circular 150/5325-4A.
[1] Assumes wet runway conditions.

Takeoff Runway Length Curves for EMB-135, EMB-145 Series Regional Jets

Continental Airlines previously operated the Embraer EMB-135, a 37-seat regional jet, and the EMB-145, a 50-seat regional jet, from Houston-George Bush Intercontinental Airport to Easterwood Airport. It was deemed appropriate to examine, in greater detail, the runway length requirements associated with these aircraft because they have more demanding runway length requirements than most turboprop aircraft operating at the airport and because they operated at the airport on daily basis.

Aircraft manufacturers' airport planning manuals are typically used to ascertain the required runway length for operation by air carrier aircraft and regional jets. These manuals contain simple-to-use runway length curves. URS also consulted with the flight operations department of Continental Express to determine typical takeoff weights for regional jets that operated between Easterwood Airport and Houston. These consultations indicated that typical takeoff weights were as follow:

- EMB-135 to Houston – 40,000 lbs.
- EMB-145 to Houston – 44,000 lbs.

Takeoff runway length curves for the EMB-135 and EMB-145 are shown in Appendix C – Runway Length Curves. These curves indicate takeoff runway length requirements at different takeoff weights, temperatures and airport altitudes. One drawback of the curves is that they do not provide data for all temperatures or all altitudes; therefore, some judgment is required when using these curves. To overcome this limitation, Continental Express was consulted to confirm the validity of the analysis results. FAA guidelines specify that runway length requirements should be calculated using the mean maximum temperature for the hottest month of the year. The mean maximum temperature for the hottest month at Easterwood Airport is approximately 96° Fahrenheit. The takeoff runway length curves provided in the airport planning manuals are only available for temperatures of 59°F and 86°F. Therefore, the curve for 86°F was used.

In addition, the curves are only produced for pre-established altitudes beginning at sea level and increasing at 2,000-foot increments. Since Easterwood Airport has an elevation of 320 feet, interpolation was used between the curve for sea level and the curve for 2,000 feet.

According to these curves, the required runway length for an EMB-135, is approximately 5,300 feet and the required runway length for the EMB-145 is approximately 5,800 feet. These values are only approximations due to the limitations inherent in the use of the curves. However, consultation with the flight operations department at Continental Express revealed that 6,500 feet is sufficient for operation by both types of aircraft and that the existing length of 7,000 feet provides desirable flexibility during hot day conditions. The conclusion of the analysis is that the existing primary runway length of 7,000 feet is capable of accommodating the operation of these aircraft to Houston without restrictions on passenger loads during typical operating conditions.

Takeoff Performance Tables for the Boeing 757

In addition to examining the runway length for regional jet operations, it was also deemed appropriate to conduct a cursory examination of the runway length requirements for the Boeing 757. The 757 has become the predominant aircraft for Texas A&M charters.

The analysis of runway length requirements for the 757 was conducted through a combination of methodologies and the use of certain assumptions regarding payload and weights. Data regarding aircraft weights and fuel load requirements were obtained from Boeing's airport planning manual for the 757 and the ATA Airline web site. Data regarding takeoff weight limitations was obtained from a takeoff performance table purchased from Aircraft Performance Group, Inc. (a vendor of aircraft performance data).

Takeoff performance tables do not directly indicate runway length requirements. They indicate takeoff and landing weight limitations for a specific aircraft operating on a specific runway at a specific airport given certain variables such as flap settings and temperature. The tables account for a large number of factors including airport elevation, obstructions within the approach and departure paths, runway gradients, runway length, etc.

The advantage of using these tables is that they provide the same level of information used by airlines for actual aircraft operations at an airport. The disadvantage of using these tables to determine runway length is that they are a cumbersome methodology. This is because each table is specific to a certain runway at a specific airport. Therefore, multiple tables may be required to determine the runway length required to operate an aircraft at a specific weight. In addition, operating weights become a key variable that must be known to conduct the analysis.

Since any 757 operations that occur at Easterwood Airport would be on a charter basis, the exact operating weight cannot be determined in advance. However, certain reasonable assumptions can be made. Consultation with airport staff revealed that ATA Airlines was the charter operator for the 2003 Texas A&M football season. Review of the ATA aircraft fleet indicates that they operate the 757-200 with RB211-535E4 engines. This aircraft has a maximum zero fuel weight of 184,000 pounds. Since the actual load of the charter operations at Easterwood Airport is not known, the analysis assumed the aircraft's maximum zero fuel weight of 184,000 pounds. Using the Payload / Range table from the 757 airport planning manual (see Appendix C) and assuming a trip range of 1,600 miles (sufficient to reach Seattle or Boston), a takeoff weight of approximately 224,000 pounds is derived. This weight was then used in the analysis.

FAA guidelines indicate that runway length requirements should be calculated using the mean maximum temperature for the hottest month. As previously indicated in Section 2.4.1, the hottest month at College Station, Texas is August with a temperature of 96° Fahrenheit. Using a takeoff performance table for the 757-200, shown in Appendix C, the takeoff weight limitation on Runway 16-34, using 20° flaps at a temperature of 95° Fahrenheit is 236,000 pounds on Runway 16 and 225,000 pounds on Runway 34. However, the climb limit weight for 20° flaps is 233,400 pounds shown in the first column. Thus, the actual weight limit for takeoff on Runway 16 is 233,400 pounds and the actual weight limit for takeoffs on Runway 34 is 225,000 pounds. Both of these limitations are greater than the likely takeoff weight of 224,000 pounds. Thus, the results of the analysis indicate that the existing runway length of 7,000 feet should be sufficient to accommodate charter operations with the 757-200 even with hot day conditions.

Conclusion

The results of these methodologies revealed the runway length requirements at Easterwood Airport shown in **Table 4.9**.

Table 4.9 Runway Length Analysis Results	
Methodology	**Runway Length Requirements (feet)**
Airport Design Computer Program	
Large Aircraft < 60,000 pounds[1]	5,500
Large Aircraft > 60,000 pounds[1]	6,970
Takeoff Runway Length Curves[2]	
EMB-135	5,300
EMB-145	5,800
Takeoff Performance Table	
757-200	7,000

[1] 75% of these aircraft at 60% useful load.

[2] Length is based on longest required of all available engines for aircraft type.

As previously noted, each of the methods has inherent limitations. However, of these methods, the takeoff runway length curves are based upon aircraft that operated at Easterwood Airport on a daily basis. Since these aircraft have the most demanding runway length requirements, the existing runway length of 7,000 feet is adequate for the majority of aircraft operations projected to occur at the airport.

4.2.3.7 Runway Width

Runway width requirements are determined by airplane design group standards. The FAA standard for runways serving aircraft in design group III is 100 feet. However, the FAA standard for runways serving aircraft in design group III that have maximum takeoff weights greater than 150,000 pounds (such as the Boeing 727 and the Boeing 757) is 150 feet. The FAA standard for visual runways serving aircraft in design group II is 75 feet. On the basis of these standards, Runway 16-34 should have a width of 150 feet, Runway 10-28 should have a width of 100 feet, and Runway 4-22 should have a width of 75 feet.

All runways at Easterwood Airport have a width of 150 feet. These widths meet or exceed FAA standards and are adequate to serve all aircraft projected to use Easterwood Airport on a regular basis throughout the study period. Although the widths of Runway 10-28 and Runway 4-22 exceed FAA standards, no reduction in width is recommended.

4.2.3.8 Runway Strength

Pavement strength requirements are related to three primary factors: 1) the weight of aircraft anticipated to use the airport, 2) the landing gear type and geometry, and 3) the volume of aircraft operations. According to the airport's FAA 5010 Form "Airport Master Record," Runway 4-22 and Runway 10-28 have pavement strengths of 27,000 pounds single-wheel loading and 50,000 pounds dual-wheel loading, and 87,000 pounds dual tandem loading. These strengths are sufficient to accommodate all existing and future aircraft projected to regularly operate on these runways. Runway 16-34 has pavement strengths of 70,000 pounds single-wheel loading, 90,000 pounds dual-wheel loading, and 150,000 pounds dual tandem loading. The issue of runway strength for Runway 16-34 was evaluated in the previous master plan update. The

1997 master plan recommended that the dual-wheel loading capability of Runway 16-34 be strengthened from 90,000 pounds to 150,000 pounds. This recommendation was primarily based upon the need to accommodate operations by the 727-200 on a charter basis.

It should be noted that the 727 is rapidly exiting the fleet of commercial passenger aircraft. The 737 and A320 have now become the predominant aircraft in the same seating range of the 727. Therefore, the need to increase the strength of Runway 16-34 should be evaluated in terms of the aircraft presently using the runway and projected to use the runway in the future. It is anticipated that the 737 and the 757 will be become the most common aircraft for charter operations at the airport in the future. The 737 has dual wheel landing gear similar to the 727, while the 757 has dual-tandem wheel landing gear.

The maximum takeoff weight for the 737 ranges from 135,000 pounds for the smaller derivatives to 175,000 pounds for the larger derivatives. The most common models, the 737-300 and the 737-700, have maximum takeoff weights in the 140,000 to 155,000 pound range. On the basis of these weights, a dual wheel runway strength of 155,000 pounds should be considered. This weight should be revaluated at the time the runway strength is to be designed on the basis of the actual aircraft fleet.

4.2.3.9 Runway Pavement Markings

Currently, all three runways have the proper runway pavement markings for the type of approach they support. Runway 16-34 has precision instrument runway markings, Runway 10-28 has non-precision instrument runway markings, and Runway 4-22 has visual runway markings. These runway markings meet FAA standards; therefore, no changes to pavement marking are required.

4.2.3.10 Taxiways

Taxiways are needed to accommodate the movement of aircraft from parking aprons to the runways and vice versa. In order to provide for the efficient movement of aircraft, it is desirable to have a parallel taxiway and several exit taxiways associated with each runway. The recommended width is 50 feet for taxiways serving aircraft in design group III. As noted in Section 2 – Airport Inventory, all of the taxiways at Easterwood Airport have a width of 50 feet. Thus, the existing taxiway widths are adequate to serve all existing and future aircraft projected to use the airport on a regular basis.

The existing taxiway system provides adequate access to all operational areas of the airport with one exception. Taxiway H needs to be extended from its current terminus at Taxiway CI to the approach end of Runway 34. This extension will allow aircraft taxiing from McKenzie Terminal to the approach end of Runway 34 to do so without crossing Runway 16-34. Since Runway 16-34 accounts for approximately 85 percent of all operations on the airfield, a reduction of aircraft taxiing across this runway would be a major safety improvement and is consistent with the FAA's goal of reducing unnecessary runway crossings.

In addition to the extension of Taxiway H, the primary areas for improvement of the taxiway system would be meeting the required FAA separation minimums discussed previously. Options for other taxiway improvements will be addressed in Section 5 – Alternatives.

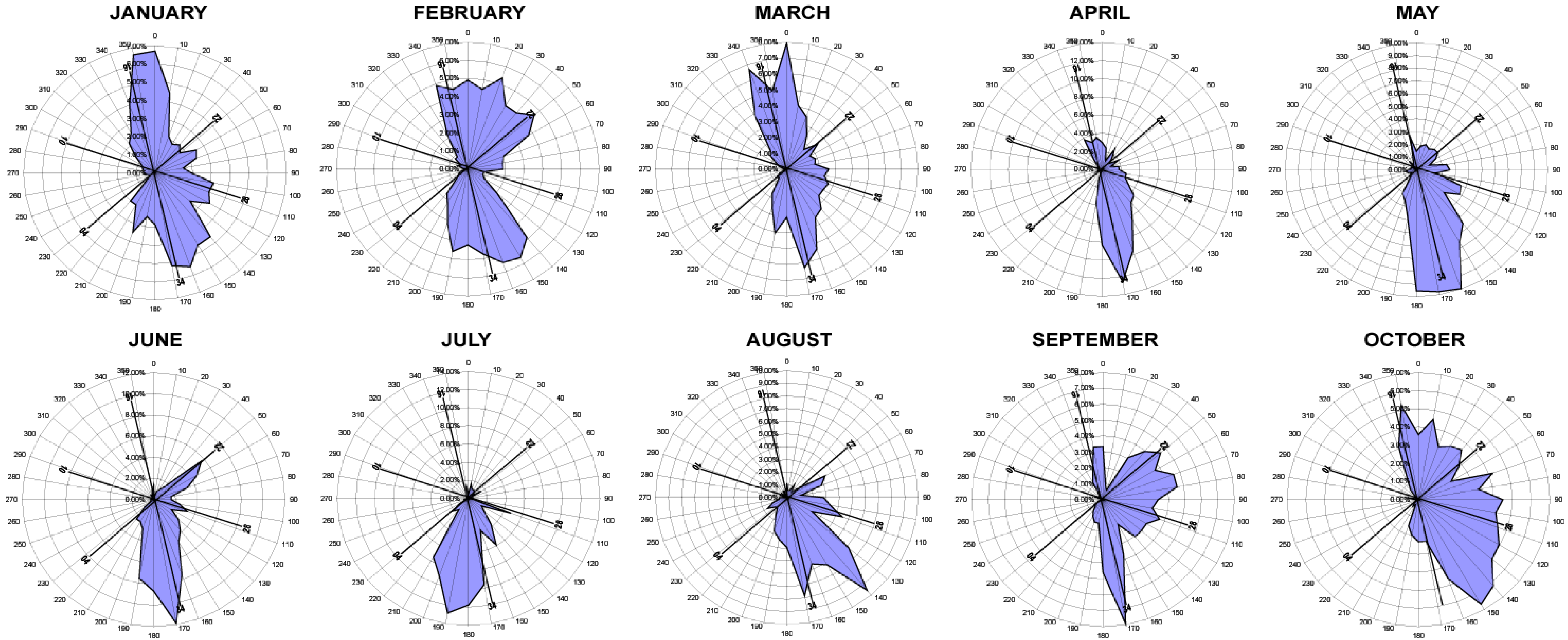
4.2.3.11 Holding Bays

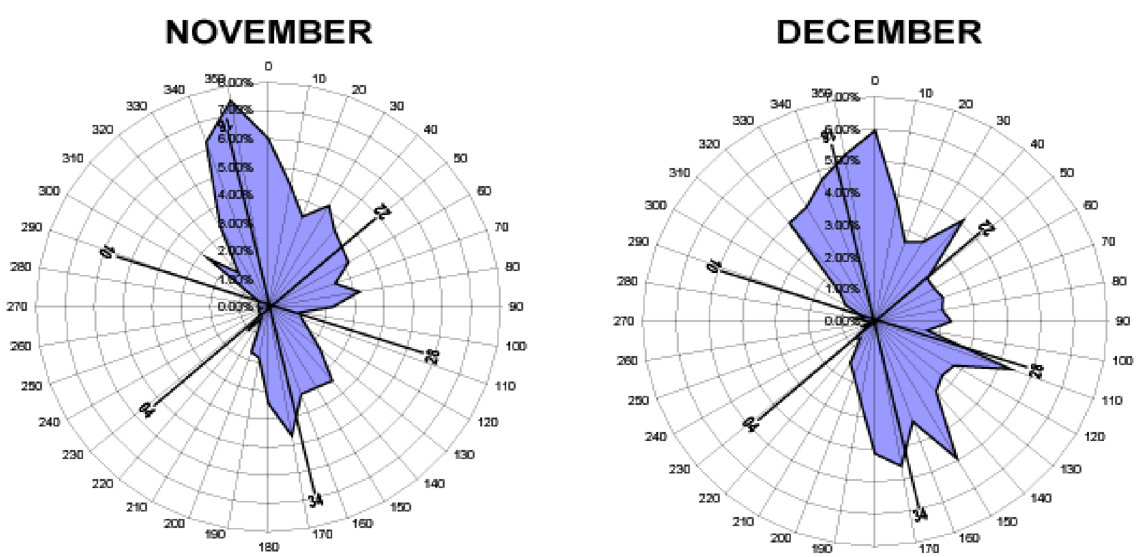
There is one holding bay on the taxiway system at Easterwood Airport. It is located on Taxiway C at the approach end of Runway 34. Holding bays provide space for an aircraft awaiting a takeoff clearance or conducting an engine run-up to move off the taxiway and allow other aircraft to taxi to the runway for takeoff. This reduces airfield delays when one aircraft is conducting engine run-ups or is being held for air traffic control reasons. Consultation with air traffic control personnel at Easterwood Airport indicated a desire for an additional holding bay on Taxiway A at the approach end of Runway 16. ATC indicated that no other holding bays are required due to the lower volume of operations on Runway 10-28 and Runway 4-22. The ability to construct a holding bay at the approach end of Runway 16 appears to be limited by grade and clearance constraints from FM 2818. However, other options, such as a by-pass taxiway maybe possible and will be explored in Section 5 – Alternatives.

4.2.3.12 Navigational Aids

The airport currently has an Instrument Landing System (ILS) on Runway 34. No other electronic navigation aids are installed at the airport. Consultation with air traffic control personnel indicates that there is a need for precision approach capability on Runway 16 due to the fact that prevailing winds favor landing on that runway. A review of the IFR wind persistency chart previously depicted in **Figure 2-16** reveals that the prevailing winds during IFR conditions are indeed from the south-southeast. That wind flow would favor the use of Runway 16 over the use of Runway 34 during IFR conditions.

To gain further understanding of this issue, additional analyses were conducted of winds during IFR conditions. **Figure 4-5** presents monthly IFR wind persistency charts. The figure shows that winds are predominant from the south during the months of April through August. During other months, there is more of a balance between winds from the north and winds from the south. A directional analysis was also conducted of IFR winds using Runway 16 and Runway 34. The resulting wind roses are shown in **Figure 4-6**. As the figure indicates, Runway 16 provides wind coverage of 59 percent, while Runway 34 provides wind coverage of 47 percent during IFR conditions.





Source: NOAA National Climatic Data Center
Station: 72244, College Station, Texas
Period of Record: 1993 –2002
Compiled by URS Corporation, 2003

Wind Data depicted relative to true north (NAD83)
Runway 16 Orientation 168° 53' 06''
Runway 34 Orientation 348° 53' 14''
Runway 10 Orientation 108° 47' 24''
Runway 28 Orientation 288° 47' 52''
Runway 04 Orientation 049° 43' 60''
Runway 22 Orientation 229° 44' 22''

Note:
This graphic depicts the percentage of time that the wind was recording from each compass heading (excluding calm conditions) during the period 1993 to 2002.

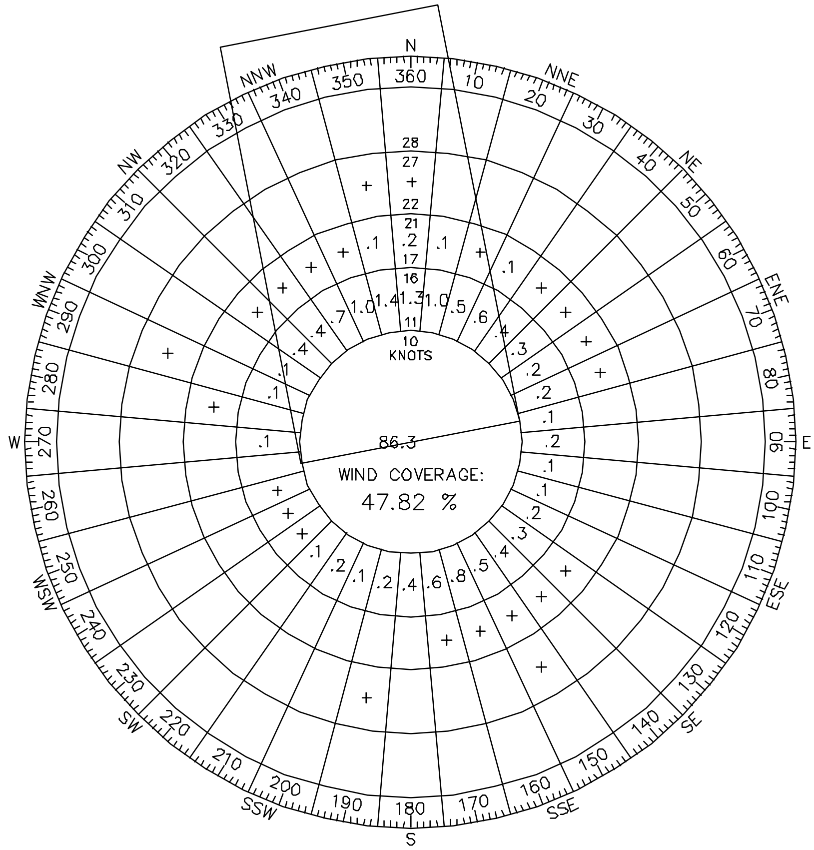
Easterwood Airport
Master Plan Update

MONTHLY IFR WIND PERSISTENCY CHARTS

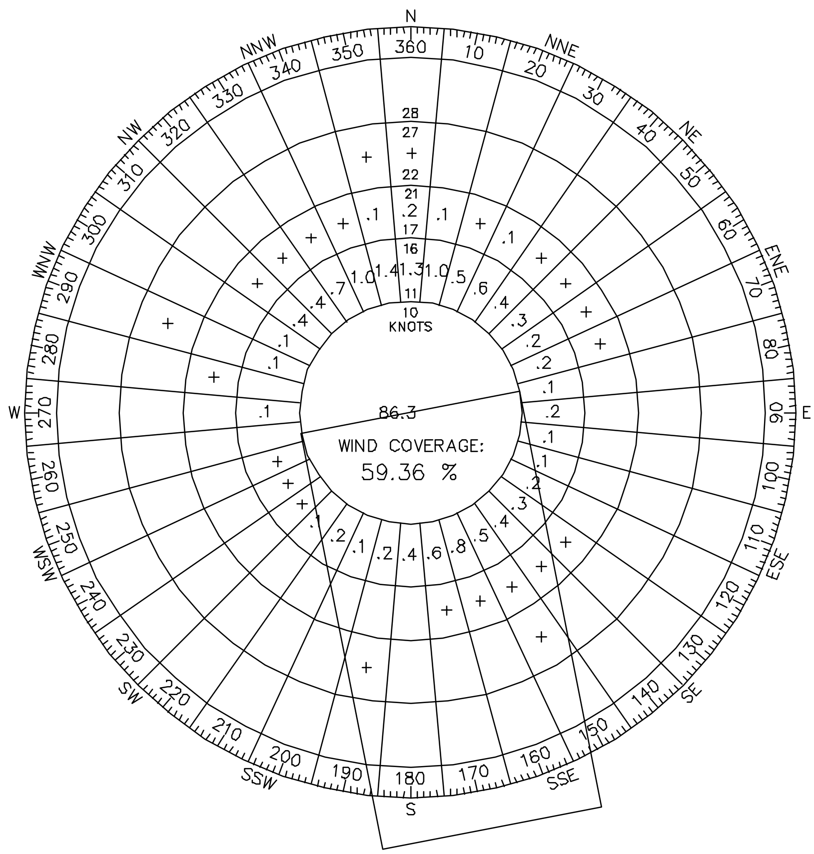
FIGURE

4-5

RUNWAY 34



RUNWAY 16



J:\COLLEGE STATION TX\INVENTORY\FIG 4-6.DWG 07/29/03 10:44

Easterwood Airport Master Plan Update	IFR WIND COVERAGE RUNWAY 16 & RUNWAY 34	FIGURE 4-6

As a result of the higher wind coverage provided by Runway 16, consideration should be given to the establishment of a precision instrument approach on Runway 16. Such a precision approach could be accomplished through the installation of an ILS or the establishment of an Area Navigation Approach (RNAV) using the Global Positioning System (GPS) with the Wide Area Augmentation System (WAAS). GPS is a satellite based navigation system, originally established by the U.S. Department of Defense, which has become a commonly used navigation system for a variety of civilian uses. WAAS is a system that has been developed by the FAA that will enable GPS to be used for precision instrument approaches at airports across the United States. One of the primary advantages of WAAS is that it will allow the development of instrument approaches to airports without the installation of the ground-based systems associated with an ILS. Hence, many more instrument approaches can be provided at lower cost.

There are however some disadvantages associated with WAAS-based GPS approaches when compared to traditional ILS precision approaches. These disadvantages include the fact that it will take a number of years for the FAA to create the RNAV approaches and the fact that the aircraft must be retrofitted with WAAS certified avionics in order for pilots to use the approaches. In addition, RNAV approaches will initially be limited to approach minimums of 250 to 350 feet compared to 200 feet with an ILS.

The ultimate acceptance of RNAV approaches by airline and general aviation users is not known at this point. Therefore, it is appropriate to plan for a precision instrument approach on Runway 16 and coordinate with the appropriate FAA divisions for its establishment. That coordination will ultimately determine whether such a precision approach is best provided through the installation of an ILS or the development of an RNAV approach.

4.2.3.13 Airfield Lighting

Approach Lighting

Three types of approach lighting are currently installed at the airport. A Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) is installed on Runway 34, a 4-box Visual Approach Slope Indicator System (VASI) is installed on Runways 16, 10 and 28, and Runway End Identification Lights (REILS) are installed on Runway 28.

Consultation with air traffic control personnel indicated a need for REILS on Runway 10. In addition, the installation of an approach lighting system, such as a MALSR, on Runway 16 would enable visibility minimums to be reduced from 1 mile to ½ mile for existing non-precision approaches. An approach lighting system would also enable lower visibility minimums for a future ILS approach or RNAV approach as discussed in the preceding section.

Runway Lighting

Runway 16-34 is equipped with High Intensity Edge Lighting (HIRL) and Runway 10-28 is equipped with Medium Intensity Edge Lighting (MIRL). These runway lighting systems are appropriate for runway with precision and non-precision approaches, respectively. No changes to these lighting system are required.

Runway 4-22 is not equipped with any runway lighting. Since this runway is for daytime visual use only, no lighting is needed on this runway.

Taxiway Lighting

The existing taxiway system has medium intensity taxiway edge lighting. This lighting is sufficient to serve the needs of the taxiway system

Apron Lighting

Apron lighting consists of apron edge lighting, similar to taxiway lighting, and high-mast flood lighting. Apron edge lighting is used to delineate the edge of pavements so that pilots do not inadvertently taxi aircraft off apron areas. High-mast flood lighting is used to provide sufficient lighting for the operation and servicing of aircraft in parking areas.

Consultation with airport management indicates that additional flood lighting is needed on the both the McKenzie Terminal apron and the north and south ends of the apron in the general aviation area. In addition, there currently is no apron edge lighting at the north and south ramps. Consideration should be given to the installation of apron edge lighting in area where the apron edge is not easily discernable during nighttime conditions. Such areas may include portions of apron that adjoin grass.

4.2.3.14 Airfield Perimeter Fencing

Existing fencing around Easterwood Airport is a combination of chain-link, wire mesh and vinyl / wood-rail. These fences have different heights and provide different levels of security. It is recommended that chain-link fencing with barbed wire tops be installed around the entire airport to provide a consistent level of security from intrusions.

4.3 AIRSPACE / AIR TRAFFIC CONTROL

4.3.1 DEMAND/CAPACITY ANALYSIS

Airspace in the vicinity of Easterwood Airport is relatively free of constraints that would adversely affect airfield capacity. Constraints that can affect capacity are regulatory, physical and operational factors. A brief description of these factors is provided in the following paragraphs.

There are no regulatory or significant physical constraints in the vicinity of the airport. With respect to operational constraints, it was noted by air traffic control personnel that there is no radar at the tower. Providing radar in the tower would provide controllers with positive identification of flights and flexibilities that they currently do not have.

The FAA currently has a program to install radar displays in certain towers that currently lack this capability. The program is known as the Interim Tower Program and includes approximately 90 airports that are eligible to receive radar displays. Consultation with FAA personnel confirmed that Easterwood Airport is one of the 90 airports identified as being eligible to participate in the program. Consultation also revealed that Easterwood Airport is currently ranked 35th in terms of priority to receive such a display, although prioritization is recalculated each year. An estimate as to when the airport would actually receive a radar display could not be given since it depends on program funding which fluctuates with each fiscal year. The installation of radar display capability in the tower would resolve the only airspace constraint identified at the airport.

4.3.2 FACILITY REQUIREMENTS

In addition to the installation of a radar display, there is currently a need for a new control tower. The existing air traffic control tower has a number of deficiencies including no elevator for disabled access, insufficient electrical capacity, insufficient communications and a lack of fire suppression. The possibility of constructing a new tower should be explored. Options for suitable locations for a new tower will be explored in Section 5 – Alternatives.

4.4 TERMINAL AREA

The capacity of terminal area facilities was calculated and compared to the forecasted levels of passenger demand. The primary areas analyzed in this section include the passenger terminal building and terminal apron area, while vehicle access and parking requirements are considered in Section 4.5. The capacities of these terminal components were evaluated in relation to forecasted demand to determine the overall adequacies of each component of the terminal area. Deficiencies in capacity of the terminal area were identified to determine future needs.

4.4.1 PASSENGER TERMINAL

4.4.1.1 Demand/Capacity Analysis

The future demand for space in the passenger terminal was calculated using a bottom up methodology. This method consists of calculating the amount of space required for each terminal function such as airline space, public space, baggage claim, etc. The amount of space required for each of these functions is then added together to determine the total amount of terminal space required. This approach requires that planning factors or dimensions be specified for each terminal function. The amount of space and the planning factors used are presented in Appendix D – Passenger Terminal Space Program.

Airline Ticket Counter and Offices

The existing area devoted to ticketing in McKenzie Terminal is adequate in terms of queuing area and ticket counter length, but is inadequate in terms of office space according to airline staff. The Transportation Security Administration (TSA) currently occupies space that previous was available for airline use.

With respect to ticket counter, the existing counter has a length of 80 feet. Currently, only about 40 feet of counter is actually being used for ticketing purposes. Another 20 feet is being used for security screening with Explosive Trace Detection equipment. The last 20 feet of ticket counter is currently not being used. That counter space is in front of office space that is currently occupied by TSA.

Demand for ticket counter, airline office, ticket counter queuing and circulation space is calculated per number of airlines. In the Terminal Space Program, a planning factor of 25 feet of counter per airlines is used. This provides adequate space for several ticketing positions and baggage wells, as well as the display of flight arrival and departure information behind the counter. The width is also dictated partially by providing adequate width for airline offices behind the ticket counter area.

A factor of three airlines was used in the program. This is one more than currently operate at the airport and, given the current industry trend toward fewer carrier operating in smaller markets, is likely the upper limit of the number of carriers that would offer service from Easterwood Airport. The Terminal Space Program projects a demand for 75 feet of counter space and approximately 5,200 square feet of space for offices, counter, queuing and circulation. The existing area provides 80 feet of counter and approximately 3,000 square feet of space.

One note of caution should be sounded with respect to the use of traditional planning factors for airline ticket counter areas. Historically, ticket counter areas were used for obtaining boarding passes and processing checked baggage. However, in just the past year several airlines have initiated intensive efforts to redesign ticketing areas to reduce the traditional layout. Electronic ticketing has enabled the use of ticketing kiosks that have reduced the need for ticket counter space. Online check-in is expected to further reduce the need for ticket counter areas. Therefore, these factors should be considered when planning future space requirements.

Passenger Departure Lounge

The passenger departure lounge is currently located on the first floor of the terminal. As described in Section 2 – Airport Inventory, the terminal was originally designed to provide the departure lounge on the second floor. Aircraft boarding was planned to occur via loading bridges from the second floor to the aircraft. This would have enable departing passengers to proceed from the departure level curb to ticket and to the departure lounge without a change of levels.

However, until 2002, Easterwood Airport was served exclusively by turboprop aircraft that required apron boarding. Furthermore, there are no passenger loading bridges at the terminal. Therefore, the departure lounge was placed on the first floor in a glass wall partitioned area. On the basis of visual observations, the departure lounge is severely undersized for existing levels of demand. This problem will be compounded in future years as passenger levels increase. A potential solution is the installation of passenger loading bridges and the relocation of the departure lounges and security to the second floor.

The existing departure lounge provides approximately 1,200 feet of space and part of this space is occupied by security screening equipment and personnel. The Terminal Space Program projects a current demand for 1,800 square feet of space that will increase to 2,600 square feet by 2022.

Security Screening

Security screening is currently provided just outside of the first floor departure lounge adjacent to baggage claim. This area is extremely congested. Passenger queues from security screening back up into the area where passengers are claiming luggage from the baggage carousel. Overall, the area for security screening is inadequate and poorly placed from a passenger comfort and convenience standpoint. However, with the departure lounge on the first floor, no other option is currently available.

The existing security screening area consists of approximately 200 square feet of space. The Terminal Space Program estimates that nearly 500 square feet of space is needed. However, unlike several other terminal functions, the amount space devoted to this terminal function is not projected to increase during the planning period.

Restrooms

Restroom facilities are provided on both the first and second floors of the terminal. The existing facilities are adequately sized to accommodate demand. However, the demand for restrooms is currently unbalanced due to the fact that that the departure lounge is located on the first floor instead of the second floor as originally planned. This leads to a relatively high demand for restrooms on the first floor and a relatively low demand for restrooms on the second floor. If the departure lounge were relocated to the second floor, this imbalance would be resolved.

The existing restrooms provide 1,255 square feet of space. The Terminal Space Program estimates a demand for nearly 2,000 square feet of space. However, the Terminal Space Program accounts for departure lounge restrooms that are not provided in the current terminal design.

Baggage Claim

The existing baggage claim area is slightly undersized in terms of baggage claim carousel and baggage claim lobby area. However, the primary problem in this area is a combination of the passenger departure lounge being on the first floor and the adjoining security screening area with the resulting passenger queues. If the departure lounge and security screening were relocated to the second floor, the existing baggage claim area would be sufficient to accommodate demand.

The existing baggage carousel provides 28 linear feet of claim area. The space program estimates demand at approximately 40 feet for existing demand, increasing to nearly 60 feet in 2022.

Concessions

Existing concessions in the terminal consists of a vending area, restaurant, lounge, and a gift shop. These areas consume approximately 3,200 square feet of space. The Terminal Space Program estimates concession space as a percentage of useable floor area and calculated a demand that is essentially the same as the existing amount of space. No additional concessions space requirements are forecasted during the planning period.

Public Circulation

Circulation in the existing terminal includes the area on the second floor that was originally designed to be the passenger departure lounge. Consequently, the amount of area for public circulation greatly exceeds demand. The existing terminal provides over 7,000 square feet public circulation area. By comparison, the Terminal Space Program estimates a requirement for approximately 1,200 square feet of circulation, although this number is somewhat low due to the fact that circulation is also calculated into other terminal functions in the program. Nonetheless, visual observations confirm that circulation in the existing terminal is more than adequate to accommodate existing and projected level of passenger demand. Even if the existing passenger departure lounge is moved to the second floor, the amount of area devoted to public circulation will be sufficient.

Vertical Circulation

Vertical circulation in the existing terminal consists of a stairway and an elevator. Both are centrally located in the terminal and provide adequate capacity to accommodate demand for vertical circulation. However, the current orientation of stairway is somewhat awkward because the first floor portion of the stairway ends close to the glass partition for the passenger departure lounge. Options for addressing this issue will be addressed in Section 5 – Alternatives.

Other Terminal Functions

Site inspections have revealed that the first floor area for inbound and outbound baggage is one of the most problematic areas in the passenger terminal. The area is undersized and has an awkward configuration that results in baggage tugs repeatedly colliding with walls, entrances and exits, as well as the metal partitions that divide each airline's space. The problem is compounded by tight turning radiuses and the relatively long drive from the baggage carousel to the area's exit. Additional space and a reorganization of the flow and use of space in this area should be considered. Options for addressing this issue will be addressed in Section 5 – Alternatives.

4.4.1.2 Facility Requirements

The requirements for additional terminal space were calculated by subtracting the existing amount of terminal space from the estimated demand for future years. **Table 4.10** presents a summary of the additional terminal space required during the study period. As the table indicates, the amount of space required using the Terminal Space Program is not significantly different from the amount of space provided by the existing terminal. Thus, the conclusion of the analysis is that reuse and improvements to certain elements of the terminal are required, but the overall size of the terminal should be nearly sufficient to accommodate demand through the study period.

Table 4.10
Terminal Space Requirements

Year	Terminal Space Demand (S.F.)	Existing Terminal Space (S.F.)	Terminal Space Requirements (S.F.)
2002	28,500	27,600	900
2007	30,000	27,600	2,400
2012	30,700	27,600	3,100
2017	31,000	27,600	3,400
2022	31,200	27,600	3,600

Source: URS Corporation, 2003.

4.4.2 Terminal Apron

The aircraft parking apron for commercial and charter passenger flight adjoining McKenzie Terminal has a depth of 250 feet, including the taxilane, and a width of 760 feet. Within this area, there is sufficient space for parking the Saab-340 operated by American Eagle and the EMB-120 operated by Skywest/Continental Connection with some extra space left over for occasional charter aircraft. However, consultation with both airport management and air traffic control personnel indicated that existing apron space is insufficient due to the following reasons: 1) the existing aircraft power-in and power-out instead of being pushed-back by a tug thereby requiring additional apron for maneuvering and 2) Easterwood Airport receives a fairly high number of air carrier aircraft that divert from Houston’s George Bush Intercontinental Airport during poor weather conditions. These diversions consist of air carrier aircraft such as Boeing 737s and MD-80s as well as EMB-135 and EMB-145 regional jets. Furthermore, it was noted that several aircraft often divert to Easterwood Airport at the same time thereby increasing demand for temporary parking apron.

Expansion of the existing ramp to provide sufficient space for the aircraft providing scheduled passenger service and at least two charter operations is recommended. Section 5 – Alternatives will examine options for expanding the existing ramp to provide this level of capability.

4.5 SURFACE TRANSPORTATION

4.5.1 INTRODUCTION

The purpose of this section is to evaluate existing and future vehicle traffic operations and identify any improvement needs for the surface transportation system supporting Easterwood Airport. This analysis includes the airport circulation roadway, the terminal curb frontage, and the parking facilities.

4.5.2 AIRPORT ROADWAYS

McKenzie Terminal is accessed via a two-lane, one-way roadway connecting the airport to Raymond Stotzer Parkway (FM 60) and provides access to the public and rental car parking. Access to the general aviation area and ARFF facility is provided via West George Bush Drive that connects to Harvey Mitchell Parkway (FM 2818).

The performance of roads is qualified based on levels of service (LOS), which are given letter designations from “A” to “F.” LOS “A” represents the best operating conditions and LOS “F” the worst.

Visual observations indicate the access road to McKenzie Terminal and West George Bush Drive operates at a Level of Service A and will continue to operate at Level of Service A throughout the study period. No capacity improvements to the McKenzie Terminal access road or West George Bush Drive are required although physical improvements are needed. The concrete slabs that comprise the access road to McKenzie Terminal Road have settled unevenly. This results in an uneven driving surface and ponds of water during periods of precipitation. Rehabilitation of the road is needed. West George Bush Drive was reconstructed in 2003 and is now in excellent condition.

4.5.3 AIRPORT PARKING

An inventory of parking facilities was conducted to determine the number of parking spaces available for public, employee, and rental car use. The following summarizes the existing parking facilities:

Type of Parking	Number of Parking Spaces
McKenzie Terminal	
Paid Public	361
Reserved	10
Rental Car	150
General Aviation Terminal	
Short Term	15
Long Term	46

After consultation with airport management, it was determined the existing parking facility operates at approximately 70 percent capacity during the peak periods, while average occupancy rates are approximately 50 percent. Typically, the peak parking occupancy rate should not exceed 85 to 90 percent in order to avoid excessive vehicular circulation by motorists searching for an empty space.

Consultation with rental car operators revealed that the ready and return lots operate at approximately 50 percent of capacity and that additional ready/return spaces will not be needed to meet future levels of demand.

Based on the existing demand, it is evident the existing parking facilities are not operating near capacity during peak travel periods, and have significant excess capacity during other periods. **Table 4.11** lists the estimated parking needs for future years for paid public parking, as well as parking for rental cars. For design purposes, future parking requirements for public and rental car parking were calculated by applying the projected growth rate of passenger enplanements to current level of peak period occupancy. As shown in this table, Easterwood Airport has parking facilities available to meet projected demand levels throughout the planning period.

While parking at the McKenzie Terminal is sufficient to meet existing and future demands, consultation with airport management revealed that parking in the general aviation area is insufficient at peak periods. The peaks are caused by student parking associated with charter flights as well as students using the Texas A&M Wind Tunnel facility. While a precise estimate cannot be made regarding how many additional spaces are required, options for additional parking are desired and will be investigated in Section 5 – Alternatives.

Table 4.11
McKenzie Terminal Parking Requirements

Category	Projections By Period				
	2002	**2007**	**2012**	**2017**	**2022**
Public Spaces					
Demand	181	197	215	235	256
Capacity	361	361	361	361	361
Addt'l Spaces Required	0	0	0	0	0
Rental Car					
Demand	75	82	89	98	106
Capacity	150	150	150	150	150
Addt'l Spaces Required	0	0	0	0	0
Reserved Spaces					
Demand	10	10	10	10	10
Capacity	10	10	10	10	10
Addt'l Spaces Required	0	0	0	0	0
Total Demand	266	289	314	343	372
Existing Spaces	521	521	521	521	521
Total Additional Spaces	-255	-232	-207	-178	-149

Note: Negative value indicates demand is less than capacity.

4.5.4 TERMINAL CURBSIDE

The curb in front of the passenger terminal provides approximately 800 linear feet for passenger loading and unloading, on an upper and lower level. Consultation with airport management, and visual observations, indicate the terminal curb is rarely full, even during peak hours. Furthermore, one hour of free parking is available directly across from the terminal curb for residents picking up arriving passengers. This further reduces demand for terminal curb. On the basis of current use patterns, the existing amount of terminal curb will be sufficient to meet projected levels of demand.

Although the amount of curbside is adequate, improvements to the condition of the entrance/exit ramps leading to and from the curb are required. Consultation with airport management revealed that drainage problems on the ramps have led to erosion beneath the concrete slabs and led to an unstable base. Rehabilitation of the entrance/exit ramps is recommended.

4.6 AIRCRAFT RESCUE AND FIREFIGHTING (ARFF)

The FAA has established specific requirements for aircraft rescue and firefighting (ARFF) equipment. These requirements shown in **Table 4.12** and vary depending upon the frequency that aircraft of various sizes serve the airport. As the table indicates, the requirements are stated in terms of “Indexes” that begin with the letter “A” for airports serving small aircraft and extend to Index “E” for airports serving large aircraft. Each Index letter defines a range for aircraft length. Index A is defined as aircraft that have a length of less than 90 feet. The longest index group with an average of 5 or more daily departures by air carrier aircraft is the Index required for the airport.

Table 4.12
ARFF Equipment Requirements

Airport Index	Length[1] of Aircraft (Representative Aircraft)	Vehicles		Extinguishing Agents	
		Light-Weight	Self-Propelled	Dry Chemicals (Pounds)	Water (Gallon)
A	Under 90 (Dash-8)	1	0	500 Sodium or 450 Potassium	0 100
B	90-125 (CRJ-700)	1	1	500 Sodium or Halon	1,500
C	126 to 158 (MD-80)	1	2	500	3,000
D	159 to 199 (767)	1	2	500	4,000
E	Over 200 (747)	1	2	500	6,000

[1] Length of largest aircraft providing an average of five scheduled departures per day. If there are less than an average of five daily departures by aircraft in a particular index, then the next lower index applies.

As of 2003 there are no commercial service aircraft having a length greater than 90 feet that average 5 or more daily departures at Easterwood Airport. Thus, the airport only needs to meet Index A requirements. Regular operations by aircraft in Index B are not projected to occur during the 20-year study period.

As described in Section 1, ARFF services at Easterwood Airport are currently provided from a modern ARFF station located at the west end of George Bush Boulevard behind Hangar 756. Services provided from this facility meet the vehicle, equipment and personnel requirements of Index B as specified by Federal Aviation Regulation Part 139.315. Therefore, the existing ARFF facilities are sufficient to meet existing and future demands.

4.7 SUPPORT FACILITIES

4.7.1 AIRPORT MAINTENANCE

As previously described in Section 2 – Airport Inventory, airport maintenance facilities consist of a covered storage area for field equipment, a maintenance garage (Building 754) for equipment storage and maintenance, and an equipment storage shed adjacent to the T-hangars. Consultation with airport management indicates that a larger maintenance facility is needed to store equipment that is currently uncovered and unprotected from the weather. It is recommended that the construction of a new maintenance facility or equipment storage shed be considered that would provide sufficient space for the storage of equipment that is currently unprotected.

4.7.2 RENTAL CAR SERVICING

Interviews with rental car operators revealed that a rental car maintenance facility for washing, fueling, and servicing vehicles in one common location on the airport is desirable. Rental car representatives noted that the existing hand wash facility in the rental car parking lot is not satisfactory and that the requirement to drive vehicles off airport property for refueling is undesirable from a cost and liability perspective.

To resolve these issues, it is recommended that a consolidated on-site servicing facility be constructed for use by all rental car operators at the airport. By constructing a common facility, the amount of space required and the cost to operators could be minimized. Options for the placement of such a facility will be examined in Section 5 – Alternatives.

4.8 GENERAL AVIATION AREA

The purpose of this evaluation is to determine the capacity of existing general aviation facilities and their ability to meet forecasted levels of demand during the planning period.

In this analysis, the following types of facilities were evaluated:

- Storage hangars

- Based aircraft apron
- Transient aircraft apron

Details of the analysis for each type of facility are provided in the following paragraphs.

4.8.1 STORAGE HANGARS

4.8.1.1 Demand/Capacity Analysis

Two approaches can be used for estimating future demands for hangar space. The first approach is essentially a theoretical exercise that estimates demand strictly on the basis of planning factors and industry standards. This approach is fairly straightforward and produces an estimate of future hangar demand, but it does not consider the actual hangar use at the airport. The second approach is based on actual hangar use at the airport, the current waiting list for hangar space, and the projected growth of based aircraft. Both approaches are discussed in the following paragraphs. The theoretical approach is discussed first.

Theoretical Approach

This approach estimates the demand for storage hangars by assuming a certain percentage of aircraft owners will desire hangars for their aircraft. The analysis assumes a greater percentage of owners of high-performance aircraft will desire hangar space as compared to owners of low performance aircraft. Therefore, the analysis assumes that 100 percent of turboprop, jet, and rotorcraft will desire hangar space and that 80 percent of single-engine and twin-engine piston aircraft will desire hangar space.

The analysis estimates demand for both open-bay hangars as well as T-hangars. The principal users of open-bay hangars are usually larger aircraft whose owners desire convenient access to FBO services and the greater amount of space typically provided by open-bay hangars. The primary users of T-hangars are owners of single and smaller twin-engine aircraft that prefer the greater security and the convenience of direct access that T-hangars provide. Therefore, the analysis assumes that all turboprop, jet, and rotorcraft would be stored in open-bay hangars and all single-engine and twin-engine piston aircraft would be stored in T-hangars.

For open-bay hangar space, the analysis estimated space requirements on the basis of industry standards. Space factors of 1,500 square feet for rotorcraft, 2,500 square feet for turboprop aircraft, and 3,500 square feet for jet aircraft were used.

Table 4.13 presents the resulting requirement for hangar space. As the table indicates, this approach estimates a high demand for T-hangars and low demand for open-bay hangars. This result is the opposite of current facilities at the airport, which mostly provide open-bay hangars and just a few T-hangars.

Table 4.13 Hangar Demand/Capacity Analysis					
	Existing	**Projected Demand**			
Category	**Capacity**	**2007**	**2012**	**2017**	**2022**
Based Aircraft					
Single-Engine Piston	46	47	48	50	51
Twin-Engine Piston	13	13	13	13	14
Turboprop/Jet	1	1	1	1	1
Rotorcraft	1	1	1	1	1
Total	61	62	63	65	67
Hangar Requirements					
T-Hangars	9	48	49	50	52
Open-Bay Hangar Spaces	9-37	2	2	2	2
Open-Bay Hangar Floor Area		5,000 SF	5,000 SF	5,000 SF	5,000 SF

Source: URS Corporation, 2003.

Actual Use Approach

As described in Section 2 – Airport Inventory, Easterwood Airport currently has 5 open-bay hangars. It is estimated that these hangars can hold anywhere from 17 to 37 aircraft depending upon aircraft size and the way they are positioned in the hangars. In addition, the airport has 9 “Port-a-Port” T-hangars. Both the open-bay hangars and the T-hangars are full and there are 19 people currently on the waiting list for hangar space.

Using this approach, there is an immediate need for approximately 20 hangar spaces. In addition to the waiting list, there may also be aircraft based at surrounding airports that would prefer to base at Easterwood Airport if additional hangar space were available and there is the projected increase of 6 based aircraft over the duration of the study period. Considering these factors, there is a potential demand for approximately 30 to 35 additional hangar spaces over the study period. However, the demand for hangar space is highly sensitive to hangar rents and the estimated demand for hangar space may not materialize once market rates for new facilities are considered. Therefore, while the estimated demand for hangars can be used to plan for the proper location of proposed facilities, the decision to actually construct new hangar facilities will depend upon an evaluation of their economic viability.

A review of the aircraft on the waiting list revealed that the majority are small single-engine aircraft that would typically be more suitable for T-hangars than open-bay hangars, although there is one jet aircraft on the waiting list. The conclusion of this approach is that there is a potential demand for approximately 25 to 30 T-hangars and 2 to 3 open-bay hangars over the study period.

One other factor to consider is that this approach does not consider business development that may create a demand for corporate hangar facilities. The demand for such facilities will depend on the amount of economic growth and business development in the cities of Bryan and College

Station and the Brazos Valley region. While the future demand for corporate hangar facilities is not known, and cannot be predicted with any degree of accuracy, good planning would dictate that the master plan consider the potential for such facilities and identify suitable locations for corporate hangars if demand materializes. This would enable Easterwood Airport to efficiently respond to the demand for hangar parcels if and when it occurs.

4.8.1.2 Facility Requirements

The results of the demand/capacity analysis indicate that there is demand for additional hangar facilities. The theoretical approach resulted in a high demand for T-hangars and a low demand for open-bay hangars. While the actual preferences of aircraft owners at Easterwood Airport with respect to open-bay hangars versus T-hangars is not known without conducting a survey, this issue is not really relevant in terms of existing facilities. The existing open-bay hangars provide aircraft storage and will continue to do so. What is relevant is that both approaches indicate a demand for additional hangar space. The actual use approach indicates a requirement for approximately 25 to 30 T-hangars and 2 to 3 open-bay hangars over the study period, as well as parcels for corporate hangar facilities. Section 5 – Alternatives will explore options for locating additional T-hangars and open-bay hangars.

4.8.2 AIRCRAFT APRON

4.8.2.1 Demand/Capacity Analysis

Apron areas should be provided for based aircraft that are not stored in hangars and itinerant aircraft. No clear distinction is made between apron for based aircraft and itinerant aircraft at Easterwood Airport. Parking for aircraft is provided on three ramps in the vicinity of the general aviation terminal. The available ramp space consists of approximately 4,200 square yards of paved apron for seven aircraft tie-downs on the new north ramp, approximately 15,400 square yards of paved apron for 42 aircraft tie-downs on the north ramp, and approximately 24,800 square yards of paved apron for aircraft parking on the south ramp. The south ramp includes sufficient space for approximately six large-aircraft parking spaces.

While there are some exceptions, the majority of aircraft based at Easterwood Airport typically park in front of Hangar 756 and 1092, while itinerant aircraft park closer to the general aviation terminal, in front of the T-hangars and on the south ramp. During peak periods, Runway 4-22 and Runway 10-28 are closed and used for parking itinerant aircraft.

As was the case for estimating hangars, the approach to estimating future ramp space can be conducted on a somewhat theoretical basis using a series of assumptions and planning factors or can be examined by examining current use patterns. Both approaches were conducted and are explained in the following paragraphs.

<u>Theoretical Approach</u>

The demand for apron for based aircraft is simply calculated by subtracting aircraft based in hangars from the total number of aircraft projected to be based at the airport throughout the study period. The demand for transient ramp is usually estimated by applying a factor to design day aircraft landings. In this instance, aircraft apron for transient aircraft was calculated by applying a design standard of 360 square yards per itinerant aircraft to the number of transient aircraft expected to park at the airport at any one time. A factor of 20 percent of itinerant operations during the design day was assumed to represent the number of aircraft that will require parking at the same time.

Table 4.14 presents projected demand for apron space for aircraft based at Easterwood Airport and itinerant aircraft. As the analysis indicates, the amount of existing apron exceeds the apron requirement. However, this assumes that hangars are provided for all aircraft that want them and that exceptionally high peaks of itinerant aircraft do not occur. Both of these assumptions are incorrect for Easterwood Airport.

The demand/capacity analysis for hangars noted that the current capacity is a maximum of 46 aircraft, yet there were 61 aircraft based at the airport in 2002. That leaves 15 based aircraft that require tie-down space. In addition, the airport does experience exceptionally high peaks for transient aircraft associated with home football games at Texas A&M.

Table 4.14
Apron Demand/Capacity Analysis

Category	Existing Capacity	Projected Demand 2007	2012	2017	2022
Based Aircraft Tie-Downs	-	12	12	13	13
Apron Area (S.Y.)	-	4,320	4,320	4,680	4,680
Transient Aircraft Tie-Downs	-	28	29	31	32
Apron Area (S.Y.)	-	10,080	10,440	11,160	11,520
Total Tie-Downs	55	40	41	44	45
Total Apron Area (S.Y.)	44,400	14,400	14,760	15,840	16,200

Source: URS Corporation, 2003.

Actual Use Approach

Consultation with airport management and air traffic control personnel reveal that lack of apron is a major constraint at the airport. In addition to experiencing exceptionally high peaks of demand for itinerant aircraft parking associated with Texas A&M events, the airport experiences a significant amount of training by military aircraft. These aircraft tend to train in groups and often park together at the same time thereby increasing demand for ramp space.

Consultation with air traffic control personnel indicates that in addition to fixed wing military aircraft, the airport may experience upwards of 8 to 10 military rotorcraft at one time. These aircraft are typically parked on a closed runway to provide sufficient space and to segregate these operations from fixed wing aircraft.

In addition to those activities, Easterwood Airport also experiences a significant amount of air carrier and regional jet diversions from Houston's George Bush Intercontinental Airport as a result of its proximity (approximately 65 miles) and instrument capability. When weather-related diversions occur at IAH, Easterwood Airport can receive several aircraft at one time. These aircraft require parking space while they wait to return to IAH. While these aircraft more typically park near or at McKenzie Terminal, they sometimes are parked on closed runways.

In conclusion, additional aircraft apron is required although it is probably not cost-effective to provide sufficient ramp for all peak events. Options for providing additional aircraft apron will be addressed in Section 5 – Alternatives.

4.9 AVIATION FUEL STORAGE FACILITIES

Table 4.15 presents historical fuel sales at Easterwood Airport during 2001 and 2002. As noted in Section 2 – Airport Inventory, the airport has one 20,000-gallon and three 12,000-gallon fuel tanks in the fuel farm. The 20,000-gallon tank and two of the 12,000-gallon tanks contain Jet-A, while the other tank contains avgas.

Table 4.15
Historical Fuel Sales (Gallons)

Year	Jet A			AVGAS			Total Fuel
	Airline	GA	Total	Airline	GA	Total	
2001	327,765	910,318	1,238,083	0	147,782	147,782	1,385,865
2002	233,580	947,906	1,181,486	0	138,274	138,274	1,319,760

There is a limited amount of data available concerning fuel sales at Easterwood Airport. Complete fuel sale data was only available from September 2000 through January 2003. For the most recent full year of data, 2002, the airport had sales of 1,181,486 gallons of Jet-A and 138,274 gallons of avgas. A figure of 10 percent of annual fuel sales was used to estimate peak month sales. This equates to approximately 14,000 gallons for avgas and 118,000 gallons for Jet-A. These figures are similar to actual peak month levels of 13,217 gallons of avgas and 120,941 gallons of Jet-A for 2002. Based on a 12,000-gallon capacity for avgas, a 26-day fuel supply is currently provided. With respect to Jet-A, an 11-day supply exists based on the existing 44,000-gallon capacity. These capacities are adequate for existing levels of demand, but may not be sufficient to accommodate projected demand. The following paragraphs examine future fuel storage requirements.

Projections of future fuel flow were made using a series of assumptions and calculations. For fuel use by general aviation, the same percentage of growth forecasted for operations (0.93 percent) was applied to fuel flow. For fuel use by airlines, a gallons per departure factor was determined for existing operations and then was applied to the future number of departures.

Applying these factors led to an estimated peak month fuel flow of 17,000 gallons for avgas and 148,000 gallons for Jet-A in 2022. These volumes equate to a 22-two-day supply for avgas and a nine-day supply for Jet-A.

According to Airport Management, approximately 24,000 to 32,000 gallons of fuel are delivered weekly to the fuel farm. This volume could be increased in the future to meet increased levels of future demand. Therefore, an expansion of fuel farm facilities to accommodate future levels of demand is not anticipated at this time.

In addition to the fuel facilities for aircraft, there are also fuel facilities for maintenance vehicles and rental cars. As described in Section 2, these facilities consist of a one 750-gallon above ground tank for diesel fuel and another 750-gallon tank for automotive gasoline. While the capacity of these tanks is sufficient to meet demand, their current placement is not optimal nor desirable.

If a new fueling facility is provided for rental cars in conjunction with the establishment of a consolidated servicing facility, then access to the existing fuel farm by rental car personnel is no longer an issue and the automotive fuel tank could be relocated the secure portion of the airfield along with other fueling facilities.

The placement of these fuel facilities will be dictated to a certain extent by the selected location for a new maintenance facility. It is desirable to have the fueling facilities close to the vehicles that use them.

4.10 SUMMARY OF FACILITY REQUIREMENTS

The results of the demand/capacity analysis and an examination of the facility requirements revealed the following conclusions:

AIRFIELD

- The existing airfield system provides sufficient capacity to meet projected demand throughout the study period.
- The runway safety area for Runway 10-28 requires improvements to meet FAA standards. The runway object free area for Runways 16-34 and 10-28 do not meet FAA standards.
- The existing runway length of 7,000 feet on Runway 16-34 is sufficient to accommodate regular operations of regional jets and occasional charter operations.
- The existing runway widths are sufficient to meet demand and should be maintained.
- The strength of Runway 16-34 should be increased to accommodate 155,000 dual-wheel loadings.

- The possibility of establishing a precision instrument approach on Runway 16 should be explored.

- The installation of an approach lighting system on Runway 16 should be explored to reduce instrument approach minimums.

- Taxiway improvements are needed to provide proper separation between runways and portions of Taxiways A, B and C.

- The possibility for a bypass exit on Taxiway A near the approach end of Runway 16 should be explored.

- A new air traffic control tower should be provided to replace the existing tower that is deficient in terms of vertical access, fire suppression, and electrical capabilities.

- Radar display should be installed in the air traffic control tower to provide controllers with additional flexibility in handling aircraft and provide increased situational awareness.

- New perimeter fencing is needed to provide a consistent level of security from airfield intrusions.

TERMINAL

- The existing passenger terminal requires reconfiguration to better allocate space amongst uses. Specifically, the departure lounge should be relocated from the first floor to the second floor per the terminal's original design.

- Passenger loading bridges need to be installed on the second floor to provide aircraft access.

- The existing baggage make-up and delivery area require reconfiguration and expansion to resolve operational problems, especially problems relating to the operation of baggage carts through the terminal.

- The terminal apron requires expansion to provide sufficient space for simultaneous operation of aircraft for schedule passenger and aircraft for charter service.

- Lighting improvements are required for better visibility on the McKenzie Terminal ramp.

ACCESS AND PARKING

- The existing amount of parking for public use and rental cars is sufficient to meet demand throughout the study period.

- The existing roadway access to the McKenzie Terminal is sufficient to meet demand, but requires rehabilitation to correct physical deficiencies.

- The access ramps to the departure level of McKenzie Terminal require rehabilitation to correct drainage and base deterioration issues.

- The existing terminal curb is adequate to meet projected demand throughout the study period.

- Additional parking is required in the vicinity of the general aviation area to support peak period requirements.

SUPPORT FACILITIES

- Existing ARFF facilities are sufficient to meet requirements throughout the study period.

- A new maintenance facility is required to provide weather protection for airfield maintenance equipment and vehicles.

- The construction of the consolidated area for rental car servicing is required.

- The existing fuel farm capacity is sufficient to meet demand throughout the study period. Relocation of fueling facilities for automotive gasoline and diesel is desirable.

GENERAL AVIATION FACILITIES

- Additional open-bay and T-hangars are required to meet demand for aircraft storage throughout the study period. An estimated 25 to 30 T-hangars and 2 to 3 open-bay hangars are required. In addition, parcels suitable for the construction of corporate hangar facilities should be identified.

- Additional ramp area is needed for itinerant aircraft including rotorcraft.

SECTION 5 ALTERNATIVES ANALYSIS

5.1 INTRODUCTION

This section examines alternative methods of providing the facilities required to serve projected levels of demand during the study period. The alternative analysis focuses on the following components of the airport:

- Airfield,
- Air Traffic Control,
- Terminal Area,
- Surface Transportation,
- Support Facilities, and
- General Aviation Area.

Alternatives for each of these components are presented in text and graphics on the following pages. Advantages and disadvantages associated with each alternative are identified and quantified to the extent possible. Conceptual cost estimates are included where needed to evaluate alternatives.

5.2 AIRFIELD ALTERNATIVES

5.2.1 LONG-RANGE RUNWAY ALTERNATIVES

The demand/capacity analysis revealed that the existing airfield has sufficient capacity to accommodate projected aircraft operations throughout the twenty-year timeframe of this study. Therefore, no additional runways are required at this time to meet operational demand. However, it is possible that increased demand may occur in the long-range, post-planning period. Therefore, an assessment of a suitable location for a future runway, should it ever become needed, was conducted. The purpose of the assessment was to consider the land use planning requirements of such a runway.

When additional runways are considered for capacity enhancement purposes they are typically situated in a parallel orientation to existing runways. This allows aircraft to simultaneously land and takeoff from both runways thereby increasing the number of aircraft that can be accommodated.

The primary runway at Easterwood Airport is Runway 16/34. It is aligned with the prevailing winds and provides the greatest capabilities due to its longer length and instrument landing system that enables aircraft operations during periods of low visibility conditions. Therefore, alternatives for the placement of a future parallel runway focused on runways that could be parallel to Runway 16/34.

An important factor when considering parallel runways is the amount of separation between the runways. The amount of separation dictates the degree to which operations can be operated independently. The FAA has established separation criteria for parallel runways that specifies whether aircraft operations can be operated independently and/or simultaneously. A description of key separations is provided below:

- A minimum separation of 2,500 feet is required for parallel runways to be operated independently when wake turbulence is an issue. Wake turbulence is generated by aircraft wings after takeoff and before landing. It consists of swirling air masses, or vortices, that trail outward behind an aircraft. These vortices can be hazardous to the operation of other aircraft if not properly accounted for.

- A minimum separation of 3,400 feet is required in order to operate simultaneously during IFR conditions with special high update radar and monitoring equipment.

- A minimum separation of 4,300 feet is required to operate simultaneously during IFR conditions with standard radar equipment.

Figures 5-1, **5-2**, and **5-3** depict potential future parallel runways at the separations listed above. Each alternative has certain advantages and disadvantages associated with its location. The alternative with a 2,500-foot separation would allow a longer runway (8,500 feet) to be constructed within the existing Texas A&M property line. However, the alternative would place the runway fairly close to the McKenzie Terminal area, thereby precluding the development of land just west of the passenger terminal. This alternative would also necessitate the relocation of some existing Texas A&M facilities such as the astronomy observatory. Another disadvantage of the alternative is that it would necessitate relocation of a portion of White Creek, although a shorter runway could avoid impacts to the creek.

The alternative with a 3,400-foot separation places the runway farther west and would avoid impacting the majority of prime airport land west of the McKenzie Terminal. It would also be located on land already owned by Texas A&M, but most other impacts to existing facilities and White Creek would be the same as for the 2,500-foot separation.

The alternative with a 4,300-foot separation places the runway very close to the western boundary of Texas A&M property and would require the purchase of some additional property. This alternative limits runway length to 7,000 feet due to a sewage treatment plant located to the south. This alternative would also place the runway closer to residential land use west of the airport. This is undesirable from a land use compatibility perspective.

A detailed evaluation of these runways alternatives was not undertaken because there is no need for a parallel runway within the study period. However, from a cursory review of site issues, it appears that a separation of approximately 3,400 feet would maximize operational advantages and minimize adverse impacts on existing airport facilities and residential land uses to the west.

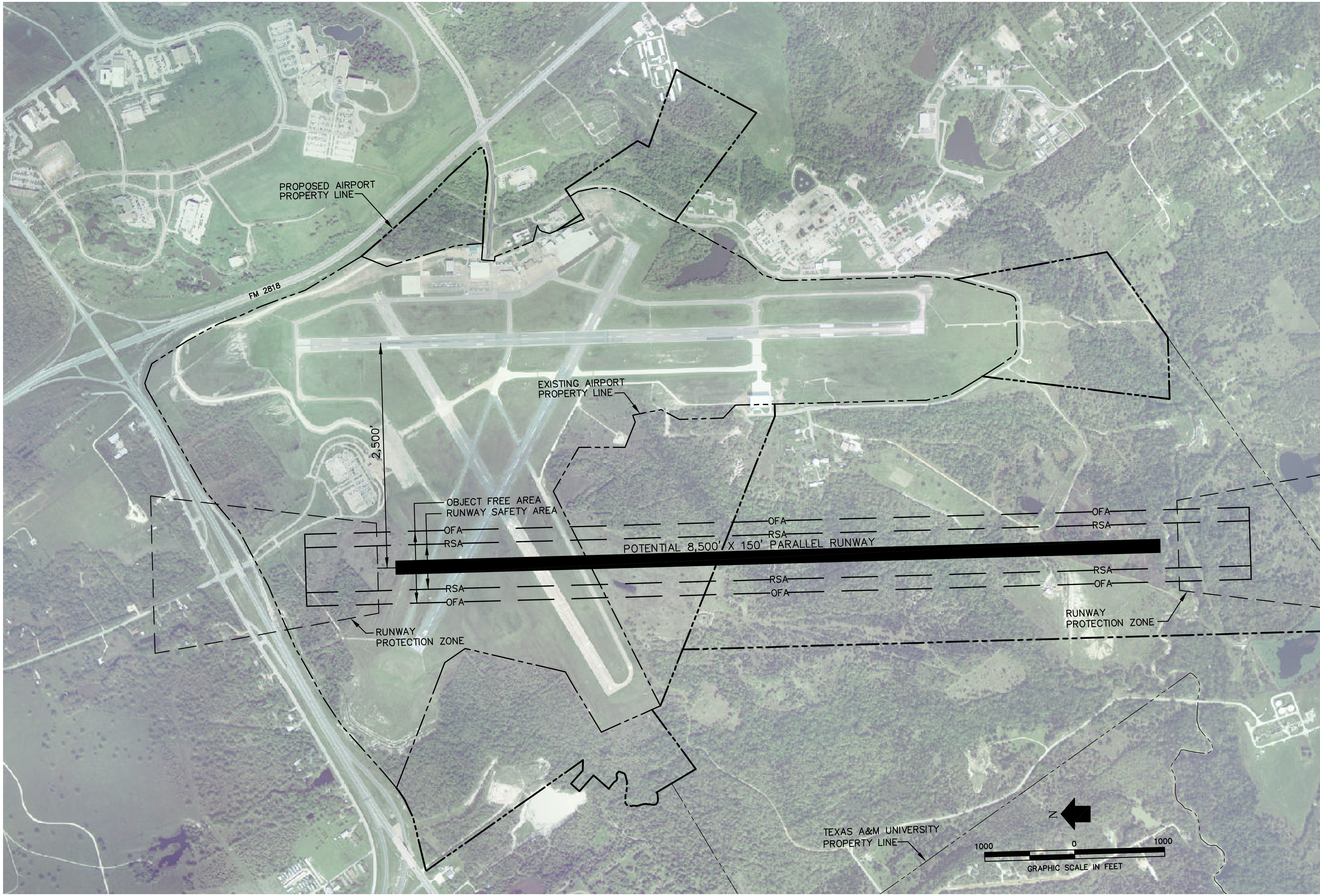


FIGURE 5-1

FUTURE PARALLEL RUNWAY ALTERNATIVE
2,500' SEPARATION

Easterwood Airport
Master Plan Update

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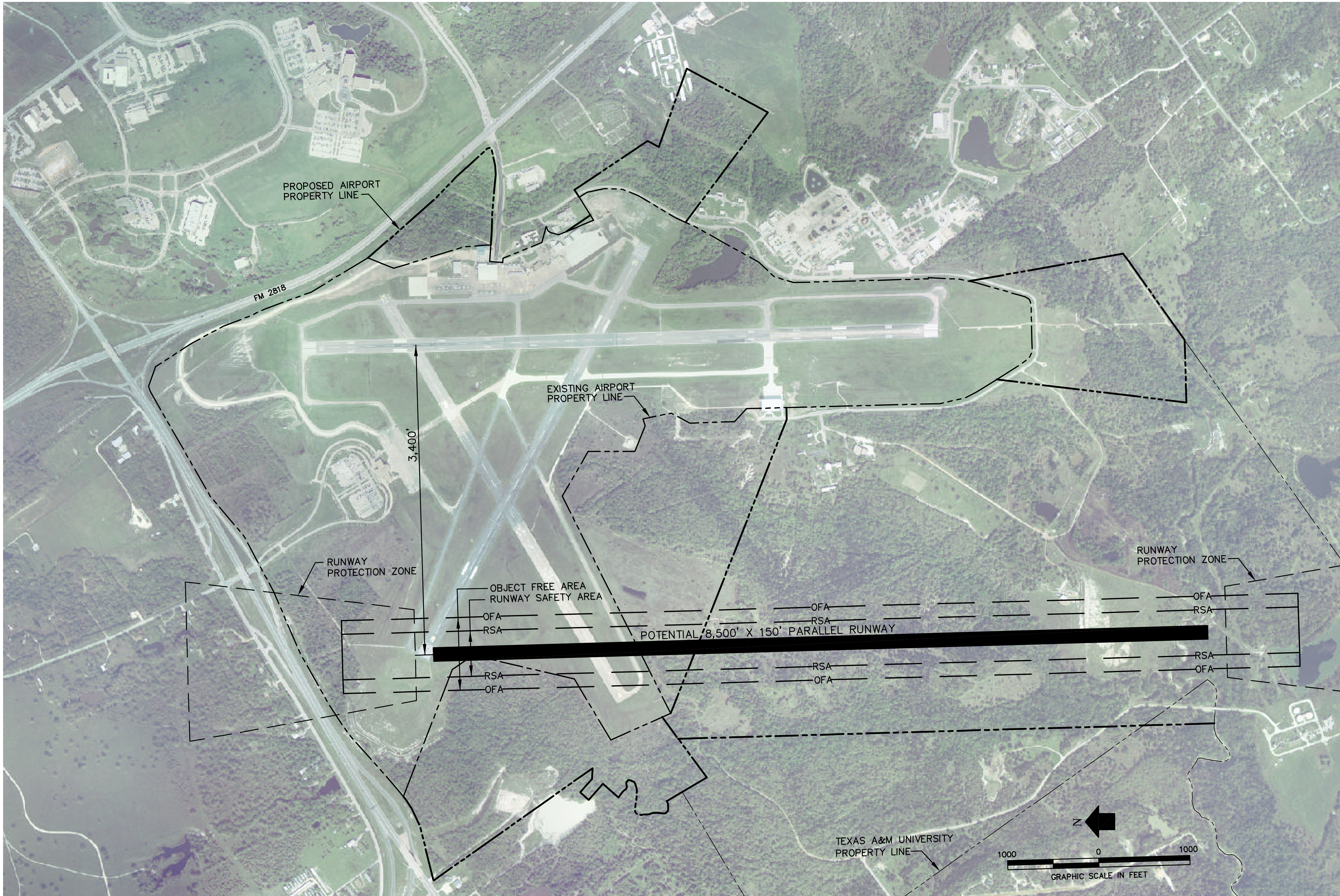

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FIGURE 5-2

FUTURE PARALLEL RUNWAY ALTERNATIVE
3,400' SEPARATION

Easterwood Airport
Master Plan Update

FIGURE 5-3

FUTURE PARALLEL RUNWAY ALTERNATIVE 4,300' SEPARATION

Easterwood Airport Master Plan Update

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5.2.2 EXISTING RUNWAY ALTERNATIVES

The facility requirements addressed in Section 4 noted that the existing runway system is adequate in terms of number of runways, runway length and runway width. However, deficiencies were noted in terms of runway safety areas, object free areas and runway separation standards with respect to parallel taxiways. The following paragraphs address these issues.

Runway Safety Areas

The extended runway safety areas for the approach to Runway 16 and Runway 28 do not meet FAA standards. The airport's perimeter road penetrates the northeast corner of the extended safety area for Runway 16 and the extended runway safety area for Runway 28 does not meet FAA standards for length or grade as described in Section 4.

No changes are recommended for the runway safety area for Runway 16. As shown in **Figure 5-4**, the perimeter road penetrates the corner of the safety area and was constructed with FAA approval. Access along the perimeter road is limited to airport employees and is controlled.

Alternatives for improving the extended runway safety area within the approach to Runway 28 were evaluated using FAA guidelines. FAA Order 5200.8, *Runway Safety Area Program* discusses options for addressing runway safety area that do not meet standards. Options presented in the Order include the following:

- Relocation, shifting or realignment of the runway;
- Reduction in runway length where the existing runway length exceeds that which is required for the existing or projected design aircraft;
- A combination of runway relocation, shifting, grading, realignment or reduction;
- Declared distances; and
- Engineered Materials Arresting System (EMAS)[1].

Relocation, shifting or realignment of Runway 10/28 are not feasible solutions. The general aviation area containing aircraft aprons and hangars is located immediately north of the runway, while a forested area that contains a small lake is located immediately south of the runway. With respect to shifting the runway, the extended safety area on the Runway 10 end was recently improved to meet FAA standards and cannot be extended due to the presence of FM60 just beyond the safety area.

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[1] EMAS is a cellular cement material that crushes under the weight of an aircraft to provide controlled deceleration in case of an overrun.

A reduction of runway length or declared distances is not feasible since the runway is the primary backup to Runway 16/34 and at 5,159 feet is already 1,841 feet shorter than the primary runway. Aircraft using this runway require all of the existing length. Finally, the use of EMAS is not a substitute for the construction of a standard safety area and cannot be considered as a replacement.

Thus, the construction of an extended runway safety area that meets standards appears to be the most feasible alternative. The FAA suggested this course of action in its runway safety area determination. This option would include the relocation of a portion of Nuclear Science Road (see Section 5.5.1) plus filling and grading of the area beyond the Runway 28 approach. It is anticipated that the cost of road relocation will be $1.2 million, while the estimated costs of the RSA construction would be $1.8 million.

Object Free Areas

The extended object free areas for both ends of Runway 16/34 and the approach end of Runway 28 do not meet FAA standards. The airport's perimeter road and FM2818 are located within the extended object free area for Runway 16. Nuclear Science Road is located within the corners of the extended object free area for Runway 34 as shown in **Figure 5-4**.

Due to the substantial differences in elevation between the roads within the object free area and each end of Runway 16/34, and the relatively small amount of penetration by these roads, it does not appear to be cost effective to consider shifting either the runway or the roadways to remove the penetration of the OFA. Therefore, no changes are recommended.

Runway Separation Standards

As noted in Section 4, several taxiways improvements are needed at Easterwood Airport to meet FAA separation standards for runway centerline to taxiway centerline. Recommended taxiway improvements include the realignment of Taxiway A north of Runway 22, the realignment of Taxiway B near the approach end of Runway 10 and the realignment of a portion of Taxiway C between C-1 and Runway 10/28. The required runway centerline to taxiway centerline separation is 300 feet for runways serving C-II aircraft and 400 feet for runways serving C-III aircraft. Therefore, projects are required to address the portions of Taxiways A, B and C that are less than the required separation from the adjacent runway. Taxiway alternatives that address these issues are presented in **Figure 5-5**.

5.2.3 TAXIWAY ALTERNATIVES

Other proposed taxiway projects are also shown in **Figure 5-5**. These projects include the southward extension of Taxiway H from H-1 to the approach end of Runway 34. This project would reduce the number of aircraft that would have to cross Runway 16/34 to taxi from the approach end of Runway 34 to the McKenzie Terminal or vice versa. The reduction of runway crossings is a major safety improvement that would be addressed by this project.

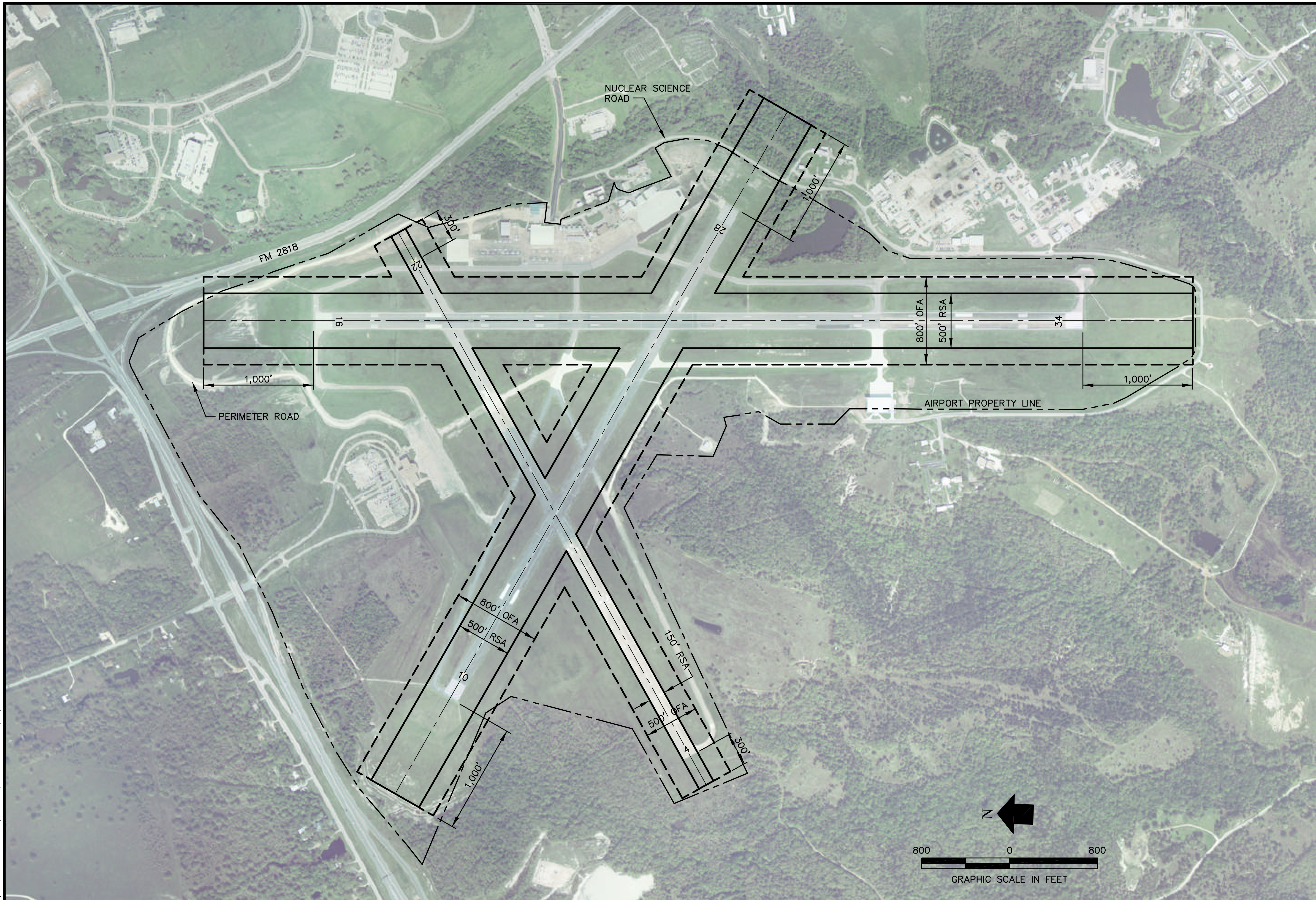

FIGURE 5-4

EXISTING RUNWAY SAFETY AREA AND OBJECT FREE AREA STANDARDS

Easterwood Airport Master Plan Update

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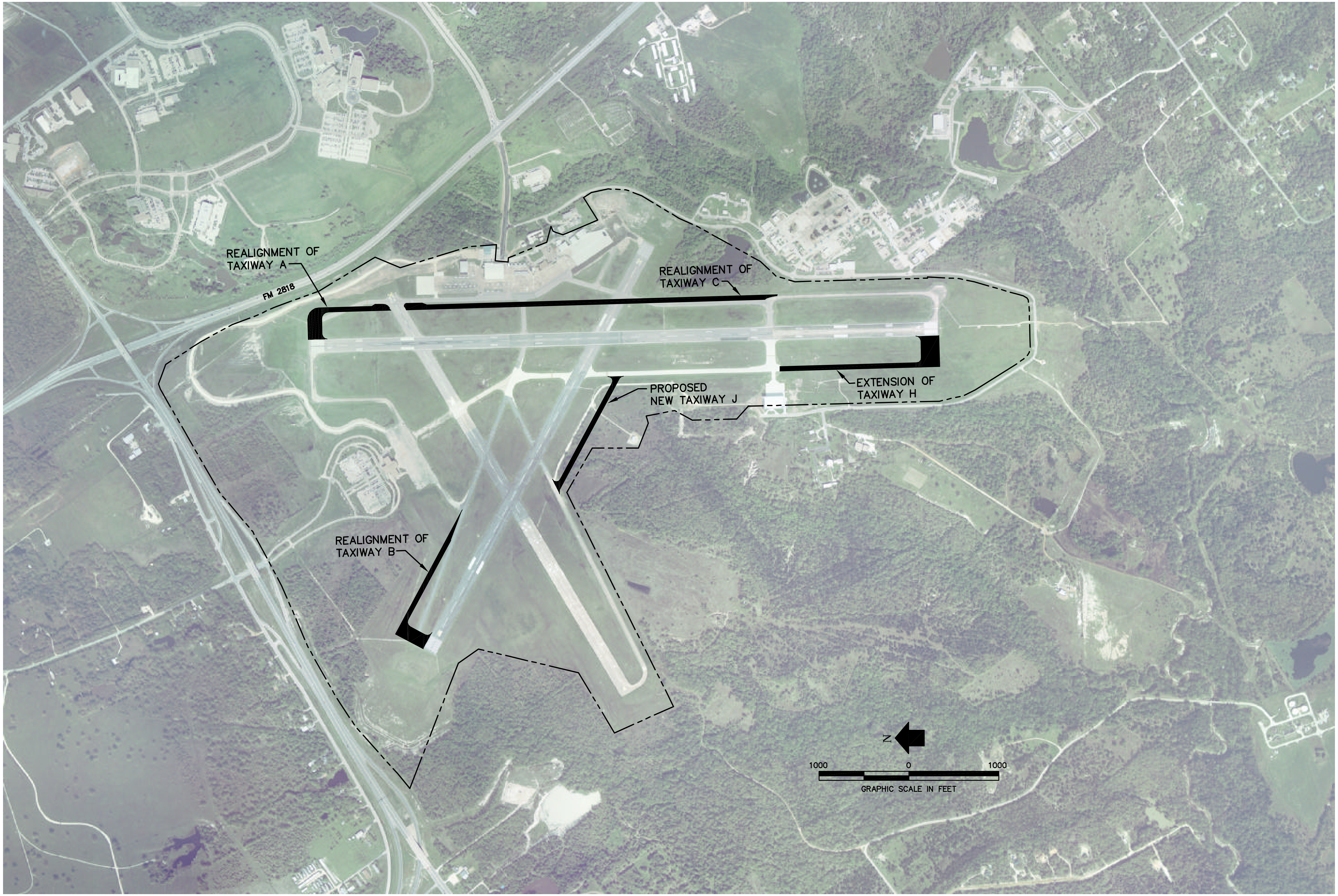

FIGURE 5-5

TAXIWAY ALTERNATIVES

Easterwood Airport Master Plan Update

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The last taxiway project shown in **Figure 5-5** is a proposed future Taxiway J that would connect Taxiway H and Taxiway E. This taxiway segment would allow future development on the west side of the airport to have a direct path to Runway 34 and Runway 4.

As part of the taxiway projects depicted in **Figure 5-5**, aircraft bypass capability is recommended for the connection of Taxiway A to the approach end of Runway 16 and the connection of Taxiway H to the approach end of Runway 34. Air traffic control personnel expressed a desire for holding bays at each end of Runway 16/34. Bypass connectors could provide the same capability as the holding bay in the limited space available.

5.3 AIR TRAFFIC CONTROL ALTERNATIVES

Section 4 noted that a new control tower is needed at Easterwood Airport. This section addresses potential locations for a new tower. Siting criteria for air traffic control towers is provided in FAA Order 6480.4, *Airport Traffic Control Tower Siting Criteria*. The Order specifies five mandatory criteria and nine non-mandatory criteria listed below:

Mandatory Siting Criteria

1. Maximum visibility of airborne traffic patterns.
2. Complete visibility of all airport surface areas used for aircraft movement that are controlled by tower personnel.
3. Sufficient space for required facilities and planned expansions.
4. Compliance with FAR Part 77.
5. Compatibility with existing and planned navigational aids.

Non-Mandatory Siting Criteria

1. Depth perception of all surface area to be controlled (i.e., perpendicular not parallel views and a vertical angle of 35 minutes or more).
2. Orientation to face north, east, south or west in that order of preference.
3. Avoidance of external light sources (i.e., ramp lights, parking area lights or reflective surfaces).
4. Visibility of all ground operations.
5. Avoidance of local weather constraints such as fog or ground haze.
6. Avoidance of high exterior noise levels.
7. Avoidance of ground access constraints.
8. Compatibility with planned airport development.
9. Avoidance of fumes and visibility impairments such as smoke and dust.

Of the five mandatory criteria, compliance with Part 77 clearances may be the most critical for Easterwood Airport. Therefore, Part 77 clearances were evaluated to determine potential locations. The required height of a future tower has not been determined, but it is possible that a new control tower may be up to 100 feet tall with antennas. Therefore, a 100-foot clearance line for Part 77 surface was drawn for the existing runways and potential tower locations were identified. The results of this analysis are shown in **Figure 5-6**.

As the figure indicates, the general aviation area, where the existing tower is located, is not a suitable tower location because the 100-foot clearance line for Part 77 surfaces encompasses the entire area. Furthermore, the orientation of a tower in the general aviation area would face the west, which is the least desirable orientation.

This leaves the area near the remote transmitter facility and the passenger terminal area as the only suitable locations for a new control tower. Three potential tower locations are depicted within these two areas. Site 1 appears to have substantial advantages over Sites 2 and 3. The orientation of the tower at Site 1 would primarily be to the north and east, which are the most desirable orientations. Conversely, the orientation of the tower at Sites 2 and 3 would be to the east and south, which is less desirable. In addition, Sites 2 and 3 would be near substantial external light sources generated by the passenger terminal parking lot. Finally, Sites 2 and 3 would potentially conflict with future development in the terminal area.

The only obvious disadvantage of Site 1 is its proximity to the remote transmitter facility and the potential for interference. To resolve concerns about radio interference, Site 1A was identified west of the TAC hangar. This site would provide approximately 1,500 feet of clearance from the remote transmitter facility. Although a detailed investigation would be needed to definitely conclude this distance will resolve any radio interference concerns, the distance being provided should be sufficient. Therefore, pending an FAA review of this issue, Site 1A appears to be the preferred location for a new control tower.

5.4 TERMINAL AREA ALTERNATIVES

5.4.1 MCKENZIE TERMINAL

The demand/capacity analysis noted a few deficiencies in the passenger terminal. These deficiencies include insufficient space in the departure holdroom, as well as insufficient space and an awkward configuration in the baggage make-up area. The demand/capacity analysis also noted concerns regarding vertical circulation in the central corridor. These issues are addressed in the following paragraphs.

Departure Holdroom Alternatives

The existing departure holdroom is located on the first floor of McKenzie Terminal as depicted in **Figure 5-7**. This holdroom is too small to accommodate a full load of passengers on a 50-seat regional jet and is also too small to accommodate passenger loads associated with more than one flight at the same time.

Other concerns with the existing departure holdroom include the fact that passenger queues for security screening back up into the same space where arriving passengers queue to collect their checked baggage and that the baggage claim area is on the opposite side of the first floor from the entrance for arriving passengers. This leads to crossing pedestrian flows and also makes the location of the baggage claim area less obvious to arriving passengers.

Two alternatives have been identified for addressing these concerns. The first alternative is to reconfigure the departure holdroom on the first floor. The second alternative is to relocate the departure holdroom to the second floor. **Figure 5-8** presents a potential reconfiguration of the first floor departure holdroom. The glass partitions that comprise the holdroom could be reconfigured to form a departure holdroom on the east side of the terminal. The entrance for arriving passengers could then be relocated to the west side of the terminal thereby providing a direct and unobstructed path to the baggage claim carousel. The reconfiguration would move the security screening checkpoint from its current location to a point just outside of the airport's conference room. An additional glass partition could be established just beyond the checkpoint for secondary screening that would allow passengers to maintain visual observation of their possessions while being screened. The estimated cost of this reconfiguration is $46,000.

Figure 5-9 presents the establishment of a departure holdroom on the second floor of the terminal. This alternative would require the relocation of the security screening station to the second floor on the right side of the stairwell. Glass partitions would be constructed around the perimeter of the existing stairwell to provide a secure barrier. This alternative would also require the installation of two loading bridges. The estimated cost of this reconfiguration is $1.3 million.

Alternative 1 and Alternative 2 are not mutually exclusive. Alternative 1 is a viable option to the existing departure holdroom in the short term and for as long as Easterwood Airport is served by aircraft that require passenger boarding via the ramp. Alternative 2 may be the more desirable option in the long-term, or whenever the airport is served by aircraft that could be boarded via loading bridges.

Baggage Make-Up Alternatives

The existing inbound and outbound baggage make-up area on the first floor is depicted in **Figure 5-10**. As previously noted in the demand/capacity analysis, the existing make-up area is undersized and has an awkward configuration that requires tight turns by baggage tug and baggage carts. This results in the tugs and carts frequently colliding with terminal walls leading to damage to both the terminal and the tugs. Discussion with airline personnel indicated that some baggage carts lack rotating rear wheels which reduces their ability to maneuver in tight spaces.

Alternatives for reconfiguring the baggage make-up area were explored to rectify these problems. The alternatives range from minimal changes that could be implemented at little expense to more substantial changes that would require removal of existing walls and the construction of new walls to increase the size of the area.

Figure 5-11 presents Alternative 1. This alternative proposes two simple changes. The first change consists of relocating the existing metal dividers that form the front of each airline's area toward the terminal's rear wall to increase the amount of space available for baggage tugs to turn when exiting their space. The second change would be to increase the size of the tug exit doorway by 3 feet to minimize collisions. The existing door next to the exit would be relocated to accommodate the larger exit. The estimated cost of Alternative 1 is approximately $42,000.

Figure 5-12 presents Alternative 2. This alternative proposes the same changes as Alternative 1, but also includes the relocation of the rear wall of the terminal by 8 feet to increase airline space and mitigate the loss of storage space that would occur when the metal dividers are relocated. The relocation of the rear wall of the terminal would also require the construction of a new roofline in the rear of the terminal to cover the additional space created. **Figure 5-13** depicts this new roof and the expanded terminal area. The estimated cost of Alternative 2 is approximately $191,000.

Alternatives 1 and 2 attempt to maintain the four existing baggage make-up areas. However, there are only two airlines currently operating at Easterwood Airport and given the current state of the airline industry, it is unlikely that two additional airlines would begin service at the airport. Therefore, another approach to reconfiguring the baggage make-up area would be to plan the space for fewer airlines thereby allocating more space to each airline.

While the existing space could be reallocated for just two carriers, that approach would not enable airport management to respond to any additional demand that materializes for airline space. Therefore, an alternative for accommodating three carriers was deemed desirable and was explored. Such a concept would increase space available to existing carriers, but would still provide airport management with the flexibility to accommodate another carrier if necessary.

Figure 5-14 presents Alternative 3. This alternative proposes some of the same changes as Alternative 2, but also includes the relocation of the stairwells from the second floor and the relocation of metal dividers between airlines. This would allow the existing space to be allocated to three airlines. The relocation of the stairwell from inside the terminal to the rear of the terminal would require that a new enclosed area be constructed behind the existing terminal wall. This would reduce the view from the airline offices to the aircraft ramp. The estimated cost of Alternative 3 is $384,000.

Alternative 2 is recommended as the preferred alternative for the reconfiguration of the baggage make-up area. The alternative should solve the tug maneuvering problems and space problems without interfering with visibility of the aircraft apron and will be substantially less expensive than Alternative 3.

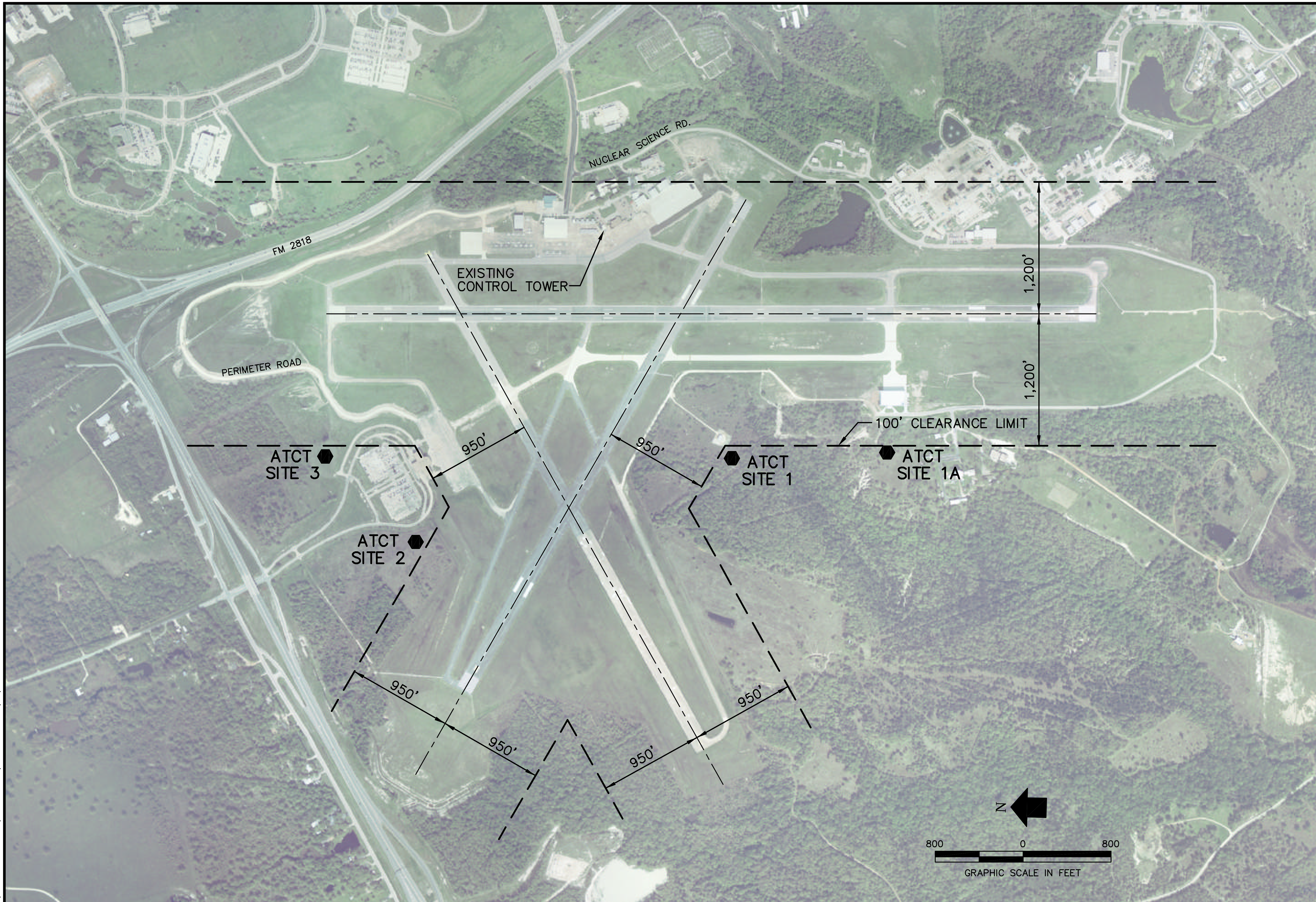

FIGURE 5-6

AIR TRAFFIC CONTROL TOWER LOCATION ALTERNATIVES

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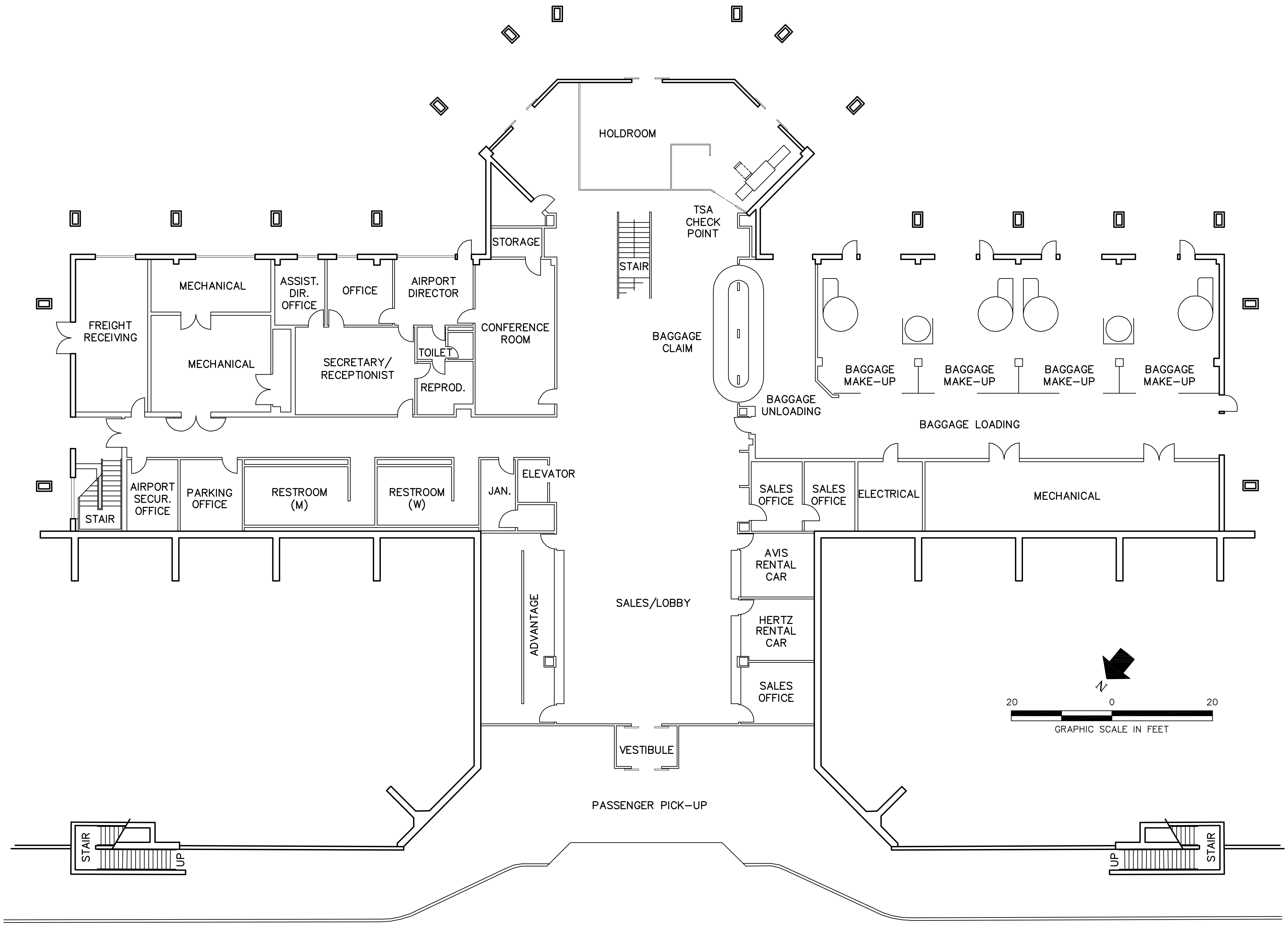

FIGURE 5-7

MCKENZIE TERMINAL
EXISTING FIRST FLOOR PLAN

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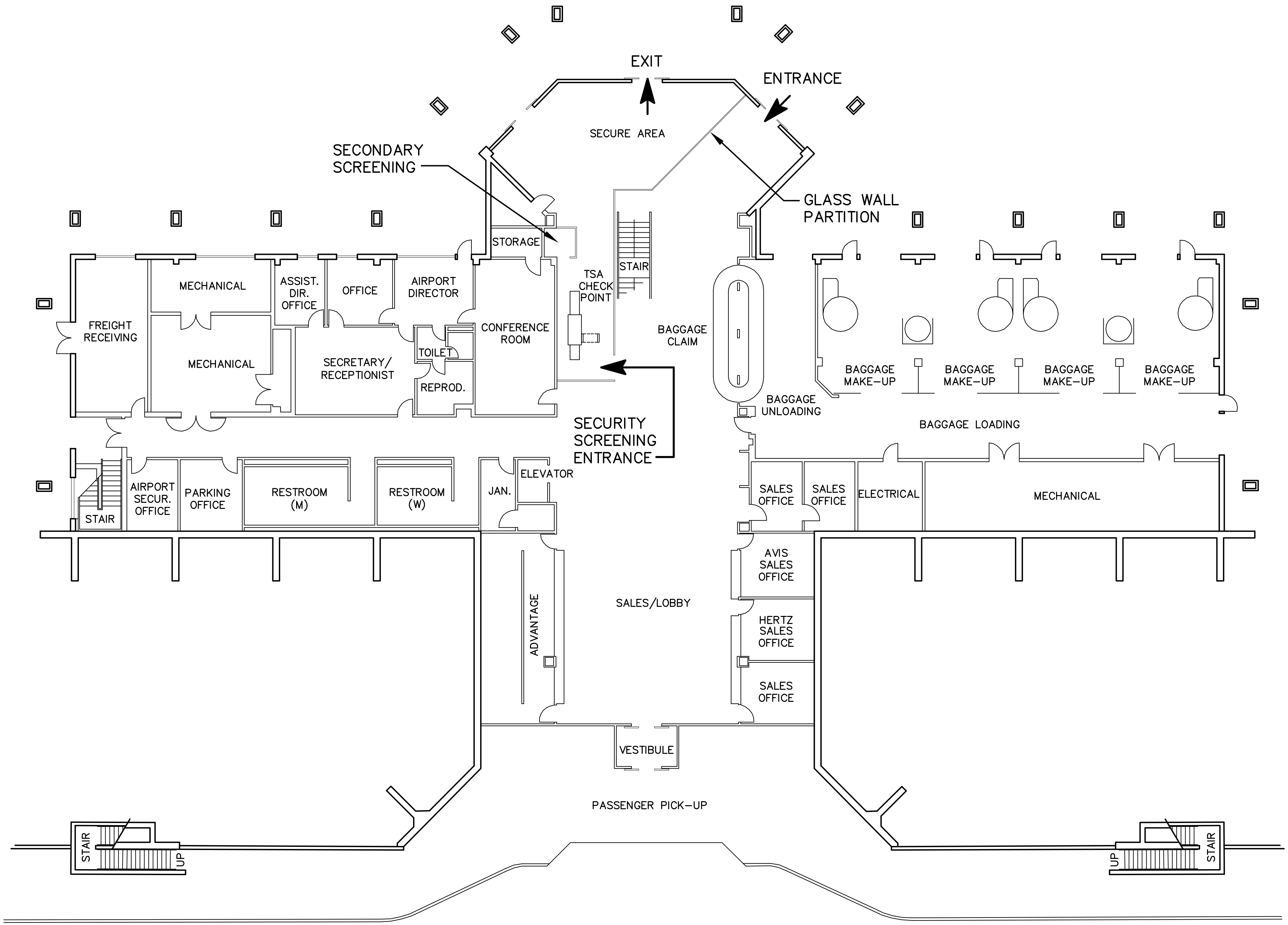

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FIGURE 5-8

MCKENZIE TERMINAL
FIRST FLOOR RECONFIGURATION

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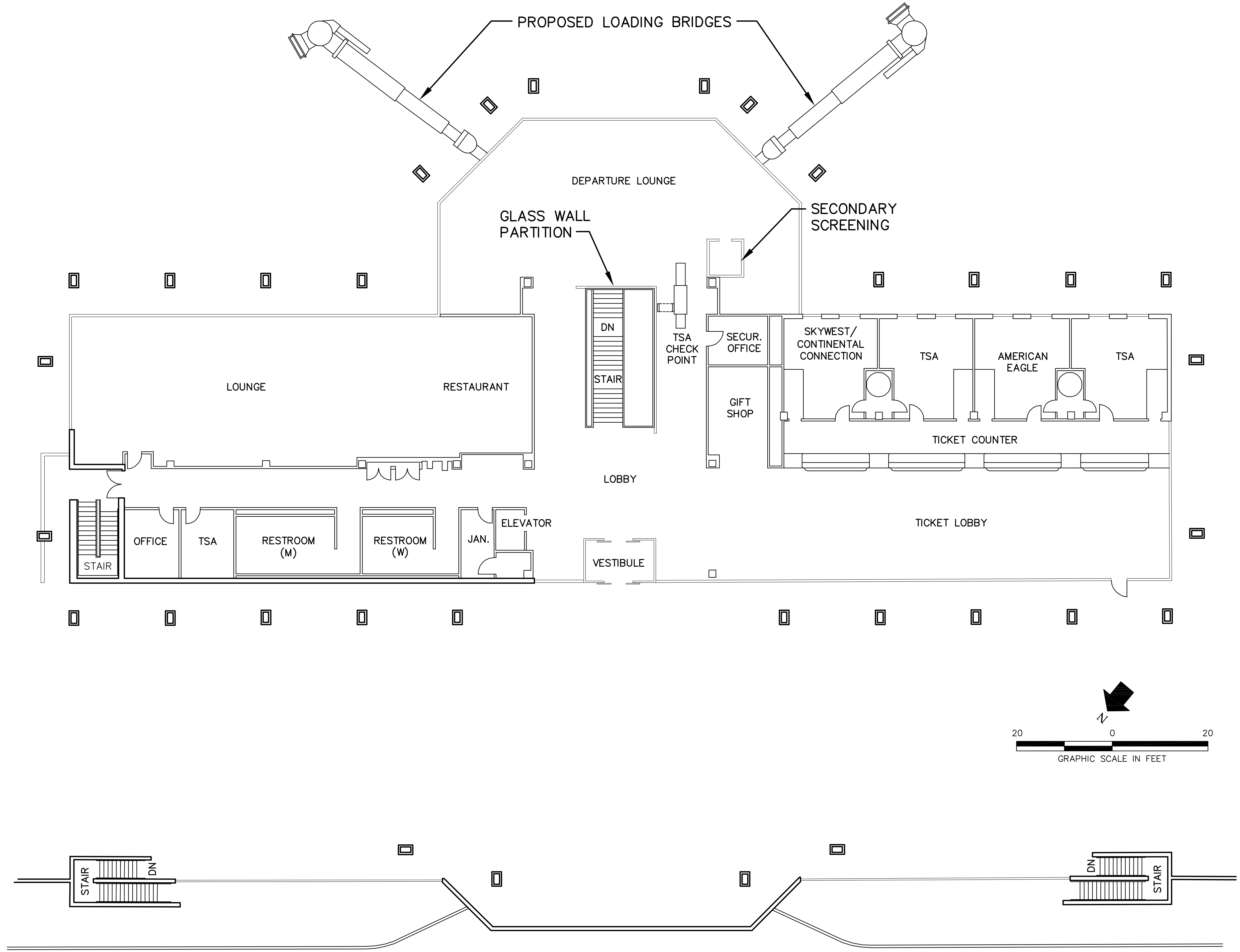

FIGURE 5-9

MCKENZIE TERMINAL
SECOND FLOOR HOLDROOM

Easterwood Airport
Master Plan Update

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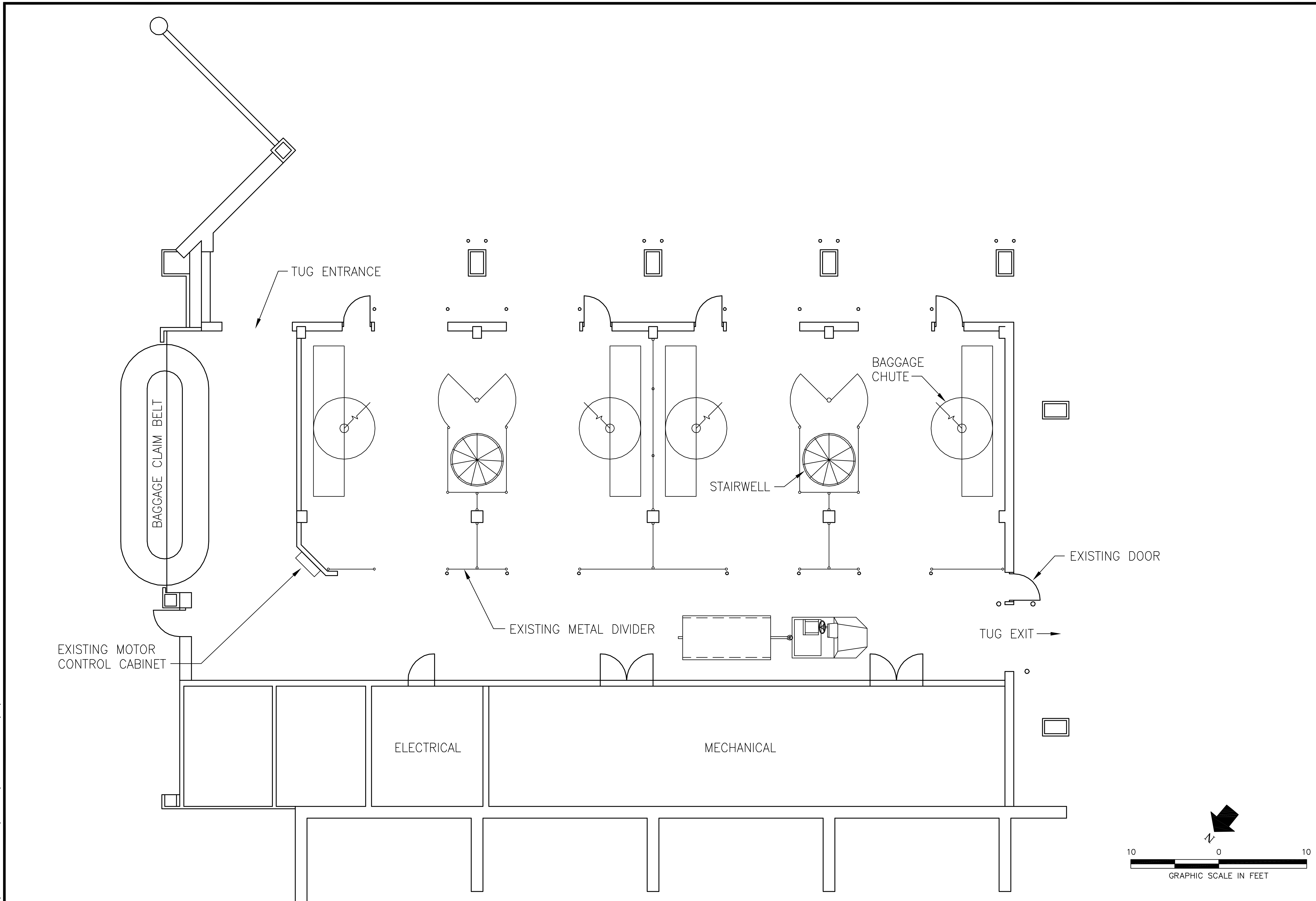

FIGURE 5-10

EXISTING BAGGAGE MAKE-UP AREA

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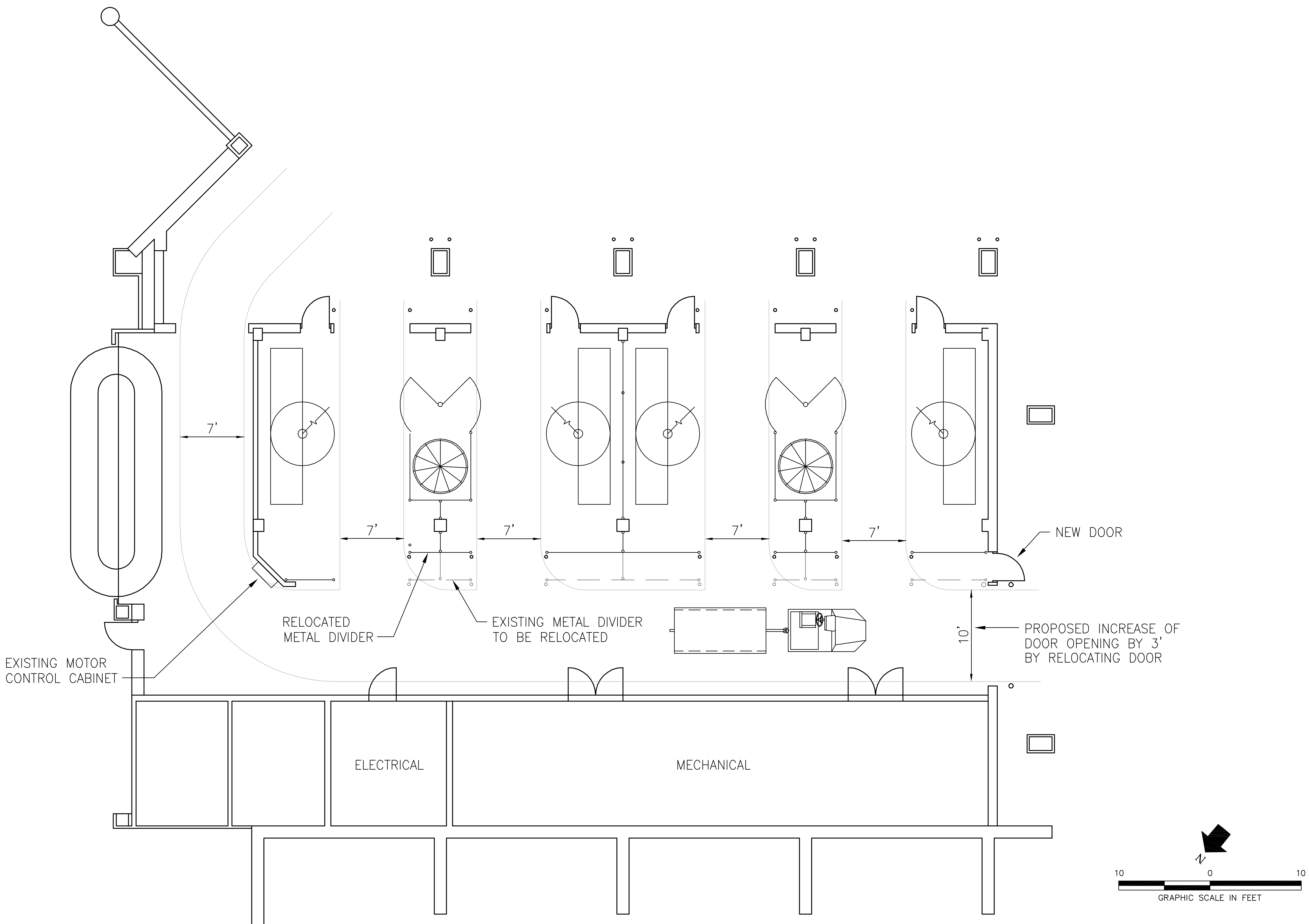

FIGURE 5-11

BAGGAGE MAKE-UP AREA
ALTERNATIVE 1

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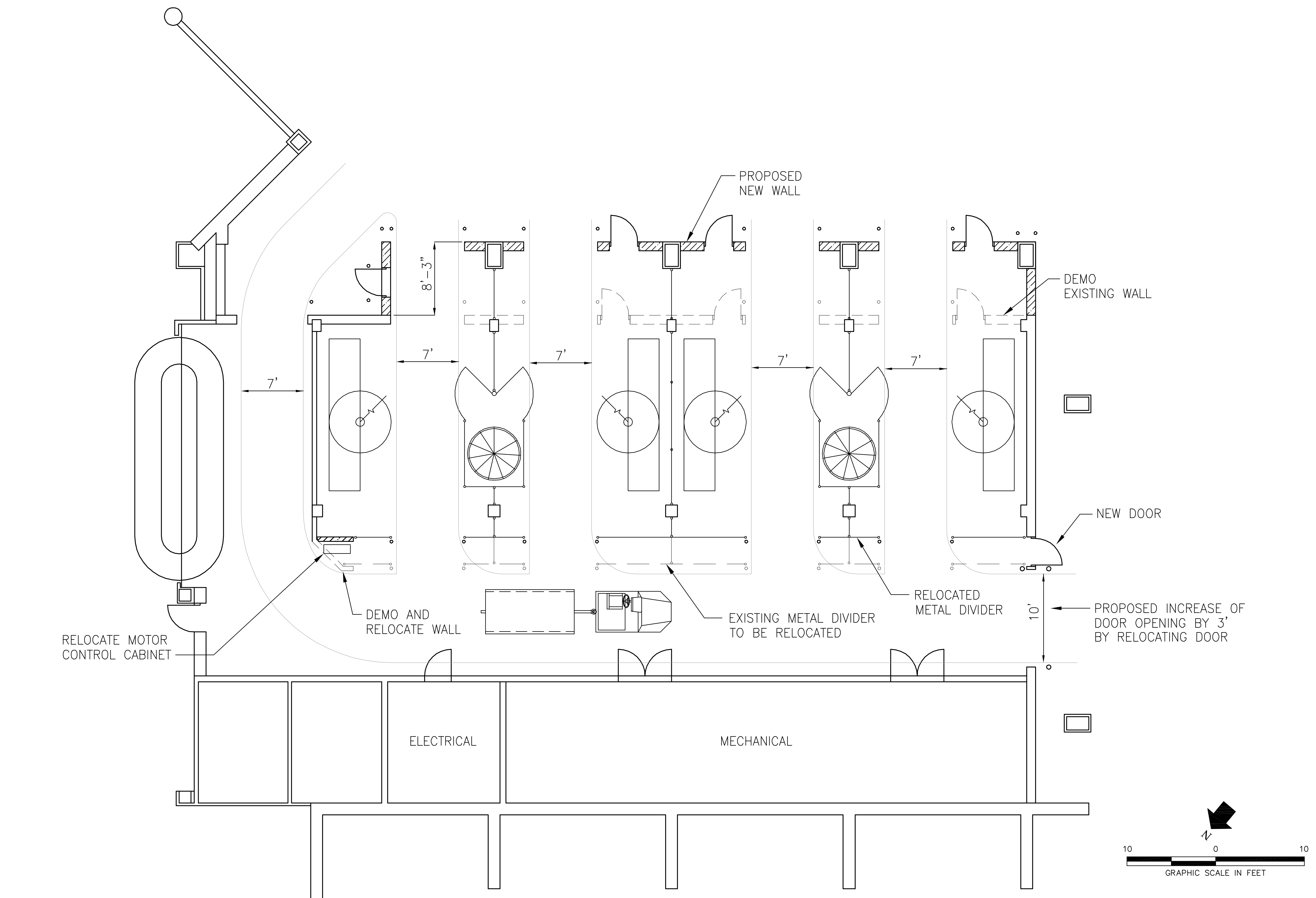

FIGURE 5-12

BAGGAGE MAKE-UP AREA ALTERNATIVE 2

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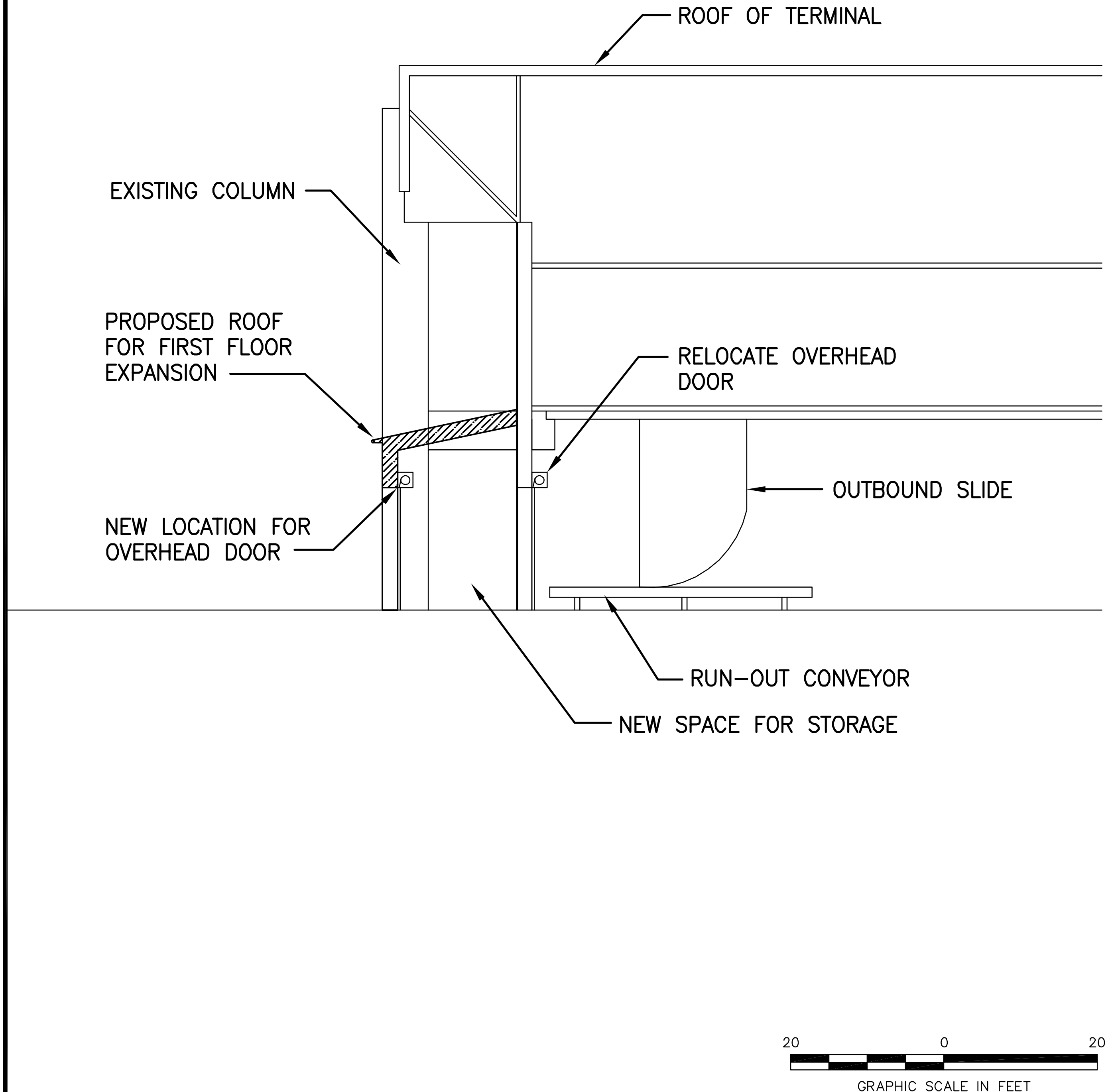

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ALTERNATIVE 2 ROOFLINE

FIGURE 5-13

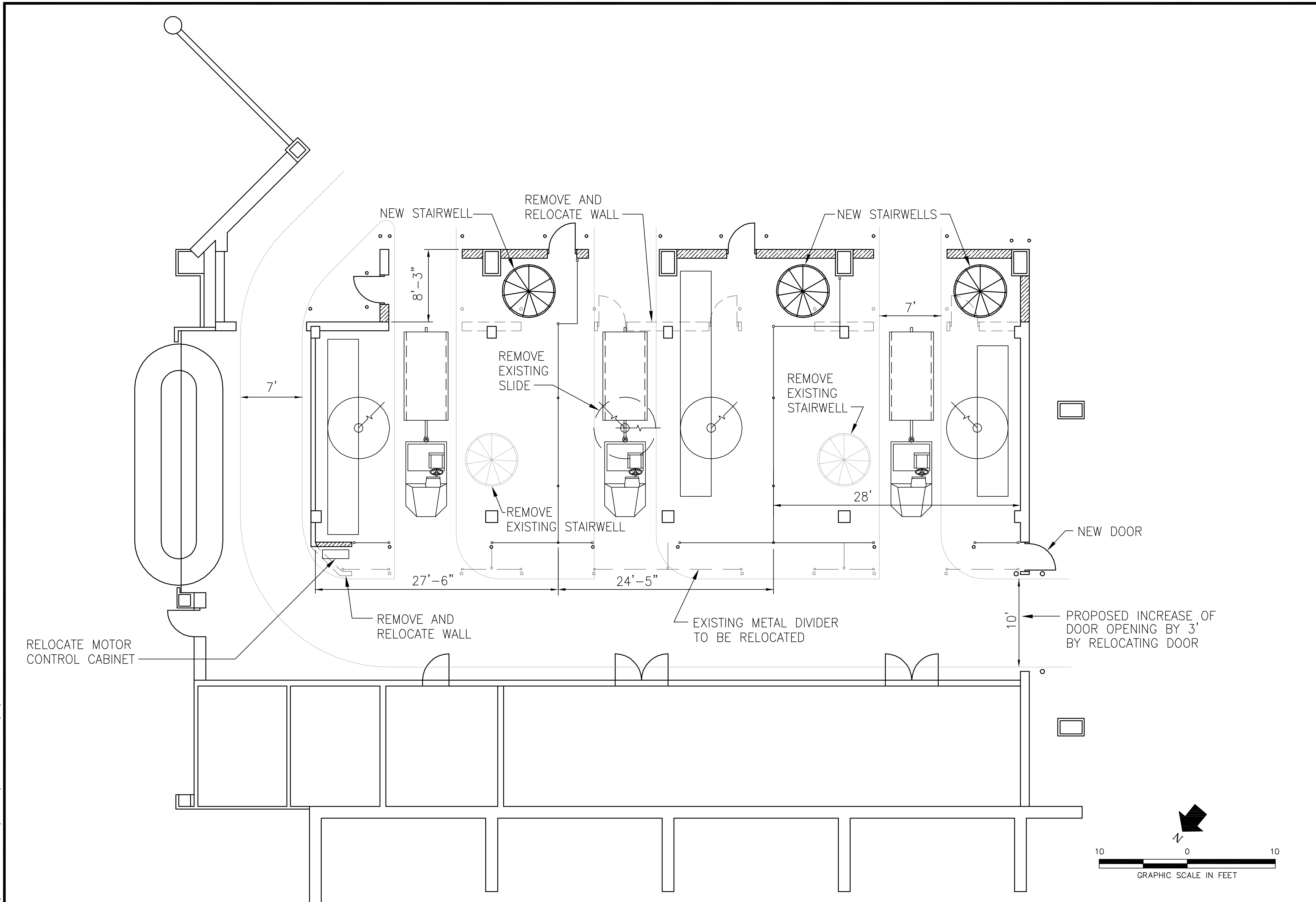

FIGURE 5-14

BAGGAGE MAKE-UP AREA
ALTERNATIVE 3

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Vertical Circulation

Vertical circulation in the central corridor of the terminal consists of a stairway and an elevator. The stairway and the elevator provide sufficient capacity to accommodate all required movement of passengers between the two levels of the terminal. However, options for adding an escalator next to the stairway were requested by airport management and are addressed in this section.

There is adequate space for the construction of an escalator next to the stairway. However, this space is currently used for passenger queues leading to security screening and by passengers claiming baggage at the baggage carousel. Therefore, options for adding an escalator in this location are dependent upon the relocation of the departure holdroom to the second floor and the relocation of the baggage claim area.

Figure 5-15 presents an alternative for the installation of an escalator once the departure holdroom is relocated to the second floor. It includes a proposed relocation of the existing baggage carousel to the rear wall of the terminal. This relocation would provide sufficient space for the installation of an escalator and would also allow the baggage claim area to be highly visible when arriving passengers descend the stairs to the first floor to claim their baggage. It would also provide the benefits of a longer baggage claim carousel. This alternative can be included in the airport plans and constructed at such time that demand or convenience dictate. The estimated cost for this alternative is approximately $701,000.

5.4.2 MCKENZIE TERMINAL AIRCRAFT RAMP

The demand capacity analysis noted that the McKenzie Terminal aircraft ramp is not adequately sized to accommodate charter activity and diversions of air carrier aircraft from nearby airports in addition to the scheduled commuter aircraft that use the ramp each day. It was recommended that the ramp be expanded to accommodate at least two air carrier aircraft in additional to the scheduled commuter aircraft.

Three alternatives were developed to address this requirement. **Figure 5-16** presents Alternative 1. This alternative proposes an expansion of the existing ramp by 150 feet at both its east and west ends. As the exhibit indicates, this would provide sufficient space for an air carrier aircraft to power-in and power-out at each end of the ramp.

Figure 5-17 presents Alternative 2. This alternative proposes the same expansion at each end of the ramp as Alternative 1. However, Alternative 2 also proposes an increase of the ramp’s depth by constructing a new taxilane at the south edge of the ramp. This taxilane would allow more of the existing ramp to be used for parking because the taxilane clearance line would shift southward. Both airport management and air traffic control staff indicated that increased depth on the ramp would be desirable to maximize flexibility in handling charters and diversions of air carrier aircraft.

Figure 5-18 presents Alternative 3. This alternative shows how additional ramp could be constructed in the long-term if greater needs for ramp space materialize. This ramp configuration could accommodate three to four additional aircraft depending upon their size.

Review of the ramp alternatives with airport management indicated a preference for Alternative 2 as the preferred alternative due to its increased flexibility in accommodating aircraft compared to Alternative 1. Therefore, Alternative 2 will be included in the airport plans. Alternative 3, which is a further expansion, will also be included in the airport plans as a long-range option that would only be constructed in response to future levels of demand.

5.5 SURFACE TRANSPORTATION ALTERNATIVES

5.5.1 ROADWAY ACCESS

Section 4 noted that existing roadway access to the McKenzie Terminal and the general aviation area is good, but that a physical rehabilitation of the McKenzie Terminal Road is needed. A project to rehabilitate the road will be included in the airport plans. Therefore, the only roadway alternatives that require an assessment are options related to the rerouting of Nuclear Science Road to allow construction of the extended Runway 28 safety area.

Alternative routings for Nuclear Science Road are depicted in **Figure 5-19**. Alternative 1 proposes that Nuclear Science Road be rerouted to connect with FM2818 at the intersection of West Luther Street. This route would bring the road past the Texas A&M Poultry Science Research Center and through the Brayton Fire School. Alternative 2 proposes that Nuclear Science Road begin farther east along West George Bush Drive closer to FM2818 and then pass around the extended runway safety area and connect into the same alignment proposed by Alternative 1. Alternative 3 proposes that most of the existing Nuclear Science Road be maintained and that the road be relocated close to the edge of the extended runway safety area.

Several factors affect the viability of these routings. First, there is a creek and associated floodway located east of the existing Nuclear Science Road. All of the alternatives would require crossing this creek and its floodway. Some of the alternatives require crossing the creek more than once. Second, certain alternatives change how access would be achieved to the Brayton Fire School and general aviation facilities on the west side of the airport. This leads to orientation and signage issues. Third, some routings would require relocation of existing facilities. A discussion of these factors per alternative is provided in the following paragraphs.

Alternative 1 would provide a direct connection to FM2818. However consultation with planners and traffic engineers at the City of College Station revealed that this intersection would not warrant the installation of a traffic signal due to its low traffic volumes. Therefore, entry and exit from this road would not be controlled. Another disadvantage of Alternative 1 is that it would provide a second entrance into existing and proposed airport facilities on the west side of Runway 16/34.

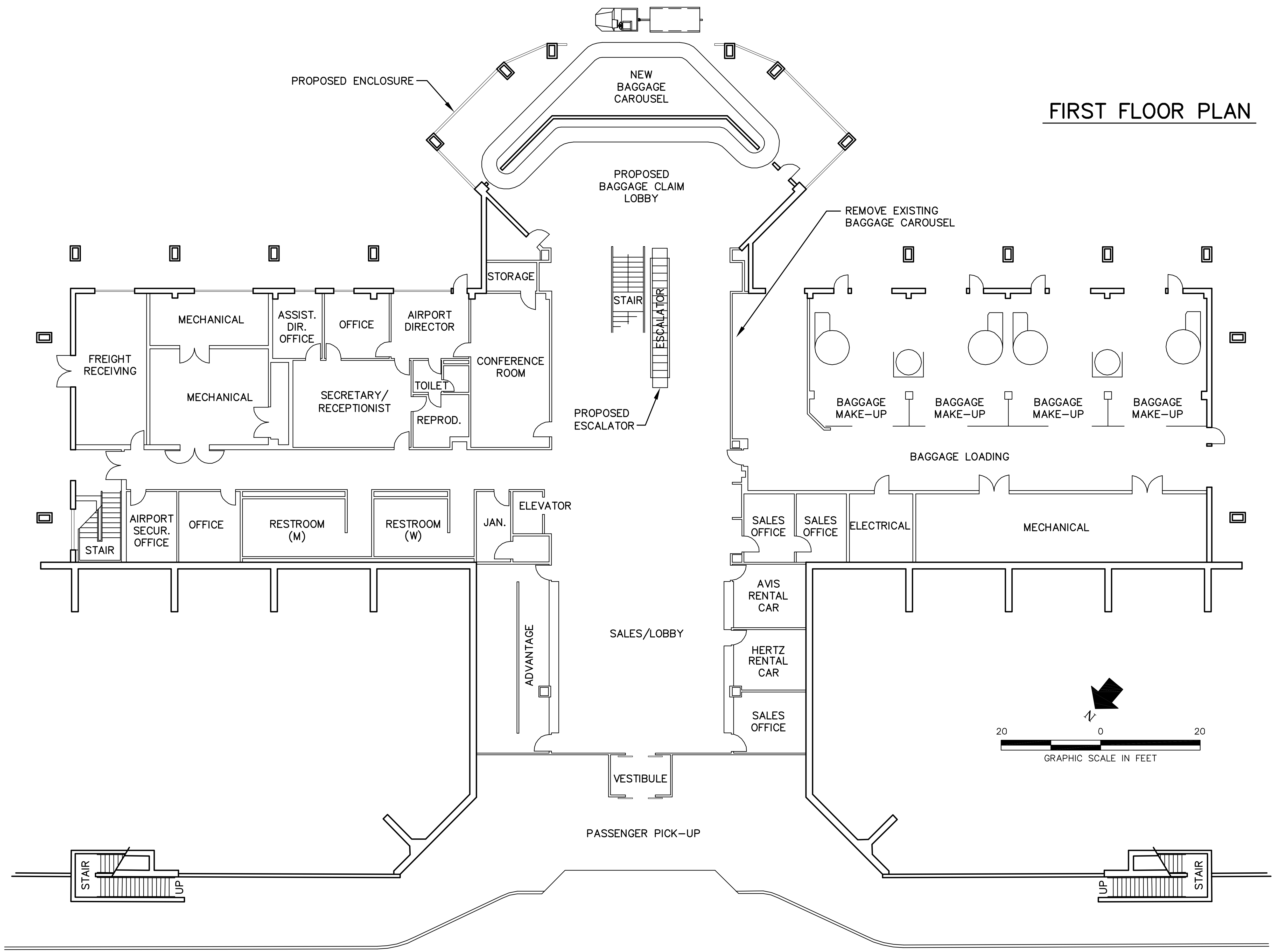

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FIGURE 5-15

VERTICAL CIRCULATION ALTERNATIVE AND BAGGAGE CLAIM RELOCATION

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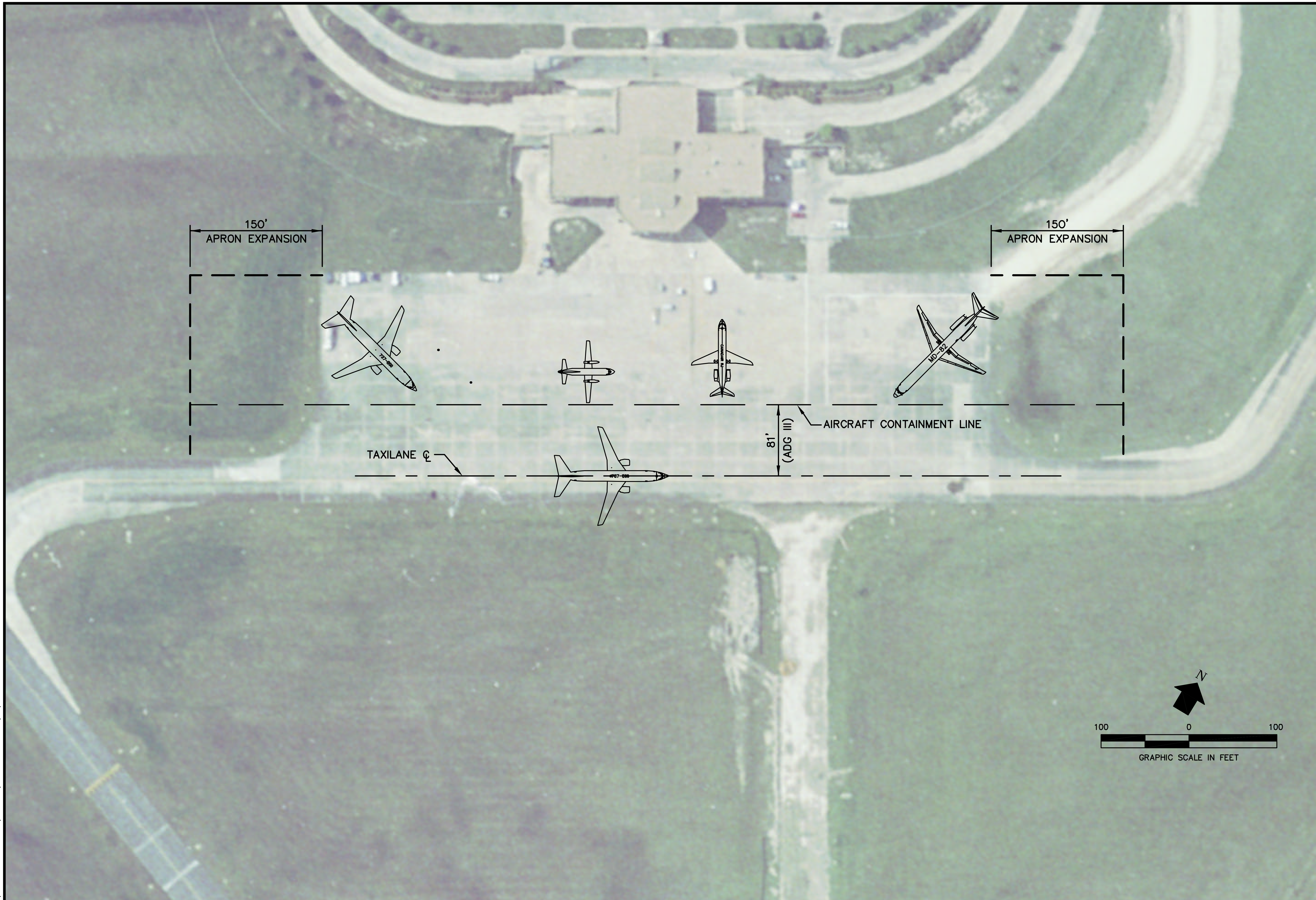

FIGURE 5-16

MCKENZIE TERMINAL AIRCRAFT RAMP
ALTERNATIVE 1

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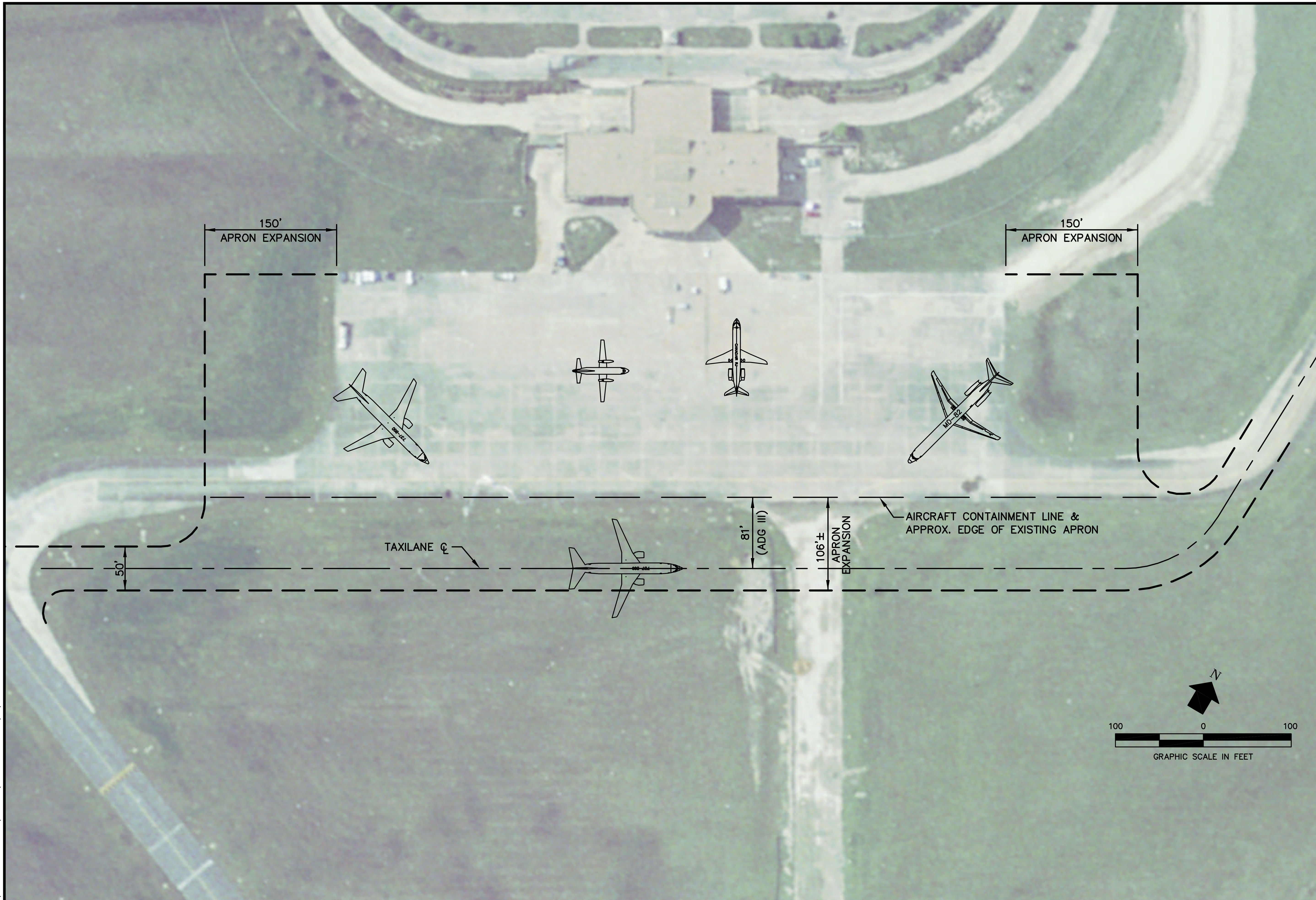

FIGURE 5-17

MCKENZIE TERMINAL AIRCRAFT RAMP
ALTERNATIVE 2

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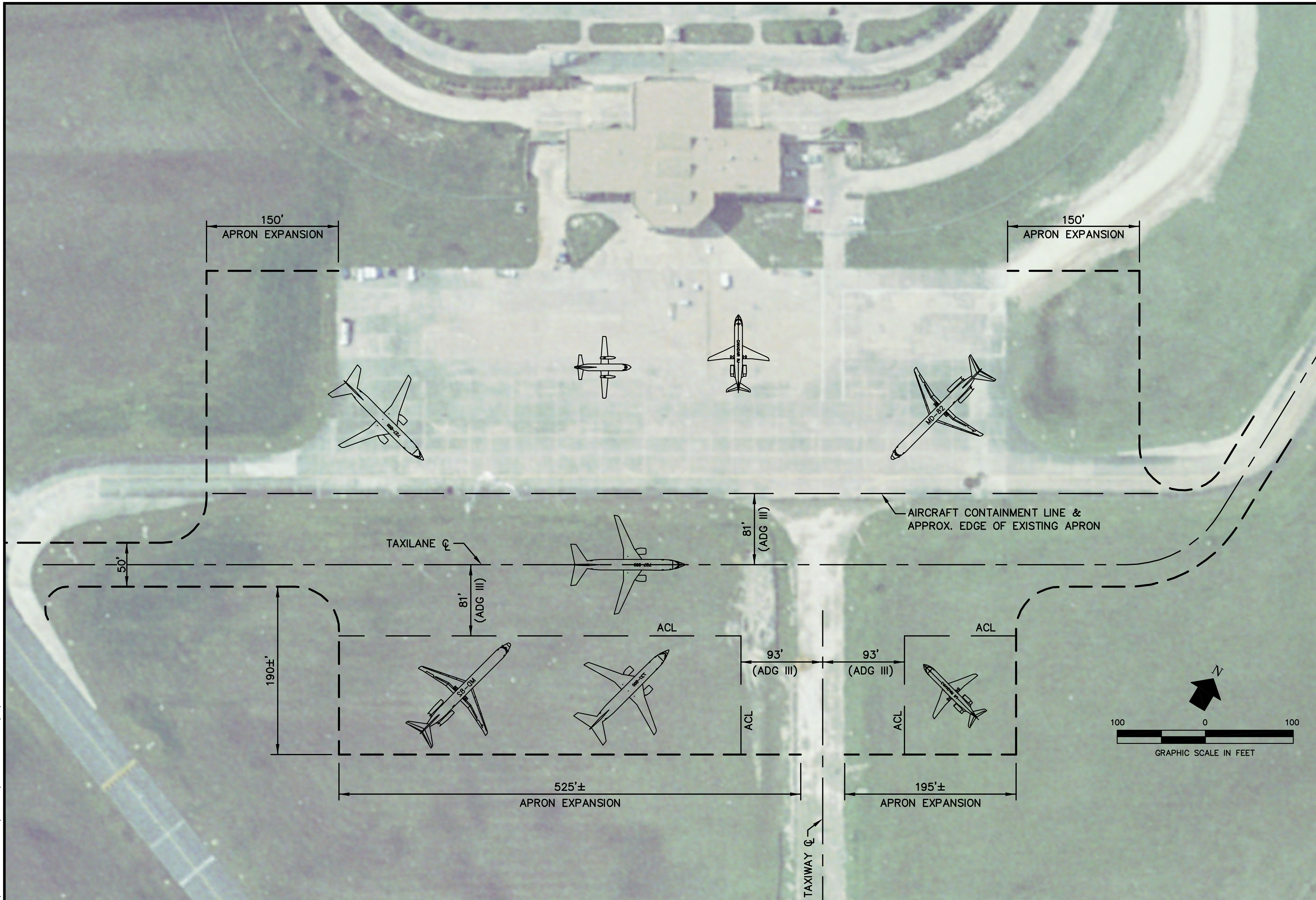
FIGURE 5-18

MCKENZIE TERMINAL AIRCRAFT RAMP ALTERNATIVE 3



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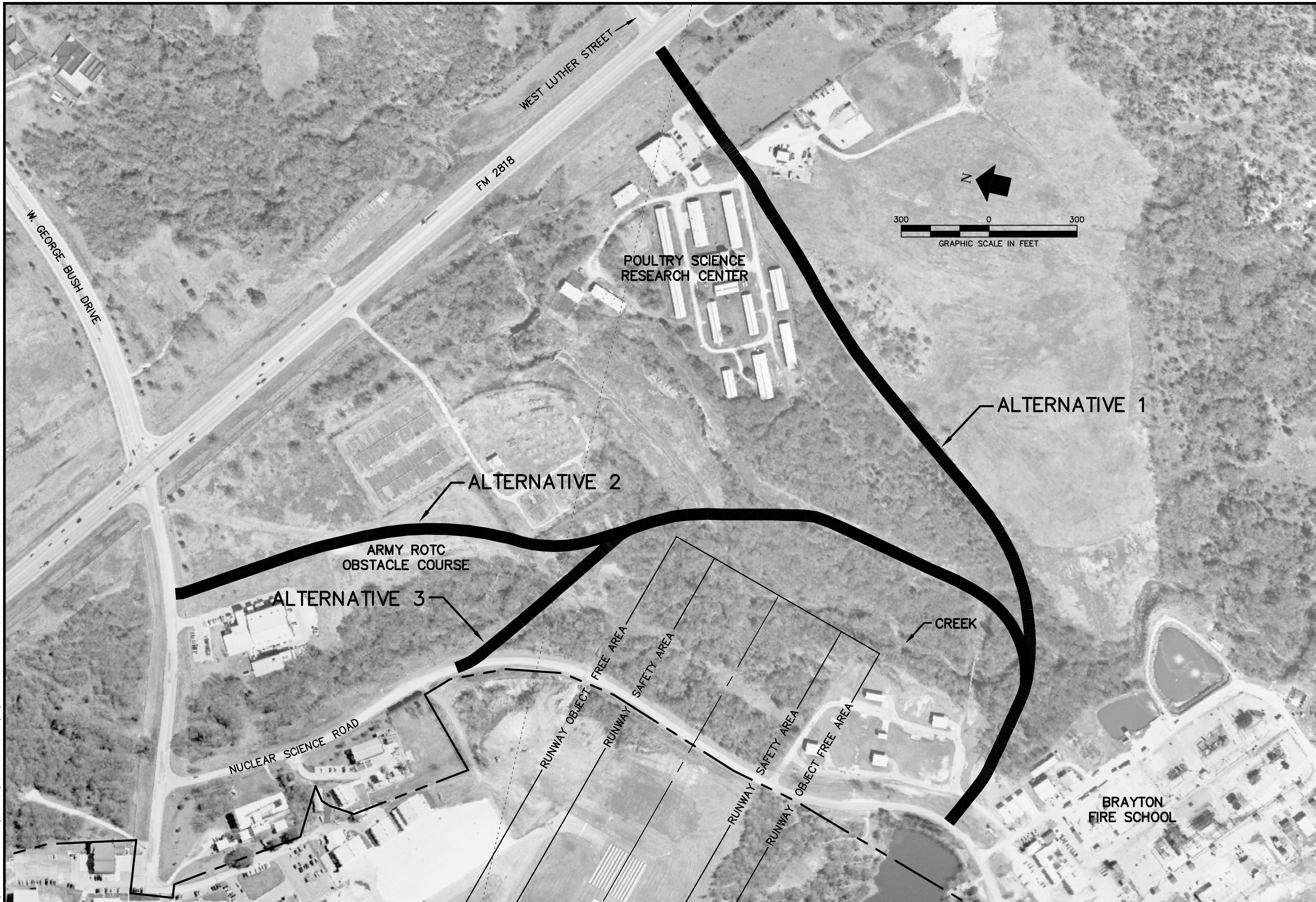

FIGURE 5-19

ROADWAY ACCESS ALTERNATIVES

Easterwood Airport
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J:\COLLEGE STATION TX\EXHIBITS\FIG 5-19.DWG 07/01/04 15:13

This would require additional signage and may lead to some confusion regarding the airport's general aviation users, because future airport facilities on the west side of the airport would be accessed via this road instead of West George Bush Drive. The advantages of Alternative 1 are that it would only require crossing the creek and floodway at one point. Consequently, it is estimated be the least costly of the three alternatives at $1,210,000.

Alternative 2 has the advantage of maintaining a connection to West George Bush Drive, thereby maintaining one common entrance to general aviation facilities and providing signalized access to the airport. The primary disadvantage of Alternative 2 is that it would pass through an area that currently contains an Army ROTC obstacle course and would require relocation of those facilities. These facilities were previously relocated as part of a project to improve the extended runway safety area in the approach to Runway 10. This alternative is estimated to cost $1,359,000.

The primary advantage of Alternative 3 is that it maintains the existing entrance from West George Bush Drive to Nuclear Science Road. Therefore, it presents the least change for users. The primary disadvantage of this alternative is that it would require crossing the creek in two locations and therefore would be the most expensive routing at $1,275,000.

Consultation with representatives of the Brayton Fire School revealed that Alternative 1 was preferred over Alternative 2 and 3. As a result of this preference, and its lower costs, Alternative 1 will be included in the airport plans as the preferred alternative.

5.5.2 GENERAL AVIATION AREA AUTOMOBILE PARKING

Section 4 noted that additional parking is desired in the general aviation area. Site inspections revealed that the existing pavement in this area requires rehabilitation and reconfiguration to improve flow. Three alternatives that range from minimal to extensive were prepared to address these issues and are described in the following paragraphs.

Figure 5-20 depicts Alternative 1. This alternative consists of adding new parking spaces by cutting into the greenfield area in the center of the parking lot. A total of 24 additional spaces could be created in this area.

Figure 5-21 presents Alternative 2. This alternative proposes a reconfiguration of the existing entrance road and the creation of additional spaces in several areas. The entrance road would be shifted to provide additional parking adjacent to the Texas A&M Wind Tunnel facility. Parking behind the T-hangars would also be reconfigured and parking associated with the air traffic control tower would be eliminated because this facility will be relocated to the west side of the airport. The center greenfield area would be expanded and would provide a suitable location for a prominent entrance sign. The existing area for parking between the general aviation terminal and the bay hangar would be reconfigured to increase the number of spaces and improve vehicle flow.

Figure 5-22 presents Alternative 3. This alternative proposes that additional parking be created through a combination of changes proposed by Alternative 2 and the construction of parking in the greenfield area. This alternative would provide the most parking spaces, but would have the most severe impact upon the area's aesthetics.

Review of the three alternatives with airport management revealed that Alternative 2 is preferred due to its superior aesthetics and improved use of existing parking areas.

5.6 SUPPORT FACILITIES ALTERNATIVES

5.6.1 RENTAL CAR SERVICE FACILITY

The demand capacity analysis noted that a consolidated facility for servicing rental cars is desired. Therefore, alternative sites for the placement of such a facility were explored. Cost, liability and time factors dictate that a rental car servicing facility be located close to the passenger terminal.

Figure 5-23 illustrates three potential locations for a rental car servicing facility. Sites 1 and 2 are located on the west and east side of the entrance road to the McKenzie Terminal. Site 3 is located along the service road leading to the McKenzie Terminal aircraft ramp.

All three sites are relatively close to the passenger terminal although Site 3 is the closest. Sites 1 and 2 could make use of existing forested areas to shield visibility of the servicing facility from drivers entering the terminal area, while Site 3 would clearly visible by all drivers leaving the terminal area. Thus, from an aesthetic point of view, Sites 1 and 2 have an advantage over Site 3. Site 1 is more favorable than Site 2 from a phasing and development perspective. This is because aircraft ramp and hangar facilities are proposed in the long-term along Taxiway B.

Finally, field inspection revealed that conditions at Site 1 are favorable from a terrain perspective and has the added benefit of being next to a previous haul road that will be a logical location for an entrance roadway. Therefore, Site 1 is the preferred location for a rental car servicing facility.

5.7 GENERAL AVIATION AREA ALTERNATIVES

The demand capacity analysis examined the need for general aviation facilities including hangars and aircraft parking apron for itinerant aircraft operations. The results of the analysis indicated that additional hangars and aircraft parking apron would be required. Options for providing these facilities are discussed in the following paragraphs.

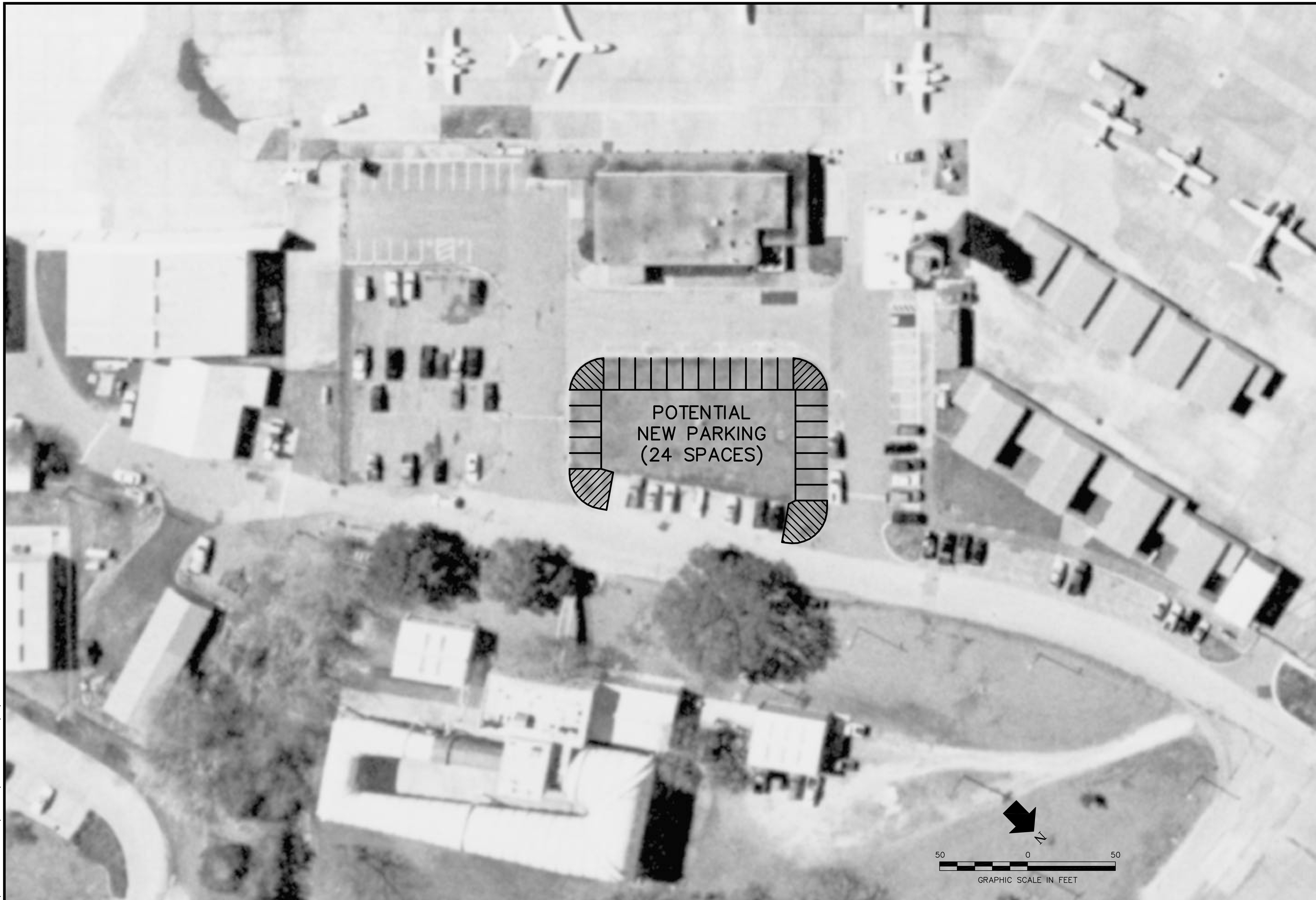

FIGURE 5-20

GENERAL AVIATION AUTOMOBILE PARKING
ALTERNATIVE 1

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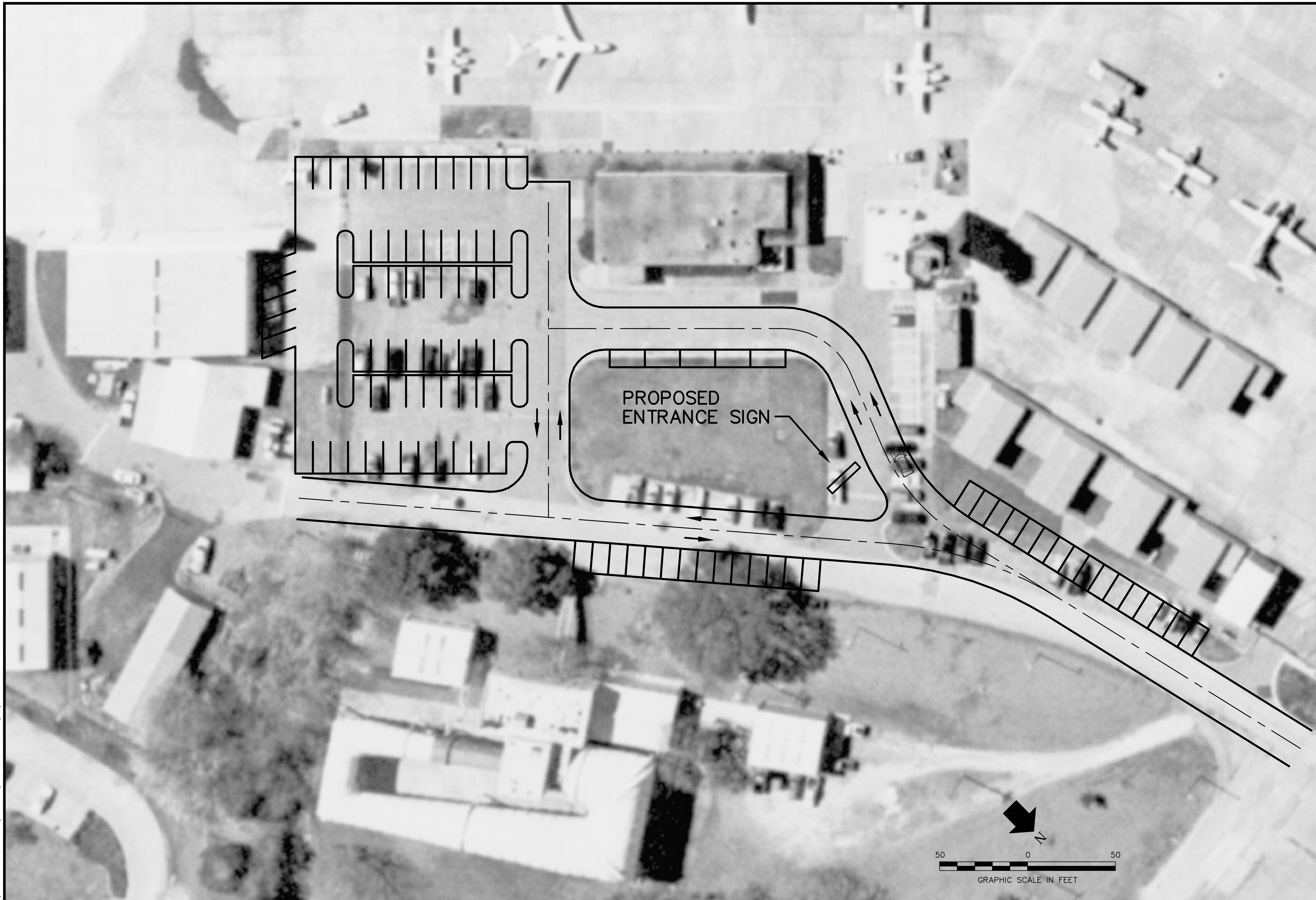

FIGURE 5-21

GENERAL AVIATION AUTOMOBILE PARKING
ALTERNATIVE 2

Easterwood Airport
Master Plan Update

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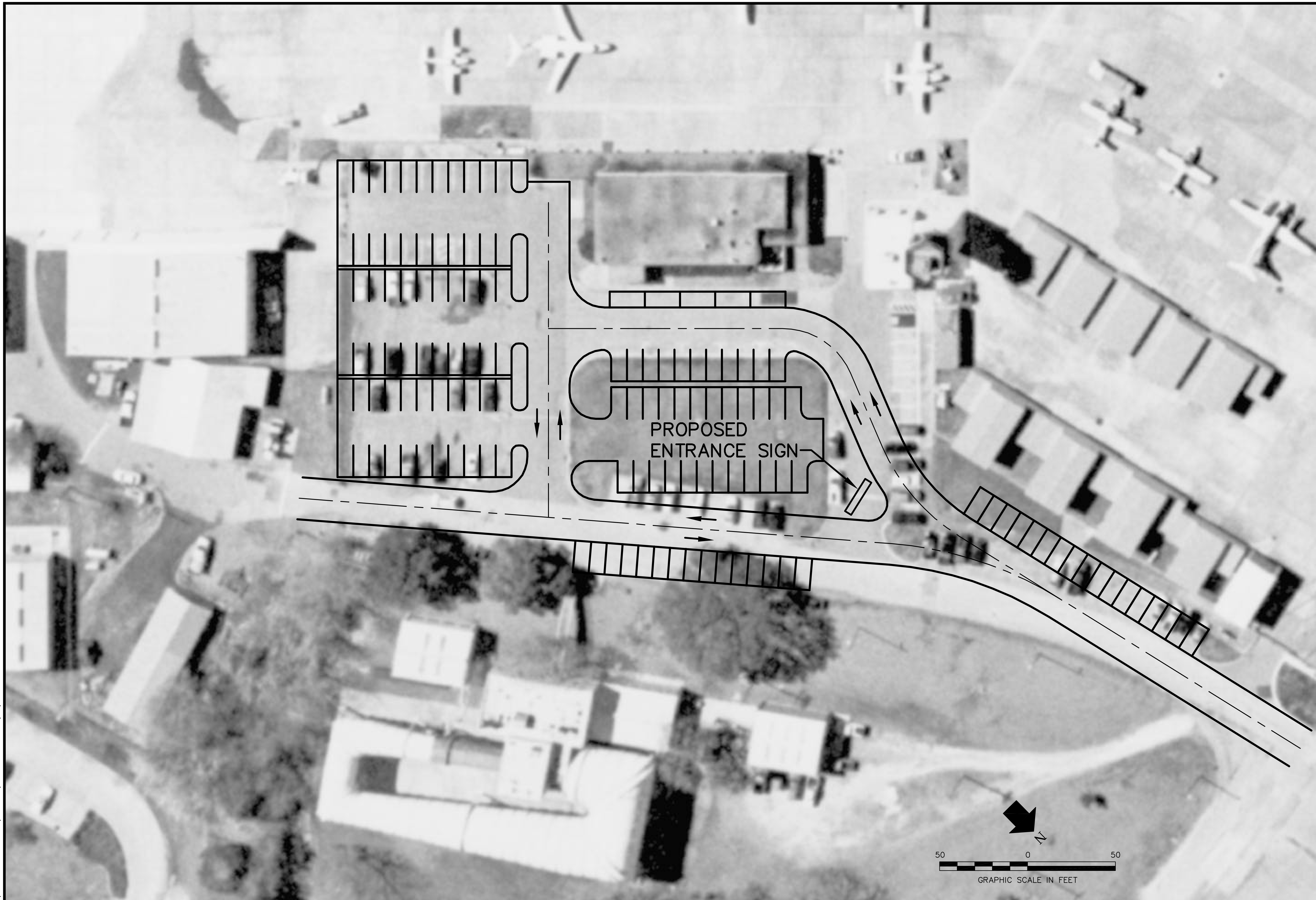

FIGURE 5-22

GENERAL AVIATION AUTOMOBILE PARKING
ALTERNATIVE 3

Easterwood Airport
Master Plan Update

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FIGURE 5-23

RENTAL CAR SERVICE FACILITY LOCATION ALTERNATIVES

Easterwood Airport Master Plan Update

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5.7.1 HANGAR DEVELOPMENT

The demand capacity analysis estimated that there could be a demand for 2 to 3 open-bay hangars and 25 to 30 T-hangars during the study period, although the demand will be highly sensitive to rental rates for these facilities. The analysis also indicated that there may be a demand for corporate hangars although the level of demand is difficult to determine. Therefore, it was recommended that suitable sites for such facilities should be identified in case the demand materializes.

The alternative analysis focused on identifying locations on the airport that are available and suitable for further development. **Figure 5-24** outlines four areas on the airport that are capable of accommodating hangars and/or aircraft parking aprons. Area 1 is located on the west side of Runway 16/34 and extends to the approach to Runway 4. It consists of approximately 117 acres although a significant portion of this property is not suitable for development due to steep terrain changes and or drainage issues. However, the majority of the land directly adjacent to the airfield is fairly level and suitable for development.

Development Area 2 is located between the approach to Runway 4 and the approach to Runway 10. This area consists of approximately 48 acres. The portion of this area closest to the airfield is the most suitable for development. Land father away begins to slope downward and is less suitable for development. Lack of utilities, roadway access and taxiway access make this area significantly less desirable compared to the other areas identified.

Development Area 3 is located between the approach to Runway 10 and the McKenzie Terminal and encompasses approximately 27 acres. This portion of airport property is prime development land due to the proximity of roadway access via the terminal entrance to FM60, as well as the availability of water and electrical service that ties into McKenzie Terminal. Furthermore, this portion of airport property would have direct access to the airfield via Taxiway B.

Development Area 4 consists of approximately 24 acres and is located between McKenzie Terminal and the perimeter road around the approach end of Runway 16. This area has some of the same advantages as Area 3 in terms of proximity to roadway access and utility lines. Access to the airfield would require the construction of a taxiway across the perimeter road that would tie into Taxiway F.

Review of the four development areas reveals that Area 1 and Area 3 are better suited to short-term development due to their advantages in terms of either roadway or airfield access. Area 3 appears to be the next most suitable location for development. Site 2 has significant disadvantages and is the least desirable location for hangar and aprons. It will be reserved for long-term functions.

In addition to the four major development areas identified above, there are a few locations where hangars could be constructed on the east side of the airport in the existing general aviation area. However, these locations are not capable of accommodating more than a few hangars and do not present a viable option for long-term development.

Development Area 1 – Conceptual Plan

Hangar development in Area 1 could continue northward in alignment with the existing hangar and apron development. This area could support several open bay hangars and would be a suitable location for individual corporate hangars if the demand materializes. Additional hangars could be constructed along parallel to Taxiway E. **Figure 5-25** shows a potential layout of future hangar facilities with open bay hangars along Taxiway H and rows of T-hangars along Taxiway E. An access road would need to be constructed in this area to reach these hangars and the proposed air traffic control tower site. A bridge or embankment will be needed for the proposed road to cross over a steep drop in terrain near the existing remote transmitter facility.

Development Area 2 – Conceptual Plan

Alternatives have not been prepared for hangar development in Area 2. Existing terrain and drainage will limit development on a portion of this property and the lack of roadway access makes this area less desirable for short-term development. Area 2 should be reserved for long-term aviation related development.

Development Area 3 – Conceptual Plan

Figure 5-26 presents a potential arrangement for apron and hangar space along Taxiway B. This area is well-suited for hangar development due to the proximity of existing airfield and roadway access. Development in this area could be for either general aviation or corporate hangars or even cargo-related development if such demand materializes.

Development Area 4 – Conceptual Plan

Alternatives for hangar or apron development have not been prepared for Area 4. This area would be suitable for aviation-related development, but other areas have more short-term potential and should be used first. If one tenant has a need for a substantial piece of contiguous property, this parcel could be considered.

5.7.2 AIRCRAFT APRON

The demand/capacity analysis in Section 4 noted that the lack of aircraft parking apron is a major constraint at Easterwood Airport. The demand for aircraft parking apron is driven by events at Texas A&M, especially home football games, as well as events at the George Bush Presidential Library. Military operations also generate significant demand for apron space since several aircraft usually train and park together.

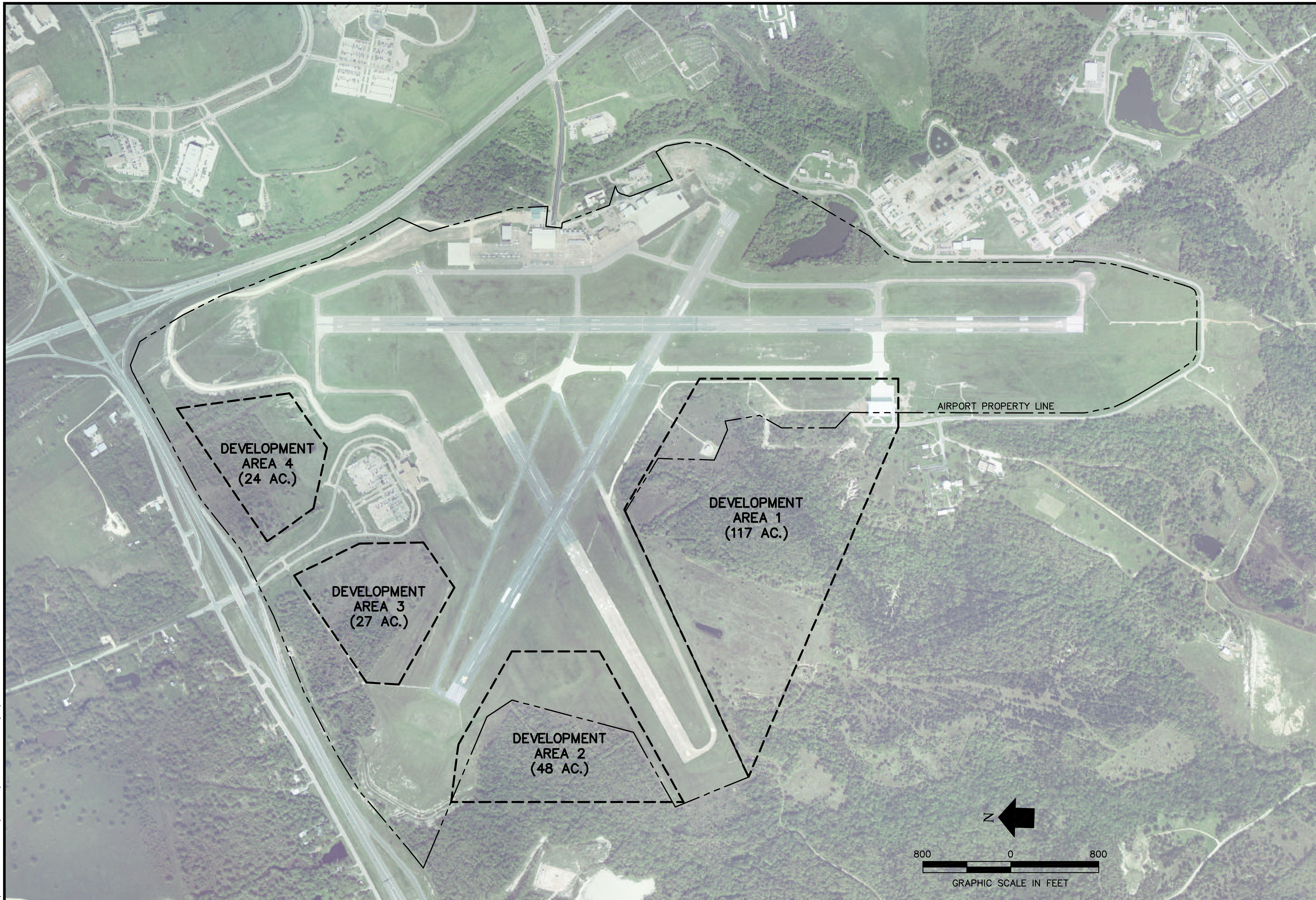

FIGURE 5-24

DEVELOPMENT AREAS

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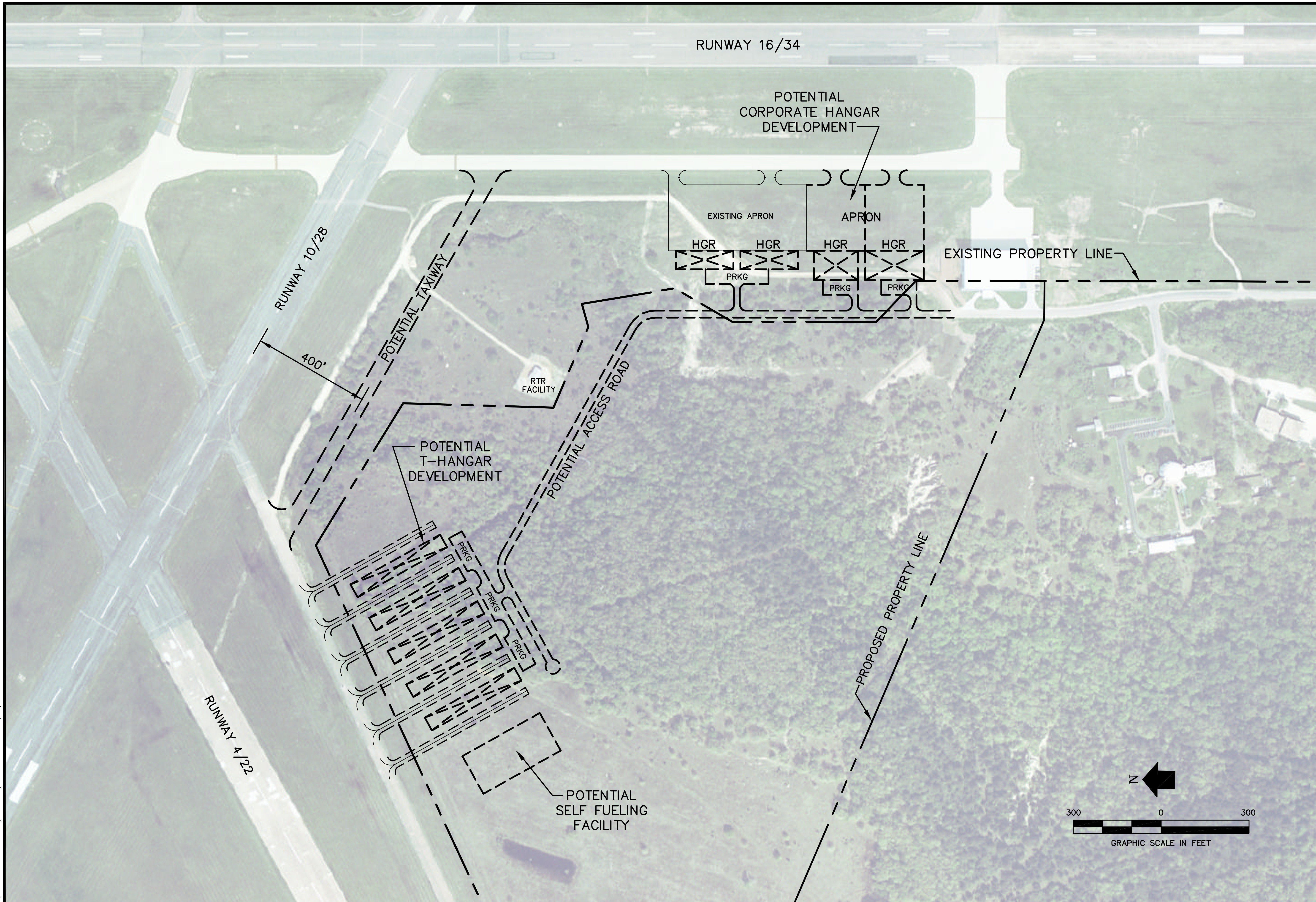

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FIGURE 5-25

DEVELOPMENT AREA 1
CONCEPTUAL PLAN

Easterwood Airport
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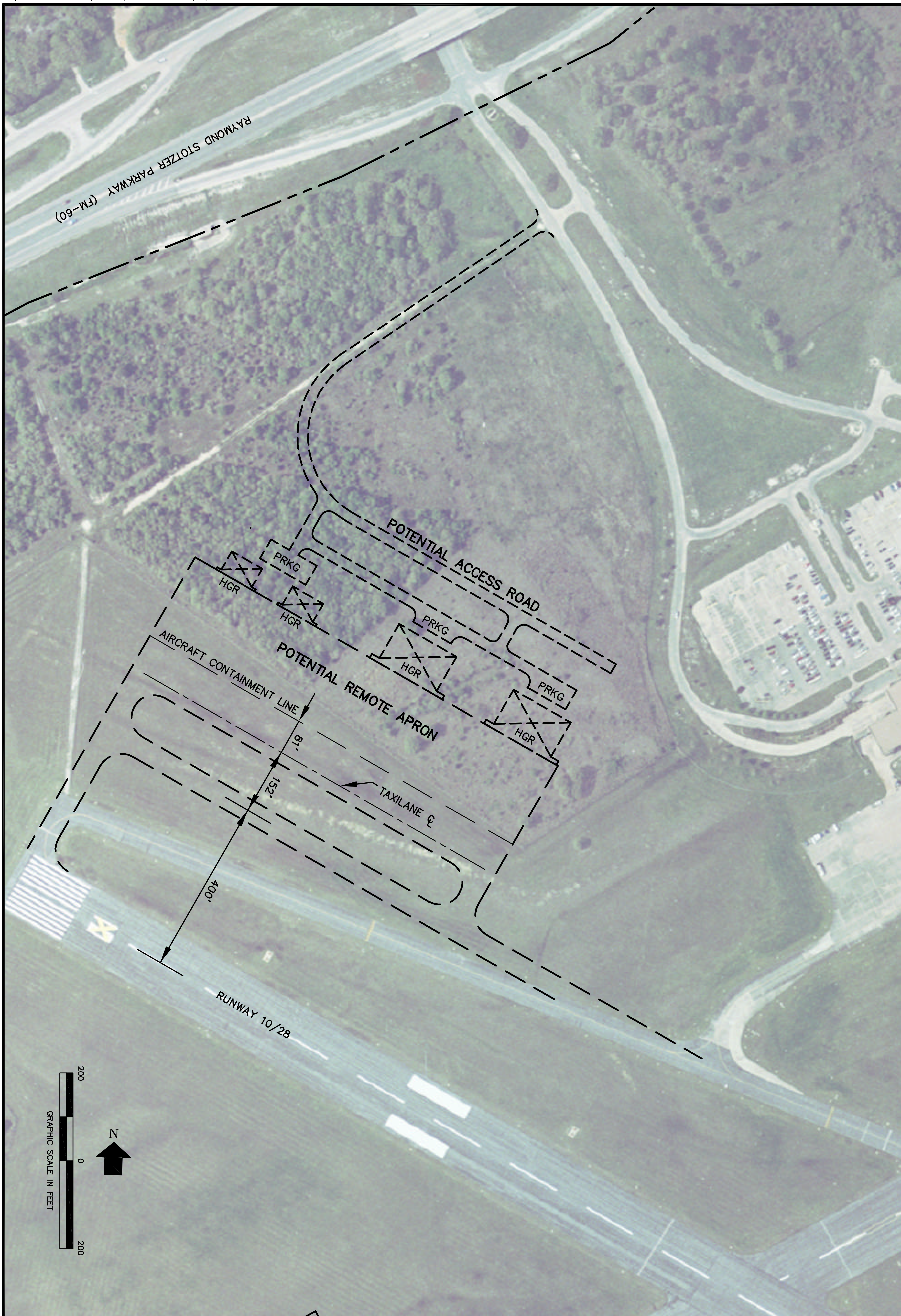

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DEVELOPMENT AREA 3
CONCEPTUAL PLAN

FIGURE
5-26

Peak demands for aircraft parking are currently satisfied by closing the airport's secondary runways and using them for aircraft parking. It is desirable to reduce runway closures by providing additional apron for aircraft parking. While it is probably not realistic, nor cost-effective, to provide sufficient aircraft apron to accommodate all peak needs, additional apron is needed and should be provided on a demand-driven basis throughout the study period.

Alternatives for additional aircraft apron focused on three locations at the airport. The first location is the existing general aviation area. The second and third locations are Development Area 1 and Development Area 3.

Existing General Aviation Area

The current configuration of aircraft parking on the existing apron is limited by the width of the apron. Therefore, alternatives were developed that focused on increasing the apron's width to accommodate more aircraft. Although the alternatives were initially developed as a series of distinct options, consultations with airport staff resulted in the alternatives being modified to represent a progressive family of alternatives that show how the existing apron could be expanded over time in response to demand and the expansion of apron in other portions of the airfield.

Figure 5-27 presents Alternative 1. This alternative would increase the number of small aircraft that could be parked on the north ramp by relocating the portion of Taxiway A between Runway 4/22 and Taxiway B. The required separation between Runway 16/34 and Taxiway A is 400 feet. However, the existing separation is 475 feet. Additional space for parking aircraft could be obtained by relocating this taxiway to the required separation. The figure shows that an additional row of double nested aircraft could be parked between a relocated taxiway and the existing hangars by relocating a portion of Taxiway A. The proposed layout shows that nearly 79 aircraft could be parked in an area that currently accommodates no more than 50 aircraft provided that Taxiway A is limited to aircraft with wingspans of less than 79 feet (i.e., airplane design group II). Consultation with airport management revealed that such a constraint is highly feasible.

Figure 5-28 presents Alternative 2. This alternative builds on the apron expansion proposed by Alternative 1. It would extend the relocated portion of Taxiway A to connect to Taxiway C. This would provide a full parallel taxiway for Runway 16/34 and would allow a combination of rotorcraft and/or business jets to be parked in the area in front of the general aviation terminal. An expansion in this area is desirable because it will provide more parking in an area that is still within walking distance of the general aviation terminal.

Development Area 1 – Conceptual Plan

As of October 2003, Easterwood Airport is proceeding with the construction of aircraft apron in Development Area 1. This apron will be located north of the existing apron and hangar development. Additional apron can be developed in this area on an as-needed basis as depicted in **Figure 5-25**.

Development Area 3 – Conceptual Plan

In addition to the existing general aviation area, aircraft ramp could be provided along Taxiway B as depicted in **Figure 5-26**. Apron in this area could be used to support future development of corporate hangars, general aviation, cargo or a combination of uses. Future demand will determine what type of facilities should be constructed.

FIGURE 5-27

GENERAL AVIATION APRON ALTERNATIVE 1

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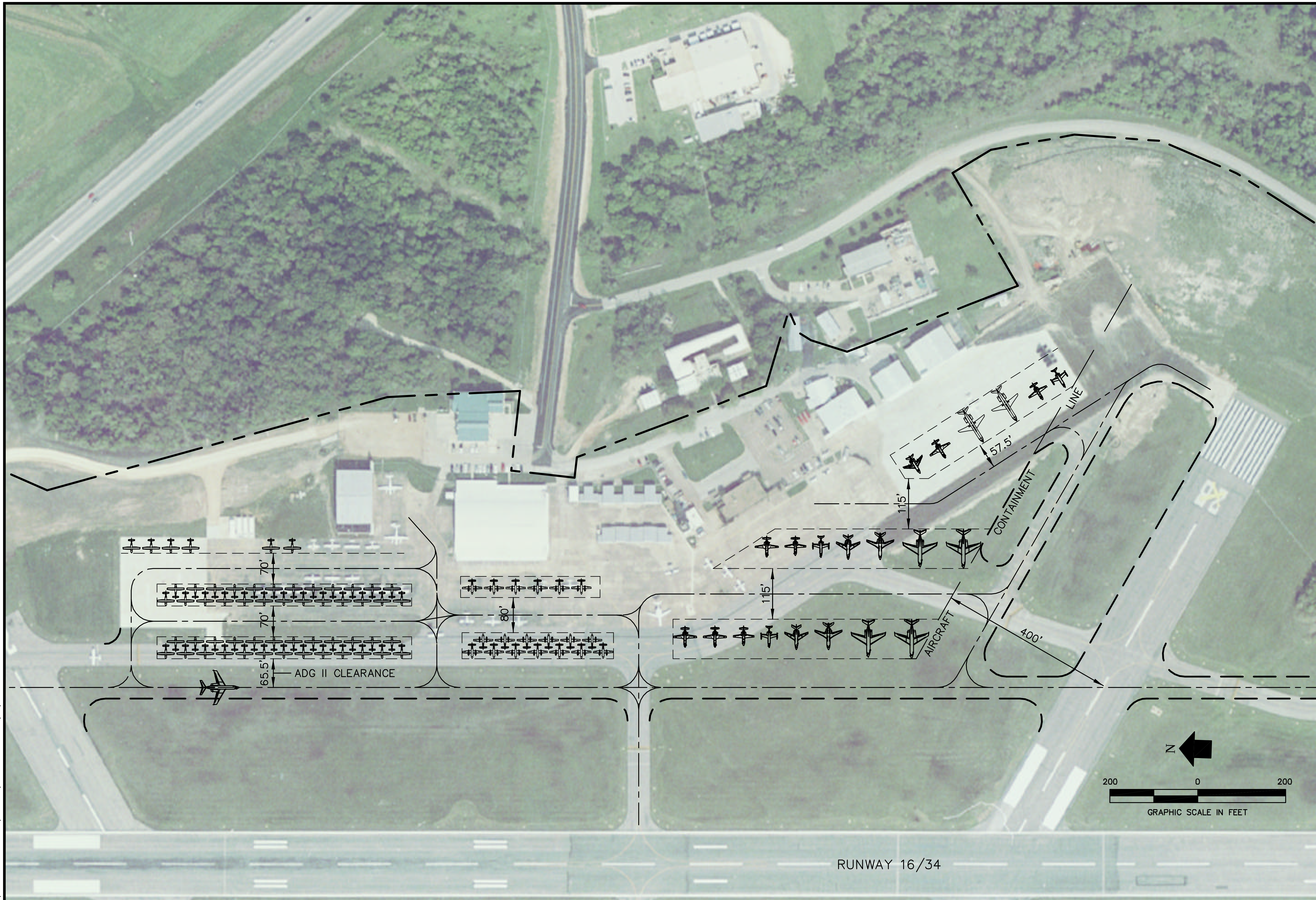

FIGURE 5-28

GENERAL AVIATION APRON ALTERNATIVE 2

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SECTION 6 ENVIRONMENTAL OVERVIEW

6.1 INTRODUCTION

This environmental overview (EO) summarizes potential environmental impacts associated with development proposed in the previous section. The EO addresses 21 specific impact categories as presented in FAA Order 5050.4A, *Airport Environmental Handbook*. This EO will identify whether the proposed development will require further environmental study or permitting and the agencies with jurisdiction over this permitting. Previous environmental analyses have been used where applicable.

Airport development projects can be classified into three categories that will determine what level of environmental review is required. The following explains these categories:

- Projects that have no potential for significant impact and do not require the preparation of an Environmental Assessment (EA) or Environmental Impact Statement (EIS).
- Projects that have significant environmental impacts and will require an EA. Based on the findings of the EA, the FAA will either issue a Finding of No Significant Impact (FONSI) or require that further study be conducted.
- Projects that have been found to have significant impacts and therefore require an EIS.

Projects that typically require the preparation of an EA and, potentially, an EIS, include:

- Airport relocation
- New runway
- Major runway extension
- Runway lengthening which results in a 1.5 DNL or greater increase in noise over any noise-sensitive area within the 65 DNL contour
- Construction or relocation of entrance or service road connections to public roads that adversely affect the capacity of such public roads
- Land acquisition associated with any of the above plus acquisition that requires relocation of residential units where evidence exists of comparable replacement dwellings, major disruption of business activities, or acquisition involving land covered under Section 4(f) of the DOT Act

- Establishment or relocation of an instrument landing system, or an approach lighting system
- An airport development action that falls within the scope of various circumstances defined by the FAA which may involve:
  - Use of Section 4(f) lands
  - Historical places or places of architectural, archaeological or cultural significance
  - Prime farmland
  - Wetlands, coastal zones or floodplain
  - Endangered or threatened species

The information presented in this overview summarizes potential environmental impacts that the proposed airport improvements could have on the surrounding physical and human environment.

6.2 PROPOSED DEVELOPMENT

On the basis of the planning contained in the preceding sections, a number of potential projects have been identified. These projects are listed below.

- Rehabilitation of McKenzie Terminal Access Road
- Rehabilitation of McKenzie Terminal Upper Level Driveways
- Construction of Westside Apron
- Extension of Taxiway H
- Construction of New Access Road to Fire School
- Construction of Runway 28 Runway Safety Area
- Construction of New Control Tower
- Demolishing of Old Control Tower
- Taxiway A Realignment
- Taxiway B Realignment
- Taxiway C Realignment
- Expansion of General Aviation Ramp

- Construction of Taxiway J
- Installation of PAPIs on Runway 16/34
- Installation of MALS on Runway 16
- Installation of REILS on Runway 10
- Installation of McKenzie Ballpark Lights
- Expansion of McKenzie Ramp – Phase 1
- Expansion of McKenzie Ramp – Phase 2
- Construction of Rental Car Service Facility
- McKenzie Terminal Roadway Signage
- McKenzie Terminal Roadway Landscaping
- Demolishing of Old Airport Maintenance Building
- Construction of New Airport Maintenance Building
- Construction of East Terminal Area Access Road
- Construction of Control Tower Access Road
- Airfield Perimeter Fencing
- Reconfiguration of First Floor Departure Holdroom
- Reconfiguration of Baggage Make-up Area
- Improvement of Long-Term Baggage Claim and Vertical Circulation

This EO will identify potential environmental impacts that may result from implementation of these projects.

6.3 AFFECTED ENVIRONMENT

6.3.1 TOPOGRAPHY

Brazos County is in the Western Gulf Coastal Plain of southeast-central Texas, about 125 miles from the Gulf of Mexico. The county has an area of approximately 591 square miles. The Navasota River borders the county on the east, and the Brazos River forms the western boundary. The northern boundary is the Old San Antonio Road (OSR), which was established in 1691. Elevation in the county ranges from 200 to 400 feet above mean sea level (MSL). The topography is nearly level to gently sloping. Easterwood Airport is situated at an elevation of 320 feet MSL.

6.3.2 CLIMATE

In winter, the average temperature in Brazos County is 51 degrees Fahrenheit (° F) and the average daily minimum temperature is 41° F. In summer, the average temperature is 83° F and the average daily maximum temperature is 96° F. Total annual precipitation is about 39 inches. Of this total, about 21 inches (54 percent) falls during April through September. Snowfall is rare. The average relative humidity in mid-afternoon is 59 percent. Humidity increases at night and the average at dawn is about 90 percent. The sun shines 65 percent of the time in summer and 47 percent of the time in winter. The prevailing wind is from the south and the average wind speed reaches a high of 9 miles per hour (mph) in March (NRCS, 2002). See Section 2.4 for more detailed meteorological data specific to Easterwood Airport.

6.3.3 VEGETATION

The airport is located in an ecotonal area between the Blackland Prairie and Post Oak Savannah vegetational regions of Texas (Gould, 1962), which is influenced by the characteristics of both regions. Native plant communities that occur in Brazos County include tall-grass prairie, post-oak savannah, and bottomland hardwoods. The urban landscape of Bryan-College Station is composed of live oak trees, crape myrtle shrubs, and various landscape plantings and non-native grasses. The airport is located in the Claypan Prairie ecological site, in which the climax plant community is a tallgrass prairie or a very open savannah with a few scattered live oak, elm, and hackberry trees along watercourses or in scattered motts (NRCS, 2002).

6.3.4 SURFACE WATER

Brazos County is bordered on the west by the Brazos River and on the east by the Navasota River. The Bryan-College Station area is located on a drainage divide separating these basins. Country Club Lake and Fin Feather Lake are located within the Bryan-College Station metropolitan area and numerous smaller bodies of water are found scattered throughout the area. White Creek and its associated tributaries, ponds and lakes are in close proximity to the western and southern boundaries of the airport.

6.3.5 SOILS AND GEOLOGY

Brazos County is in the Southern Claypan and the Southern Blackland Prairie Major Land Resource Areas. The soils formed under post oak savannah and prairie vegetation. The soils that formed under post oak savannah are mostly acidic, light colored and sandy, and many have a dense clay subsoil that is less than 12 inches below the surface. The soils that formed under prairie vegetation are mostly dark loams and clays (NRCS, 2002).

According to the Bureau of Economic Geology (Austin Sheet, Revised 1963), the airport is underlain by the Yegua Formation of Eocene age and Fluviatile terrace deposits of Pleistocene age. The Yegua Formation is a sandstone, clay, and lignite soil, with flat ironstone concretions and spherical calcareous concretions a foot or more in diameter, and some fossil wood. The Yegua Formation is between 750 and 1,000 feet in thickness. The Fluviatile terrace deposits in this area were most likely deposited by White Creek, a tributary of the Brazos River. They are high gravel deposits comprised of an upper silty clay layer good for crop production and a lower coarse clay layer that yields some water.

6.3.6 WILDLIFE

The airport lies within the Texan biotic province as described by Blair (1950), an area dominated by a moist, sub-humid climate. The Texan province represents an ecotone between the forests of the Austroriparian province of the southeastern U.S. and the grasslands and plains of the Kansan and Balconian provinces to the west. The intermingling of forests with grasslands is the most noteworthy characteristic of this biotic province. Rivers and tributaries passing through the Texan province (e.g., the Red, Trinity, Sabine, Brazos, Colorado, and Guadalupe Rivers) support riparian forests important to the western dispersal of Austroriparian species, while patches of grasslands and prairies represent the easternmost ranges for many western species. There are no endemic vertebrate species of the Texan province, but species characteristic of surrounding provinces commonly occur (Blair, 1950).

Four wildlife habitat types have been identified in Brazos County: 1) cropland on the floodplain along the Brazos River, 2) bottom-land hardwoods and wooded wetlands along the Navasota River, 3) native and introduced pastures around Bryan-College Station and along major highways radiating from the metroplex, and 4) post oak woodlands and savannah, which is the main habitat type in the county. The cropland areas on the Brazos River floodplain, especially depressional areas that are subject to frequent flooding and prolonged inundation, provide feeding grounds and habitat for resident and migratory wildlife. The wooded bottomland along the Navasota River provides the most diverse and productive wildlife habitat in Brazos County. Native and introduced grassland associations provide limited cover and food sources for wildlife, especially where they are close to urbanized areas. Wooded corridors along streams in these areas provide the most beneficial habitat for wildlife. Post oak woods and savannahs provide a diverse upland habitat with many wet depressions and comprise more than half the wildlife habitat in Brazos County. The Navasota and Brazos Rivers provide habitat for a variety of native aquatic species (NRCS 2002).

6.3.7 LAND USE

Due to the airport’s proximity to the cities of Bryan and College Station, single- and multi-family residential areas and various public/university and service areas including hospitals, shopping complexes, athletic fields and complexes, and wastewater treatment plants are located near the airport.

6.4 ENVIRONMENTAL CONSEQUENCES – SPECIFIC IMPACT CATEGORIES

6.4.1 NOISE IMPACTS

6.4.1.1 Methodology

An evaluation of aircraft noise at Easterwood Airport was conducted using the methodologies developed by the FAA. Aircraft noise levels in the vicinity of airports are determined on an annual average-daily basis utilizing the Day Night Average Sound Level (DNL) noise metric. The DNL is a measure of cumulative noise exposure occurring over a 24-hour period, averaged over the entire year. DNL is measured in A-weighted decibels (dBA), with a 10-decibel penalty added to nighttime noise events occurring during the hours of 10 p.m. to 7 a.m. The 10-decibel penalty for nighttime noise events is assessed to account for the increased sensitivity most people display towards noise during the quiet nighttime hours when most people are sleeping.

Once the magnitude of noise is measured, a method for illustrating the location of various noise levels is needed. The noise contour is the commonly accepted method for representing noise levels. Noise contours represent a line of equal noise exposure, in much the same manner as ground contours represent lines of equal elevation.

The Integrated Noise Model (INM), Version 6.1, was used to produce noise contours at the Easterwood Airport. The FAA developed the INM, which has been upgraded over many years with the latest noise metrics data. Additionally, the INM model is the most commonly used method to predict airport noise contours and has been designed to: 1) quantify current noise exposure; 2) forecast future noise exposures; and 3) assist in analyzing abatement alternatives if needed.

The INM program requires the input of the physical and operational characteristics of the airport. Physical characteristics include runway end coordinates, airport elevation, topography, and meteorological conditions. Operational characteristics include aircraft fleet mix; runway configuration and utilization; departure and arrival flight tracks; and numbers of daytime, evening, and nighttime operations by different aircraft types. Optional data that can be incorporated into the model include approach and departure profiles and procedures, and airport noise curves.

6.4.1.2 Noise Contour Calculations

To estimate noise levels at Easterwood Airport for the baseline year (2002) and 20-year future conditions (year 2022), computer modeling techniques were used which produced DNL contours in increments of 60, 65, 70, and 75 A-weighted decibels (dBA). The following sections describe the data used in the INM to produce the 2002 and 2022 noise contours.

Runway Data

The airport's three existing runways were entered in the INM to model 2002 conditions. However, a different airfield configuration was used to model 2022 conditions. As described at the beginning of Section 5, long-range alternatives explore the option of constructing a new runway west of, and parallel to, Runway 16/34. Therefore, 2022 conditions were modeled using an airfield that consists of the existing Runway 16/34 and an 8,500-foot parallel runway located 3,400 feet to the west (see **Figure 5-2**). Even though this Master Plan does not consider the construction of such a runway, it is prudent to examine the potential noise impacts of such a runway.

2002 Aircraft Operations

Existing average-daily aircraft operations and fleet mix data are the basis for developing noise contours for the 2002 Existing Conditions. The total number of aircraft operations during 2002 was 72,126 as specified in Section 3. The number of average-daily aircraft operations for this period was 240.

Existing aircraft at Easterwood Airport can be classified as Air Carrier, Commercial, General Aviation, Military, or Rotary. In addition, the aircraft fleet can be classified as either itinerant or local. Aircraft mix data are presented in Section 4. Table 4.1 shows the typical aircraft mix data and representative aircraft types that frequent Easterwood Airport. Aircraft based at or traversing Easterwood Airport range from small, general aviation Class A aircraft such as Cessna and Piper models, to large commercial carriers utilizing Class C aircraft such as Boeing 737s and Embraer 135/145s. Representative aircraft types in each class as shown in Table 4.1 were identified and modeled in the INM. Due to the relative infrequency of rotary aircraft operations at Easterwood Airport, no helicopter operations were included in the airport noise analysis and noise contours are not expected to be significantly altered due to rotary operations.

2002 Runway Utilization

Runway utilization rates are the average percentages that each runway is used for departures, arrivals, and touch and go operations. This information is important because runways with greater numbers of aircraft operations will have larger noise impacts in the areas beyond the runway end. Data regarding runway utilization is entered into the INM.

Consultation with air traffic control personnel indicated that Runway 16/34 is used approximately 85 percent of the time due to prevailing wind conditions. Runway 10/28 is used 10 percent of the time and Runway 04/22 is used the remaining 5 percent of the time. Utilization of specific runway ends is as follows: Runway 16 (70 percent), Runway 34 (15 percent), Runway 10 (5 percent), Runway 28 (5 percent), Runway 04 (2 percent), and Runway 22 (3 percent).

2002 Noise Contours and Noncompatible Land Uses

Most airport noise studies, including this analysis, are based on computer-generated DNL estimates. Typical DNL levels in a community can range from 70 to 75 dBA in a noisy urban environment to 40 to 45 dBA in very quiet rural areas. DNL levels near a modest sized commercial and general aviation airport such as Easterwood Airport would normally range from about 60 to 75 dBA. A DNL of 65 dBA or higher is considered by the FAA to be incompatible with noise sensitive land uses such as residential.

The FAA has adopted guidelines regarding the compatibility of land uses with various noise levels measured in the DNL metric. These guidelines are presented in **Table 6.1**. Compatibility or incompatibility of land use is determined by comparing the noise contours with existing and potential land uses.

Figure 6-1 shows the DNL noise contours resulting from existing 2002 aircraft operations superimposed over an aerial base map. The base map graphically depicts the airport boundaries and runway configurations. It also depicts adjacent roadways and other identifiable geographic features. **Table 6.2** shows the areas contained within each contour.

The existing 75 DNL contour is contained almost entirely within the airport boundary for the baseline year. The 70 DNL contour extends off the airport to the southeast near a single-family residential area south of FM 2818 and west of the Union Pacific Railroad line and to the northwest within undeveloped areas just off airport property. No residences or other sensitive receivers are located within the 70 DNL contour. The 65 DNL contour extends off the ends of Runways 10/28 and 16/34 to include 4 single-family residences southeast of the airport and 4 single-family residences northwest of the airport along FM 60. Approximately 24 persons are estimated to reside within the 65 DNL contour. Two commercial enterprises and institutional land use areas are also contained within the 65 DNL contour. The 60 DNL noise contour extends approximately 8,600 feet south, 3,250 feet northwest, and 10,100 feet north of the airport property boundary. An additional 26 residences north and northwest of the airport and 14 residences south of the airport are located within the 60 DNL noise contour. An estimated 120 additional persons reside within the 60 DNL noise contour.

As previously stated, DNL levels of 65 dBA and greater are normally considered incompatible with residential land use and are deemed by the FAA to create significant impact on people because of their potential to disrupt speech, disturb sleep, and cause annoyance. Noncompatible land uses impacted by these contours include single-family residences located within the 65 DNL contour to the northwest and southeast of the airport, as mentioned above.

Table 6.1
Land Use Compatibility with Yearly Day-Night Average Sound Levels

	Yearly Day-Night Average Sound Level (DNL)					
	Below 65 Decibels	65-70 Decibels	70-75 Decibels	75-80 Decibels	80-85 Decibels	Over 85 Decibels
<u>Residential</u>						
Residential (Other than mobile homes & transient lodges)	Y	N[1]	N[1]	N	N	N
Mobile Home Parks	Y	N	N	N	N	N
Transient Lodging	Y	N[1]	N[1]	N[1]	N	N
<u>Public Use</u>						
Schools	Y	N[1]	N[1]	N	N	N
Hospitals, Nursing Homes	Y	25	30	N	N	N
Churches, Auditoriums, 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
<u>Commercial Use</u>						
Offices, Business & Professional	Y	Y	25	30	N	N
Wholesale & Retail Building Materials, Hardware & 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
Communications	Y	Y	25	30	N	N
<u>Manufacturing & Production</u>						
Manufacturing, General	Y	Y	Y[2]	Y[3]	Y[4]	N
Photographic and Optical	Y	Y	25	30	N	N
Agriculture (Except Livestock) & Forestry	Y	Y[6]	Y[7]	Y[8]	Y[8]	Y[8]
Livestock Farming & Breeding	Y	Y[6]	Y[7]	N	N	N
Mining & Fishing, Resource Production & Extraction	Y	Y	Y	Y	Y	Y
<u>Recreational</u>						
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 & Zoos	Y	Y	N	N	N	N
Amusements, Parks, Resorts, Camps	Y	Y	Y	N	N	N
Golf Courses, Riding Stables, Water Recreation	Y	Y	25	30	N	N

Table 6.1 (Continued)
Land Use Compatibility with Yearly Day-Night Average Sound Levels

NOTE: The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties remains with the local authorities. FAA determinations under Part 150 are not intended to substitute Federally determined land use for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise-compatible land uses.

KEY TO TABLE:

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

[1] Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor NLR of at least 25 dB and 30 dB 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 the 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 the 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 the 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 dB.

[7] Residential buildings require an NLR of 30 dB.

[8] Residential buildings not permitted.

Noncompatible land use.

Source: 14 CFR FAR Part 150, Appendix A, Table 1 (28 December 1995).

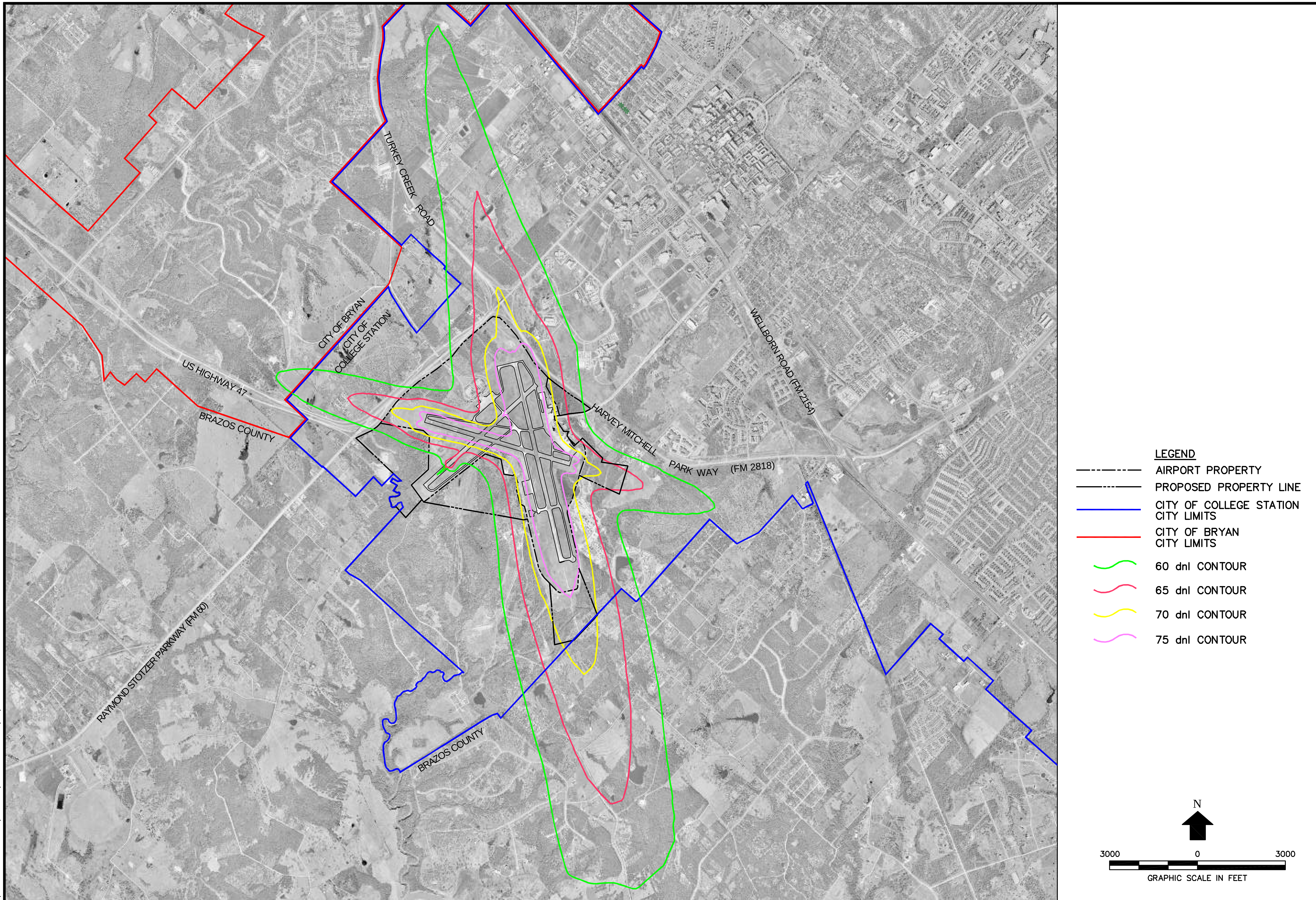

FIGURE 6-1

2002 NOISE CONTOURS

Easterwood Airport
Master Plan Update

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Table 6.2 Easterwood Airport 2002 Noise Contours				
Unit	Area Within Contour			
	> 60 dBA	> 65 dBA	> 70 dBA	> 75 dBA
Acres	2,785.4	1,303.8	587.7	292.3
Square Miles	4.35	2.04	0.92	0.46

2022 Airport Configuration and Aircraft Operations

Forecast airport design configurations and average-daily operations for Easterwood Airport during 2022 were the basis for developing noise contours for the 2022 Future Conditions. For the future conditions scenario, construction of a new 8,500-foot parallel runway located approximately 3,400 feet west of the existing Runway 16/34 alignment has been added to the airport noise analysis, and aircraft operations on Runway 10/28 and Runway 04/22 were removed. The existing primary runway has been renamed Runway 16L/34R and the new runway alignment designated Runway 16R/34L.

Runway utilization rates used for the 2022 Future Conditions closely parallel those used in the 2002 analysis for the predominant Runway 16/34 alignment. Aircraft operations for Runway 16 were increased from 70 to 75 percent with the remaining 25 percent assigned to Runway 34 based on average prevailing wind conditions. In addition, the runway utilization ratio was estimated to be 60 percent on the existing Runway 16/34 and 40 percent on the proposed runway. Therefore, the runway utilization percentages were modeled as follows: Runway 16L (45 percent), Runway 16R (30 percent), Runway 34R (15 percent), and Runway 34L (10 percent).

2022 conditions were modeled using 89,000 annual aircraft operations. Total average-daily operations are forecasted to increase to 296 operations from 240 operations. This represents an approximate 23 percent increase in operations for all air carrier, commercial, general aviation, and military aircraft. Aircraft mix data used to model 2022 conditions were similar to those used in the 2002 analysis.

2022 Noise Contours and Non-Compatible Land Uses

Figure 6-2 shows the DNL noise contours resulting from future 2022 aircraft operations superimposed over an aerial base map. **Table 6.3** shows the areas contained within each contour.

Table 6.3 Easterwood Airport 2022 Noise Contours				
Unit	Area Within Contour			
	> 60 dBA	> 65 dBA	> 70 dBA	> 75 dBA
Acres	4,391.7	2,010.7	848.3	419.3
Square Miles	6.86	3.14	1.33	0.67

The 75 DNL noise contour remains contained entirely within the airport boundary for the Future Conditions year. The 70 DNL contour extends off the parallel runways of the airport to the southeast just west of a single-family residential area near FM 2818 and west of the Union Pacific Railroad line and to the northwest near FM 60. No residences or other sensitive receivers are located within the 70 DNL contour. The 65 DNL contour extends off the ends of Runways 16L/34R and 16R/34L to include 3 single-family residences southeast of the airport and 6 single-family residences northwest of the airport along FM 60. Approximately 27 persons are estimated to reside within the 65 DNL contour. Two commercial enterprises and institutional land use areas are also contained within the 65 DNL contour. The 60 DNL noise contour extends approximately 2 miles to the north and south of the airport property boundary. An additional 4 residences north of the airport and 12 residences south of the airport are located within the 60 DNL noise contour. An estimated 60 additional persons reside within the 60 DNL noise contour.

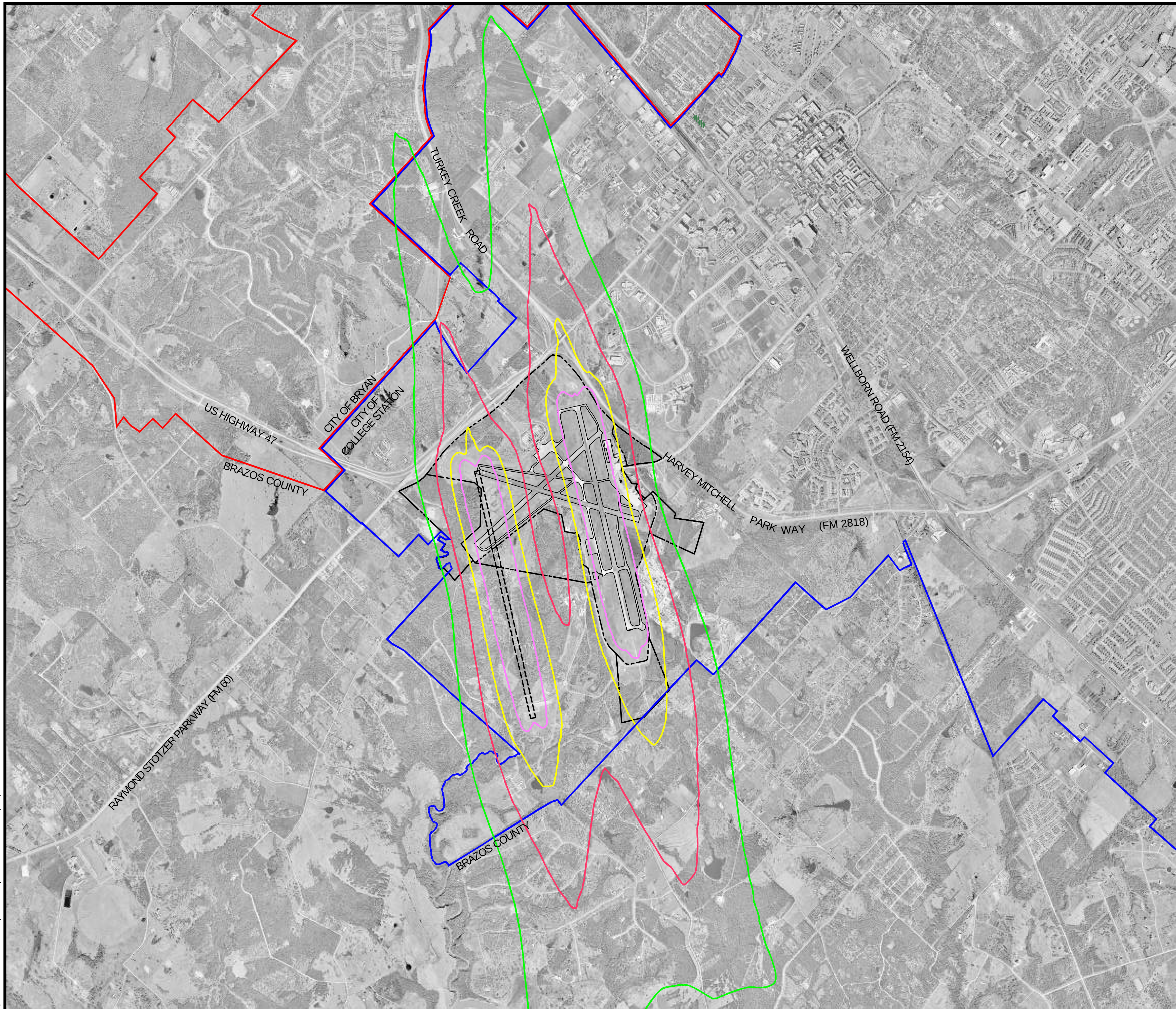
6.4.2 COMPATIBLE LAND USE

The issue of compatible land use surrounding airports is primarily related to noise impacts although other issues such as light emissions and wildlife attractants can also be items of concern. The preceding section revealed that the noise contours generated by aircraft operations at Easterwood Airport are primarily confined to the approach and departure paths from Runway 16/34 and Runway 10/28. The noise contours surrounding Runway 4/22 do not extend off of airport property. A discussion of land use compatibility within the noise contours is provided in the following paragraphs. The discussion focuses on land uses inside the 65 and 60 DNL noise contours. Existing land use surrounding the airport is depicted on **Figure 6-3**.

Approach to Runway 16

The airport's 65 DNL contour, within the approach to Runway 16, extends off of airport property northward across FM 60 and FM 2818 encompassing mostly Texas A&M property. However, the noise contour also encompasses land between FM 2818 and Turkey Creek Road north of FM 60.

A review of aerial photographs reveals that most of the land inside the 65 DNL noise contour west of FM 2818 is vacant, although a few residences and one business front along the service road on the north side of FM 60. Land use in this area is shown on the City of College Station's Land Use Plan as Industrial along FM 60 and Retail Regional along FM 2818. The city's zoning for this area consists of Agricultural-Open, Planned Industrial, and General Commercial. All of these zonings are compatible with noise levels of 65 DNL.



LEGEND

- AIRPORT PROPERTY
- PROPOSED PROPERTY LINE
- CITY OF COLLEGE STATION CITY LIMITS
- CITY OF BRYAN CITY LIMITS
- 60 dnl CONTOUR
- 65 dnl CONTOUR
- 70 dnl CONTOUR
- 75 dnl CONTOUR

N

3000 0 3000

GRAPHIC SCALE IN FEET

FIGURE 6-2

2022 NOISE CONTOURS

Easterwood Airport
Master Plan Update

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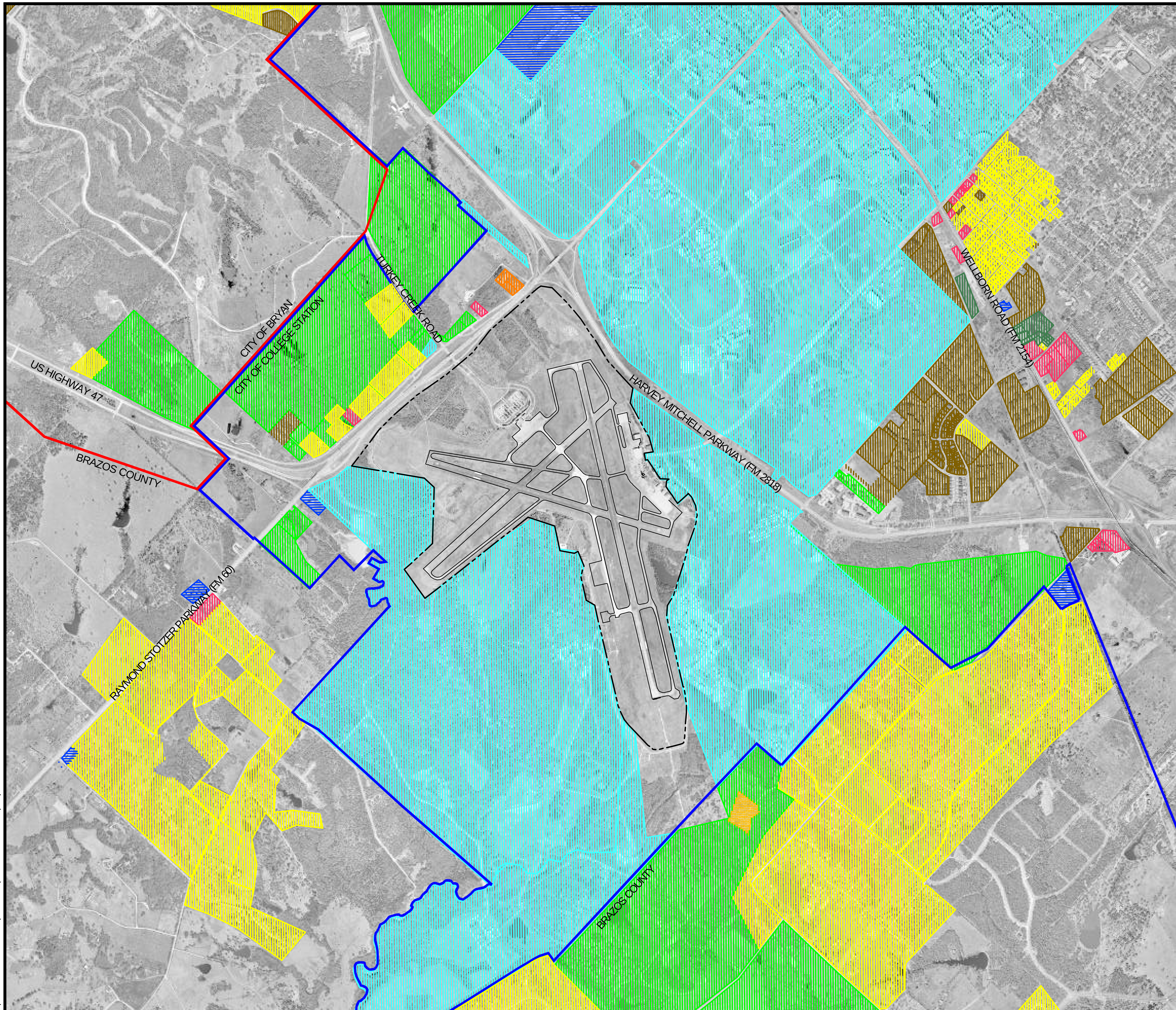

LEGEND

- AIRPORT PROPERTY
- CITY OF COLLEGE STATION CITY LIMITS
- CITY OF BRYAN CITY LIMITS

LAND USE

- AGRICULTURAL/RURAL
- COMMERCIAL/RETAIL
- INDUSTRIAL
- MIXED USE
- MULTI-FAMILY RESIDENTIAL
- PARKS/RECREATIONAL
- PUBLIC/INSTITUTIONAL
- SINGLE FAMILY RESIDENTIAL
- UNIVERSITY
- VACANT

Sources:
1. City of College Station Land Use Plan, 1995 - 2015.
2. City of Bryan Land Use Plan, 2000 - 2020.
3. US Geological Survey Aerial Mapping, 1995.
4. URS Corporation, 2003.

N

2000 0 2000

GRAPHIC SCALE IN FEET

FIGURE 6-3

2002 LAND USE

Easterwood Airport
Master Plan Update

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Land use on the east side of FM 2818, north of FM 60, is primarily vacant and is shown on the City's land use plan as part of Texas A&M. Zoning in this area is for a combination of uses including Single-Family Residential, Apartment High-Density, General Commercial, Neighborhood Business, and College and University. Residential land use in this area would be extremely undesirable. The approach to Runway 16 experiences more aircraft overflights than any other approach at the airport. Furthermore, noise levels of 65 DNL and higher are classified as incompatible with residential land uses and should be avoided. Therefore, rezoning should be considered in this area to prohibit residential land uses.

The 60 DNL contour extends farther northeast of FM 2818 and encompasses mostly vacant land owned by Texas A&M. Land use in this area should be kept free of residential land uses to minimize the possibility of future land use compatibility problems.

Approach to Runway 34

The 65 DNL noise contour on the south end of the airport encompasses rural land and a few residences within the approach to Runway 34. The 60 DNL contour encompasses the same types of land uses, but covers a larger area. Land use for this area is shown on the City of College Station's Land Use Plan as being Rural, and Single-Family Residential Low-Density.

Although residential land use is undesirable within the noise contour, the housing densities are low and are expected to remain low due to the lack of utilities in this area. Furthermore, there is no control of land use in this area since it is outside of the city boundaries and there is no zoning in Brazos County.

One option for addressing future land use compatibility in this and other areas surrounding Easterwood Airport is to consider the creation of a joint airport zoning board that would have land use compatibility zoning authority within specified areas beneath the approaches to runways at Easterwood Airport. Chapter 241 of the State of Texas Local Government Code (see Appendix E) permits the creation of such a board for the purpose of ensuring the public's investments in airports. Such a board could specify allowable land uses within defined areas adjacent to each runway's end. It is recommended that Texas A&M explore the creation of such a board with Brazos County, as well as the City of Bryan and the City of College Station.

Approach to Runway 10

The 65 DNL noise contour within the approach to Runway 10 extends off of airport property and westward across FM 60. Land use in this area presently consists of a few residences and businesses along the north side of FM 60 and mostly vacant land farther west. The City of College Station's Land Use Plan depicts this area as Industrial and current zoning is Agricultural-Open. Further residential land use in this area should be discouraged.

The 60 DNL noise contour within the approach to Runway 10 extends farther west into the City of Bryan. Although land within the 60 DNL noise contour is currently vacant, the area's proposed land use is Planned Mix Use that includes residential. According to the City's land use plan, high-density residential is planned close to Highway 47. Although residential land use is considered compatible with noise levels less than 65 DNL under FAA guidelines, the potential for noise complaints from future residents in this area is very high due to its location beneath the approach to Runway 10. Residential land use in this area is not desirable from an airport compatibility perspective and should be reconsidered by the City.

Approach to Runway 28

The 65 DNL noise contour within the approach to Runway 28 extends eastward just south of FM 2818 and stays on Texas A&M property. Land use compatibility can be maintained in this area as long as no noise sensitive land uses are established. The 60 DNL noise contour extends slightly farther east encompassing land that is currently vacant and is shown as Industrial in the City of College Station's Land Use Plan. This land use is compatible with airport operations.

Potential Long-Range Airport Configuration

As noted in Section 6.4.1.2, the possibility of changing the airport's runway configuration was examined in the alternatives analysis. While this master plan does not contemplate the construction of any additional runways, the long-range compatibility of the airport with surrounding land use is an item of concern and was examined.

The noise contours for 2022 were generated using a parallel runway configuration in a 16/34 orientation. The analysis revealed that additional land use north and south of the airport would be encompassed by the noise contours. The 60 and 65 DNL noise contours with the approach to the proposed Runway 16R would encompass existing residential land use along Turkey Creek Road and future residential land uses within the Planned Mix Use development in the City of Bryan. The construction of additional residential land use within this area will significantly reduce the land use compatibility of any future parallel runway.

Land use on the south end of the airport with 60 and 65 DNL noise contours is primarily rural with some low density residential. This is similar to the current land use condition with the approach to the existing Runway 34. Land use compatibility can be maintained with a future parallel runway if residential land uses are minimized in this area.

6.4.3 SOCIAL IMPACTS

FAA Order 5050.4A, *Airport Environmental Handbook*, specifies that the principal social impacts to be considered during an environmental review include those associated with relocations or other community disruptions. The order states that further analysis is required if the proposed development would relocate any residence or business; alter surface transportation patterns; divide or disrupt established communities; disrupt orderly, planned development; or create and appreciable change in employment. Review of the proposed projects reveals that all projects will occur on airport or Texas A&M property and therefore, will not generate the types of social impacts described above.

6.4.4 INDUCED SOCIOECONOMIC IMPACTS

According to the FAA *Airport Environmental Handbook*, Order 5050.4A, induced socioeconomic impacts will normally not be significant except where there are also significant impacts in other categories, especially noise, land use or direct social impacts. In such circumstances, a more thorough analysis of induced effects may be needed as part of an environmental impact statement.

The proposed projects are all confined to airport and/or Texas A&M property and will not result in the relocation of any businesses; consequently, adverse impacts on business activities are not expected. As a provider of new temporary and permanent employment, the airport can be expected to have a continued positive impact on the community's employment trend. During construction, the projects will provide employment and local spending will increase.

No adverse impacts on recreation are expected, as none of the proposed projects occur on or directly bordering public parklands or other recreational areas. In general, the economic benefits of improved airport operations are expected to contribute to providing an atmosphere conducive to industry and other business needs, including those of the local tourism industry. The current contribution of Easterwood Airport to the local economy is quantified in the airport's Economic Impact Study.

6.4.5 AIR QUALITY

Section 176 of the Clean Air Act Amendments of 1977, published in the Federal Register April 1, 1980, requires federal agencies to assure that their actions will conform to the State Implementation Plan (SIP) for air quality control. It also requires that states establish procedures for the review of federal conformity in their SIPs. If the proposed improvements result in the installation of any fuel-burning equipment (heaters, incinerators, generators, etc.), a permit may be required, depending on the volume of the emissions.

Easterwood Airport is located in Brazos County, Texas, which is considered in attainment of all National Ambient Air Quality Standards (NAAQS). The proposed development plan and improvements for Easterwood Airport will conform to the Texas SIP.

In all cases, proper measures should be incorporated during airport construction activities to minimize temporary adverse air quality impacts. Every effort will be made to minimize temporary air quality impacts such as minimizing or eliminating unnecessary idling of construction vehicles and incorporating dust-suppression techniques during construction activities.

6.4.6 WATER QUALITY

The Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977, provides the authority to establish water quality standards, control discharges into surface and subsurface waters, develop waste management plans and practices, and issue permits for discharges associated with construction (Section 402) and for placement of dredged or fill material (Section 404). Consultation with the EPA regional office should be undertaken if there is the potential for contaminating any aquifer designated by the EPA as a sole or principal drinking water resource for the area (pursuant to Section 1424(e) of the Safe Water Drinking Act, as amended). A Texas Pollutant Discharge Elimination System (TPDES, formerly NPDES and now administered by the Texas Commission for Environmental Quality, or TCEQ) permit under Section 402 of the Clean Water Act is required for discharges into navigable waters, a Section 404 permit is required for dredged or fill material in jurisdictional waters, and a Section 10 permit under the Rivers and Harbors Act of 1899 is required for obstruction or alteration of navigable waters (none occur within the project area). The EPA is charged with the overall responsibility for Section 402 permits and the U.S. Army Corps of Engineers (USACE) for Section 404 and Section 10 permits.

Section 401 of the Clean Water Act provides that an applicant for a federal permit to conduct an activity that may result in a discharge to waters of the State must provide the permitting agency with a water quality certification issued by the State from which the discharge originates. This section of the Clean Water Act is a direct delegation from Congress to the States intended to enable each State to ensure that federally approved activities meet water quality standards established by the State under the Clean Water Act. Application for Section 401 and Section 404 permits is made jointly in Texas. Section 401 water quality certification is required by the USACE prior to the issuance of a Section 404 permit. The TCEQ is responsible for conducting Section 401 certification reviews of USACE Section 404 permit applications for the discharge of dredged or fill material into waters of the U.S., including wetlands. The TCEQ is the lead state agency that administers the Section 401 certification program in Texas except with respect to oil and gas exploration, which is the responsibility of the Railroad Commission of Texas. The goal of these certification reviews is to determine whether a proposed discharge will comply with state water quality standards.

The TCEQ is required, under Section 303(d) of the Clean Water Act, to identify water bodies for which effluent limitations are not stringent enough to implement water quality standards. The TCEQ also develops a schedule identifying Total Maximum Daily Loads (TMDLs) that will be initiated in the next two years for priority-impaired waters. Water quality permitting in Section 303(d)-listed water bodies is described in the TCEQ regulatory guidance document *Procedures to Implement the Texas Surface Water Quality Standards* (August 2002, RG-194).

The airport is located in the Brazos River Basin, which drains a total area of 45,573 square miles, of which approximately 43,000 square miles are in Texas, and stretches from New

Mexico to the Gulf of Mexico. For purposes of monitoring water quality, TCEQ has divided each of the state's river basins into segments. The airport is approximately 2.5 miles north of segment 1242 of the Brazos River, a freshwater stream as classified by the TCEQ. Water quality information for this section of the Brazos River Basin was obtained from the TCEQ (2002). Segment 1242 extends 183 miles from a point immediately upstream of the confluence of the Navasota River in Brazos/Grimes/Washington County to the low water dam forming Lake Brazos in McLennan County.

According to the 2002 TCEQ water quality assessment, Segment 1242 of the Brazos River is classified as impaired because it does not meet applicable water quality standards or is threatened for one or more designated uses by one or more pollutants. Its designated uses include contact recreation, aquatic life use, general use, fish consumption use, and public water supply use. Additional data and information will be collected on this segment before a TMDL is scheduled. Water quality problems in this segment include elevated levels of bacteria in the downstream portion of the segment and the portion of the segment within Waco city limits. The portion of the segment upstream of Bryan was issued a Public Water Supply Concern related to increased costs due to demineralization (TCEQ, 2002). Other areas of the river have generally good water quality (TCEQ, 2002). The aquatic life, public water supply and general uses were fully supported for 2002, and the fish consumption use was not assessed.

Three other Section 303(d)-listed (impaired) unclassified water bodies occur in the Bryan-College Station area: Country Club Lake, Fin Feather Lake, and Carters Creek (TCEQ, 2002). Country Club Lake, which extends from the Country Club Branch Dam up to normal pool elevation in Bryan, is considered impaired due to ambient toxicity in the sediment. It is approximately 3.5 miles north of the airport. Fin Feather Lake, which extends from Fin Feather Dam up to normal pool elevation in northwest Bryan, is considered impaired due to ambient toxicity in the sediment. It is approximately 4 miles north of the airport. Carters Creek, which extends from the confluence with the Navasota River in Brazos County to the confluence with Moores Branch and Rocky Branch in Robertson County, is considered impaired due to bacteria. It is approximately 5 miles east of the airport.

Water quality data are not available for the various tanks and creeks near the project area and none are classified as impaired by TCEQ (2002). White Creek, an unlisted/unclassified body of water, follows the southeastern boundary of the airport and has tributaries to the south and west of the airport. White Creek flows into segment 1242 of the Brazos River approximately 3 miles south-southwest of the airport. It will potentially be affected by the construction of a new access road on the eastern side of the airport, and by the proposed upgrade of the Runway Safety Area (RSA) on the approach to Runway 28, via one of its tributaries.

The northern half of Brazos County is underlain by the downdip portion (that part of a water-bearing rock layer that dips below other rock layers) of the Carrizo-Wilcox Aquifer, while the southernmost part of the county is underlain by the Gulf Coast Aquifer. The minor aquifers underlying Brazos County are the Yegua-Jackson Aquifer, which underlies most of the county but not the northwestern edge; the Sparta Aquifer (downdip), which underlies most of the county but not the southern tip; the Queen City Aquifer (downdip), which underlies most of the county but not the southern tip; and the Brazos River Alluvium Aquifer, which underlies the northwest corner and southern tip of the county. The airport is underlain by the Yegua-Jackson, Sparta, and Queen City Aquifers (TCEQ, 2001).

According to a November 2003 search of Texas Water Development Board (TWDB) and TCEQ online and hard copy records, there are no water wells within existing or proposed airport boundaries. No impacts on aquifers are expected from the proposed activities; however, appropriate measures should be taken to prevent negative impacts on water quality.

The potential upgrade of the RSA on the approach to Runway 28 could result in the realignment (and subsequent fill) of approximately 1,000 linear feet of a small creek (water of the U.S.), as well as the placement of approximately 90,000 cubic yards of fill material to bring the RSA up to FAA standards. The channel realignment and placement of fill associated with these improvements would require authorization under a Section 401/404 permit (most likely an individual permit) prior to construction. The actual extent of potential impacts upon sensitive ecological areas (including wetlands and waters of the U.S.) will need to be confirmed prior to the beginning of construction. USACE guidelines require that an applicant consider all reasonable avoidance and minimization strategies and arrive at the least damaging practicable alternative prior to permit approval.

According to the FAA *Airport Environmental Handbook*, for most airport actions, significant impacts on water quality can be avoided by design considerations, controls during construction, and other mitigation measures. The airport’s storm water pollution prevention plan (SWPPP) and the requirements specified by the TCEQ for its TPDES permits will provide runoff control measures. Construction specifications should require the installation of traps or holding basins to retain toxic materials or other pollutants that might tend to spill or run off into the waterways and groundwater. To minimize the effects to the water quality during construction, methods, and practices used should conform to FAA Advisory Circular 150/5370-10A, *Standards for Specifying Construction of Airports*, Item P-156 *Temporary Air and Water Pollution, Soil Erosion, and Siltation Control*; and FAA Advisory Circular (AC) 150/5370-2E, *Operational Safety of Airports During Construction*. These provisions should be incorporated into project specifications to minimize potential adverse impacts from construction activity.

6.4.7 DEPARTMENT OF TRANSPORTATION ACT, SECTION 4(f) (RECODIFIED AS 49 USC, SUBTITLE I, SECTION 303)

Section 4(f) of the Department of Transportation (DOT) Act provides that the Secretary “shall not approve any program or project which requires the use of any publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance or land of an historic site of national, state, or local significance unless there is no feasible and prudent alternative to the use of such land and such program or project includes all possible planning to minimize harm resulting from the use."

The airport is located entirely on land owned by Texas A&M. According to TPWD quad maps of the airport area and the Land Use Map of the City of College Station Comprehensive Plan (1995-2015), the proposed projects would not require the use of or affect any publicly-owned land associated with a public park, recreational area, wildlife or waterfowl refuge lands, or historic site of national, state, or local significance. No impacts to Section 4(f) lands are anticipated.

6.4.8 HISTORIC, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

The National Environmental Policy Act (NEPA) requires consideration of important historic, cultural, and natural aspects of our national heritage. Important aspects of our national heritage that may be present in the project area were considered under Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended. This act requires federal agencies to take into account the effect that an undertaking may have on historic properties. Historic properties are those included in or eligible for inclusion in the National Register of Historic Places (NRHP) and may include buildings, structures, districts, objects, and archaeological sites. In accordance with the Advisory Council on Historic Preservation (ACHP) regulations pertaining to the protection of historic properties (36 CFR 800.4), federal agencies are required to locate and evaluate historic properties and assess the effects that the undertaking may have on such properties.

Research for this section was conducted at the Texas Archaeological Research Laboratory, the Texas Historical Commission, and at TxDOT, Environmental Affairs Division. Research focused on the identification of archaeological sites, surveys, and potential site locations. There are no previously recorded archaeological sites within 500 feet of the project area. There are no sites listed or considered to be eligible for the NRHP or as a State Archaeological Landmark (SAL). No surveys have taken place in the project area; however, two surveys have taken place just outside the project area.

In 1992, the Texas Water Development Board conducted a linear survey along White Creek, southeast of Easterwood Airport. This survey recorded two sites, 41BZ116 and 41BZ117. Both were characterized as surficial lithic scatters, and both were determined to be ineligible for NRHP/SAL listing. These sites lie outside the project area.

In March 2000, Texas A&M conducted a survey of an area southwest of Easterwood Airport. This project recorded two sites, 41BZ137 and 41BZ138. Both sites were described as surficial lithic procurement sites and both were determined to be ineligible for NRHP/SAL listing. These sites lie outside the project area.

There is some potential for prehistoric archaeological sites in the project area, due to the presence of landforms (creeks/drainages) that have a higher potential than the surrounding area for containing buried archaeological sites. There is a very low potential for historical archaeological sites due to the lack of standing structures or homesteads noted on historical maps. Potential for unrecorded archaeological sites has been determined through examination of the USDA soil survey maps for Brazos County, the Geologic Atlas of Texas, and historical maps. According to the Brazos County Soil Survey, the project crosses through moderate to deep loamy soils whose parent associations belong mainly to Zack-Boonville-Zulch series. These appear predominantly on uplands. Zack-Boonville-Zulch series soils are generally undulating. The underlying geology is characterized by high Pleistocene gravel deposits and sandstone deposits of the Yegua formation developed during the Eocene Era. Potential for intact, buried prehistoric archaeological sites along upland areas is relatively low. However, the project crosses through fingers of recent alluvium consisting of deep loamy soils, particularly along the terraces adjacent to White Creek and its tributaries, where Holocene alluvium is present and could potentially contain unrecorded prehistoric archaeological sites. Prehistoric sites at these locations could be deeply buried.

Specific projects associated with the airport expansion that occur in areas with a higher potential for buried resources (relative to the remainder of the tract) include the construction of hangars west of Runway 16/34, construction of Taxiway J, construction of a new control tower, construction of a control tower road, construction of a west side apron, and extension of Runway H on the south side of the airport. The construction of a runway safety area on the southeast side of the airport will also occur in an area of higher potential for archaeological resources. Projects planned for the north side of the airport occur in an area with a lower probability for archaeological resources.

An archaeological survey is recommended for all high probability areas in the airport expansion project area. The survey should include pedestrian inspection supplemented by shovel tests and backhoe trenches in areas of deep alluvium.

6.4.9 BIOTIC COMMUNITIES

6.4.9.1 Fauna

The airport lies within the Texan biotic province as described by Blair (1950), an area dominated by a moist, subhumid climate. The Texan province represents an ecotone between the forests of the Austroriparian province of the southeastern U.S. and the grasslands and plains of the Kansan and Balconian provinces to the west. The intermingling of forests with grasslands is the most noteworthy characteristic of this biotic province.

There are no endemic vertebrate species of the Texan province, but species characteristic of surrounding provinces commonly occur, such as Virginia possum (*Didelphis virginiana*), fox squirrel (*Sciurus niger*), hispid cotton rat (*Sigmodon hispidus*), gopher (*Geomys breviceps*), eastern cottontail (*Sylvilagus floridanus*), swamp rabbit (*S. aquaticus*), and California jackrabbit (*Lepus californicus*). Common reptile species in the Texan biotic province include the green anole (*Anolis carolinensis*), collared lizard (*Crotaphytus collaris*), racer (*Coluber constrictor*), Baird's rat snake (*Elaphe obsoleta*), and western diamondback rattlesnake (*Crotalus atrox*). Rivers and tributaries passing through the Texan (e.g., the Red, Trinity, Sabine, Brazos, Colorado, and Guadalupe Rivers) support riparian forests important to the western dispersal of Austroriparian species, while patches of grasslands and prairies represent the easternmost ranges for many western species.

Impacts on wildlife within the project area would most likely occur in conjunction with the removal of vegetation and disturbance in and around water features. Native vegetation provides cover, food, and habitat for many resident and migratory species. Disturbance associated with construction-related activities could impact aquatic species occurring in the pond adjacent to the proposed new access road on the eastern side of the airport, and in the creek crossing the area of the proposed improvement of the Runway 28 RSA.

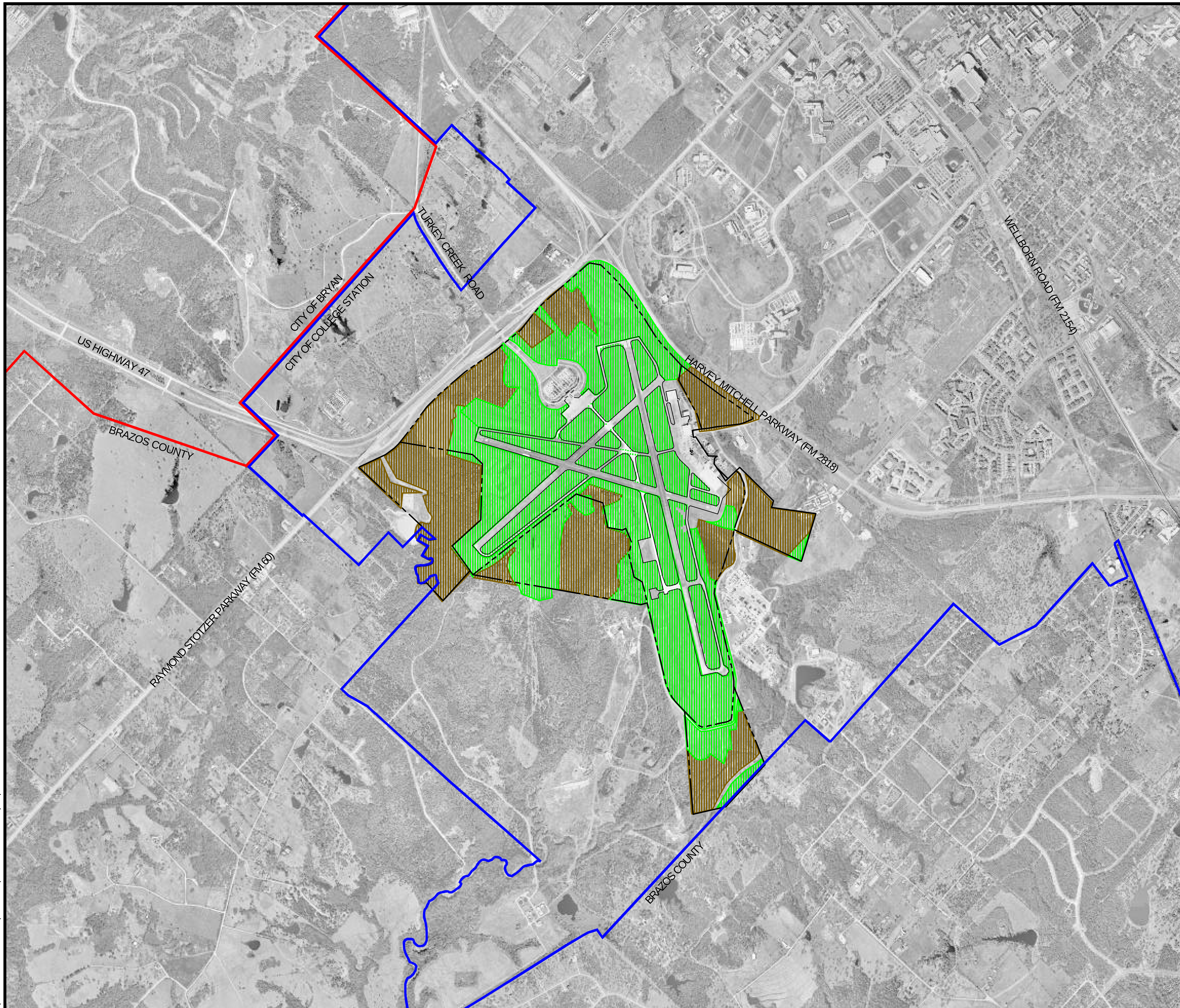
6.4.9.2 Flora

The airport is located in an ecotonal area between the Blackland Prairie and Post Oak Savannah vegetational regions of Texas, named and described by Gould (1962). The Blackland Prairie vegetational region has a gently rolling to nearly level topography, with dark-colored calcareous clay soils developed under prairie grass-forb vegetation. Average annual rainfall varies from about 30 inches on the west to slightly more than 40 inches on the east (Gould, 1962). Due to extensive cultivation in the region, only small acreages of meadowland remain in climax tall grass vegetation, in which the climax dominant species is little bluestem (*Schizachyrium scoparium* var. *frequens*). Other important grasses are big bluestem (*Andropogon gerardii* var. *gerardii*), yellow indiangrass (*Sorghastrum nutans*), switchgrass (*Panicum virgatum*), sideoats grama (*Bouteloua curtipendula* var. *curtipendula*), hairy grama (*B. hirsuta*), tall dropseed (*Sporobolus asper* var. *asper*), silver bluestem (*Bothriochloa laguroides* spp*. torryeana*), and Texas winter-grass (*Nasella leucotricha*) (Gould, 1975).

The Post Oak Savannah vegetational region covers approximately 8.5 million acres from Fannin to Bowie counties in northeast Texas to portions of Guadalupe and Jackson counties in the south-central region of the state, interspersed with areas of Blackland Prairie. The topography of the Post Oak Savannah varies from gently rolling to hilly with elevations of 300 to 800 feet above MSL. Annual rainfall for this area is between 35 to 45 inches with highest precipitation levels occurring in May and June (Correll and Johnston, 1970). Typically, upland soils of the Post Oak Savannah are acid sandy loams or sands, while bottomland soils range from acid sandy loams to clays (Hatch et al., 1990). The area is characterized by post oak (*Quercus stellata*) woodlands with thick yaupon (*Ilex vomitoria*) undergrowth on upland sites, a condition possibly due to cessation of wildfires and continuous livestock grazing pressure (Correll and Johnston, 1970). Common canopy species include, in addition to post oak, blackjack oak (*Quercus marilandica*), black hickory (*Carya texana*), elms (*Ulmus* spp.), hackberry (*Celtis* *laevigata*), and eastern red cedar (*Juniperus virginiana*). The understory dominants include yaupon, American beautyberry (*Callicarpa americana*), coralberry (*Symphoricarpos orbiculatus*), greenbriar (*Smilax* spp.), poison ivy (*Toxicodendron radicans*), and grapes (*Vitis* spp.). Interspersed among woodland-dominated stands are grasslands consisting largely of introduced pasture grasses, and some indigenous grassland (tallgrass prairie) associations. Common grasses include little bluestem, switchgrass, yellow indiangrass, Texas wintergrass, silver bluestem, purpletop (*Tridens flavus*), and beaked panicum (*Panicum anceps*).

The Post-Oak Savannah vegetational region is further divided into two vegetation types as described in *The Vegetation Types of Texas* (Frye *et al*., 1984): Post Oak Woods/Forest and Other Native or Introduced Grasses. The Post Oak Woods/Forest vegetation type is most apparent on sandy soils. Commonly associated plants include blackjack oak, eastern red cedar, mesquite (*Prosopis glandulosa*), black hickory, live oak (*Quercus virginiana*), sandjack oak (*Quercus incana*), cedar elm (*Ulmus crassifolia*), hackberry, yaupon, poison ivy (*Toxicodendron radicans*), American beautyberry, hawthorn (*Crataegus* spp.), Alabama supplejack (*Berchemia scandens*), trumpet creeper (*Campsis radicans*), dewberry (*Rubus* spp.), coral-berry, little bluestem, silver bluestem, sand lovegrass (*Eragrostis trichodes*), beaked panicum, three-awn (*Aristida* spp.), sprangletop (*Leptochloa* spp.), and tickclover (*Desmodium* spp.). The Other Native or Introduced Grasses vegetation type occurs principally in northeast, east-central, and south Texas. Commonly associated plants include mixed native or introduced grasses and forbs on grassland sites or mixed herbaceous communities resulting from the clearing of woody vegetation. This vegetation type is associated with the clearing of forests in northeast and east-central Texas. It also occurs in the South Texas Plains where brush has been cleared (Frye *et al*., 1984).

A general vegetation evaluation was performed on December 8, 2003. The primary vegetation types found in the project area were upland hardwood woodland, open grassland, and developed areas (see **Figure 6-4**). Some riparian woodland species occur in a narrow strip along creeks on the southwestern, southern, and eastern sides of the airport. Riparian strips are typically dominated in the canopy by eastern cottonwood (*Populus deltoides*), black willow (*Salix nigra*), American sycamore (*Platanus occidentalis*), water oak (*Quercus nigra*), and cedar elm; dominant understory species include poson ivy and grapes (*Vitis* spp.). The dominant canopy species in the upland wooded areas are post oak, blackjack oak, eastern red cedar, and winged elm. The understory dominants are yaupon, dogwood, and saplings of the dominant canopy species. Grassland areas are dominated by little bluestem, bushy bluestem, Indian wood-oats (*Chasmanthium latifolium*), bermuda grass (*Cynodon dactylon*), and other forbs and grasses. Developed areas are dominated by weedy species and cultivated landscape plants.



LEGEND

AIRPORT PROPERTY

PROPOSED AIRPORT PROPERTY

CITY OF COLLEGE STATION CITY LIMITS

CITY OF BRYAN CITY LIMITS

VEGETATION TYPE

WOODLAND

GRASSLAND

N

2000 0 2000

GRAPHIC SCALE IN FEET

FIGURE 6-4

VEGETATION TYPES

Easterwood Airport
Master Plan Update

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Based on field observations and aerial photographs provided by the engineer, it appears that many of the proposed projects will not result in the removal of trees or other woody vegetation, as they are to be carried out in developed areas. However, the construction of proposed improvements to the Runway 28 RSA will result in extensive tree removal (approximately 8 acres of upland woodland removal), as will the proposed improvements on the west side of Runway 16/34. The new rental car facility and the new access road in the General Aviation terminal area would require the removal of trees, shrubs, and open grassland, and may impact riparian and aquatic plant species on the eastern side of the airport, where there is a pond (across from the Fire Training Institute).

Areas outside the project area will be disturbed directly in the case of the construction of the new access road. Otherwise, impacts to vegetation are confined to the project area, which lies within existing airport property boundaries. Where possible, vegetation removed during development should be replaced at appropriate locations within Texas A&M property using appropriate species that have been recommended by the local Natural Resource Conservation Service (NRCS) office. However, vegetation removed in order to meet required safety standards for airfield operations cannot be replaced within these safety zones.

6.4.10 ENDANGERED AND THREATENED SPECIES OF FLORA AND FAUNA

Section 7 of the Endangered Species Act as amended requires each federal agency to ensure that any action that agency authorizes, funds, or carries out is unlikely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of endangered and threatened species' critical habitat.

Data on endangered, threatened, and other rare species and community types potentially occurring in the project area have been obtained from recorded information sources, including the Texas Parks and Wildlife Department (TPWD)'s Biological and Conservation Data System (BCDS) and the U.S. Fish and Wildlife Service (USFWS). According to annotated county special species lists, 24 endangered, threatened, and rare species may occur or have historically occurred within Brazos County (**Table 6.4**). Some listed species would not be expected to occur within the project area because of the absence of suitable habitat, and are described accordingly. Species that have a potential to occur within the project area are noted in **Table 6.4**, along with their state/federal listing status and potential occurrence in the project area.

Table 6.4
Threatened and Endangered Species of Potential Occurrence in Brazos County, Texas

Species	Scientific Name	Federal Status	State Status	Habitat Present (Y/N)	Species Impacted (Y/N)	Justification of Impacted Status*
Amphibians						
Houston Toad	*Bufo houstonensis*	E	E	N	N	1
Reptiles						
Texas Horned Lizard	*Phrynosoma cornutum*	-	T	N	N	1
Timber/Canebrake Rattlesnake	*Crotalus horridus*	-	T	Y	N	3a
Alligator Snapping Turtle	*Macrochelys temminickii*	-	T	N	N	1
Louisiana Pine Snake	*Pituophis ruthveni*	C	T	N	N	1
Birds						
Arctic Peregrine Falcon	*Falco peregrinus tundrius*	DL	T	Y	N	2
Bald Eagle	*Haliaeetus leucocephalus*	T-PDL	T	N	N	1
Whooping crane	*Grus americana*	E	E	Y	N	2
Wood Stork	*Mycteria americana*	-	T	N	N	1
Mammals						
Black Bear	*Ursus americanus*	T/SA; NL	T	N	N	1
Louisiana Black Bear	*Ursus americanus luteolus*	T	T	N	N	1
Rafinesque's Big-eared Bat	*Corynorhinus rafinesquii*	-	T	Y	N	3a, c
Fish						
Blue Sucker	*Cycleptus elongates*	-	T	N	N	1
Smalleye Shiner	*Notropis buccula*	C	-	N	N	1
Sharpnose Shiner	*Notropis oxyrhynchus*	C	-	N	N	1
Plants						
Navasota Ladies-tresses	*Spiranthes parksii*	E	E	Y	TBD	4

Table 6.4 (Continued)
Threatened and Endangered Species of Potential Occurrence in Brazos County, Texas

Notes:

USFWS: United States Fish and Wildlife Service
USFWS. 2003. Federally Listed as Threatened and Endangered Species of Texas. 12 September 2003.

E:	Endangered (in danger of extinction throughout all or a significant portion of its range)
T:	Threatened (likely to become endangered within the foreseeable future)
C:	Federal candidate; information supports proposing to list as Endangered/Threatened
T/SA:	Threatened due to similarity of appearance. (Protections of the Endangered Species Act, such as consultation requirements for federal agencies under Section 7, and recovery planning provisions under Section 4(f), do not apply to species listed under similarity of appearance provisions.)
DL, PDL:	Federally Delisted/Proposed for Delisting
NL:	Not federally listed
“-”:	Rare, but with no regulatory status

TPWD: Texas Parks and Wildlife Department
TPWD. 2003. Annotated County Lists of Rare Species. Brazos County. 13 February 2003.

E:	Listed as Endangered in the State of Texas
T:	Listed as Threatened in the State of Texas
“-”:	Rare, but with no regulatory listing status

*1. The study area does not contain the preferred habitat for this species.
2. This species is migratory through the study area and would only potentially utilize the area for temporary stopover sites.
3. The study area may contain preferred habitat, but the project would not adversely impact the habitat due to one or more of the following reasons:
   a. No preferred habitat would be removed.
   b. The species is mobile. It is anticipated that it would avoid construction activities/machinery.
   c. No evidence of the species was observed during field investigations.
   d. Project could directly impact individuals; however, this impact is not likely to affect regional populations.
4. Potential impacts may occur.

TBD: To be determined

Life Histories of Listed Species

Houston Toad – Federally Endangered

According to TPWD records, known Houston toad habitat is located approximately 14 miles northwest of the airport in Robertson County. There are no records of occurrence within existing or proposed airport boundaries, no deep sands in those areas, and no impacts are anticipated.

Alligator Snapping Turtle - State Threatened

The project area does not contain the preferred habitat for this species; consequently, no impacts to this species are anticipated.

Louisiana Pine Snake - Federal SOC and State Threatened

The project area does not contain the preferred habitat for this species; consequently, no impacts to this species are anticipated.

Texas Horned Lizard - State Threatened

Because its preferred habitat does not occur in the project area, no impacts to this species are anticipated.

Timber/Canebrake Rattlesnake – State Threatened

The study area may contain the preferred habitat for this species, but none of the proposed projects would involve the removal of preferred habitat. No impacts to this species are anticipated.

Navasota Ladies'-Tresses – Federally Endangered

Sites within the area of Bryan-College Station are threatened by the rapid development of this metroplex (TPWD, 2003). According to TPWD, there are five records of occurrence around Bryan/College Station, all outside a 5-mile radius of the airport. There are no records of occurrence within existing or proposed airport boundaries. Potential habitat was identified in association with areas of fine sandy loam soils within the project area. According to NRCS Soil Survey Maps (2002) and TxDOT (1997), the soils preferred by *S. parksii* that occur in the project area include those of the Sandow (Sa) unit (although in Brazos County, Sandow soils may be inclusions of other soil series units). There are approximately zero acres of Sandow soils within the existing airport boundary. Sandow soils occur along the eastern boundary of the airport, and along a creek tributary, possibly within the southern RPZ of Runway 16/34. Within the existing airport boundary, there are approximately 210 acres of other fine sandy loam soils considered to be low potential habitat, including soils of the Boonville fine sandy loam (BoA, BoB) and Zack very fine sandy loam (ZaB, ZaD) soil series. Within the existing airport boundary, there are approximately 525 acres of other fine sandy loam-urban complex soils of the Boonville-Urban land complex (BrB; **Figure 6-5**).

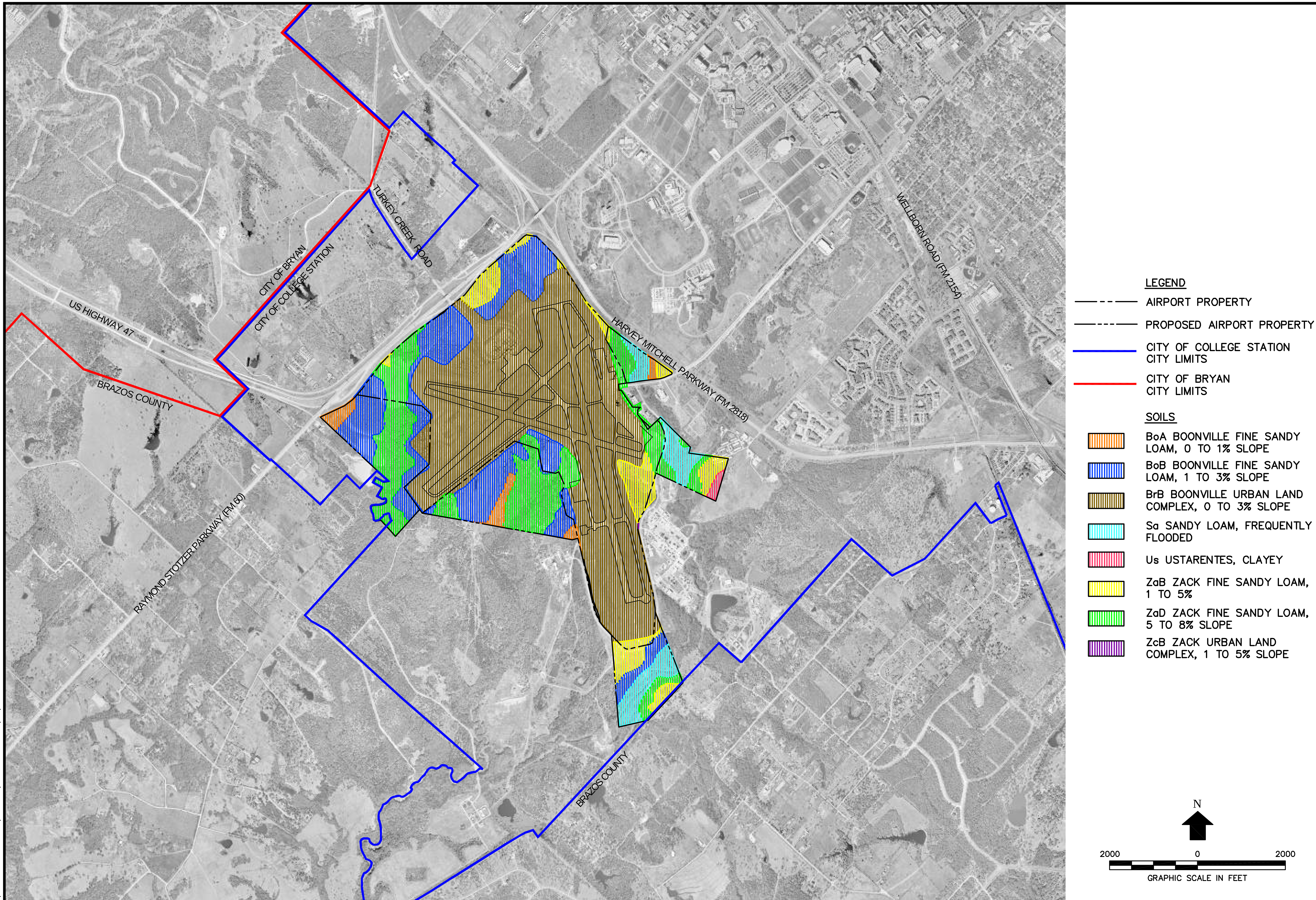

FIGURE 6-5

SOIL TYPES

Easterwood Airport Master Plan Update

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Additional investigations should be undertaken in conjunction with the EA in order to determine the potential for project related impacts.

Black Bear – Federally Threatened in eastern Texas due to similarity of appearance; State Threatened

The preferred habitat of this species does not occur in the project area; consequently, no impacts to this species are anticipated.

Louisiana Black Bear - Federal and State Threatened

Because the project area is in an urbanized area lacking intact habitat, this species is not expected to be affected by the proposed projects.

Rafinesque's Big-Eared Bat – State Threatened

Although the study area may contain the preferred habitat for this species, no impacts are anticipated due to the fact that no preferred habitat would be removed and no evidence of the species was observed during field investigations.

Arctic Peregrine Falcon – State Threatened

There are no records of occurrence within existing or proposed airport boundaries. This species would most likely occur in the project area only as a migrant.

Bald Eagle – Federally Threatened, Proposed for Delisting

There are no records of occurrence within existing or proposed airport boundaries.

Whooping Crane – Federally Endangered

Migratory species common to many counties may occur as a migrant in Brazos County but no confirmed sightings have been made (TPWD, 2003). There are no records of occurrence within existing or proposed airport boundaries. This species would most likely occur in the project area only as a migrant.

Wood Stork – State Threatened

The preferred habitat of this species does not occur in the project area; consequently, no impacts to this species are anticipated.

<u>Blue Sucker</u> – State Threatened

The preferred habitat of this species does not occur in the project area; consequently, no impacts to this species are anticipated.

<u>Summary of Potential Effects on Listed Species</u>

Site-specific occurrence records maintained by the TPWD indicate that no federally listed Endangered or Threatened species, or any other rare or sensitive species, are known and reported to occur within the proposed project area. Federally listed species known to occur in Brazos County include: two migratory birds - the endangered whooping crane and the threatened (with potential for delisting) bald eagle; one mammal - the threatened Louisiana black bear; one amphibian - the endangered Houston toad; and one plant species - the endangered Navasota ladies' tresses. Three federal species of concern (SOC) - the branched gay-feather, small-headed pipewort, and Texas meadow-rue, are located in the vicinity of the project, but not in the project area. According to TPWD records, there is one mixed rookery of little blue heron, snowy egret, and cattle egret less than one mile southwest of the intersection of FM 2818 and Leonard Road, approximately 4 miles northwest of the airport. It is recommended that presence/absence studies for any federally listed species potentially impacted by the proposed improvements be conducted as part of a formal EA.

6.4.11 WETLANDS

Waters of the U.S. are protected under Section 404 of the Clean Water Act, as administered by the USACE. The term "water of the U.S." has broad meaning and encompasses both deepwater habitats (lakes, rivers, streams, bays, etc.) and special aquatic sites, including wetlands. Wetlands are transitional areas between terrestrial and aquatic systems which are defined by the USACE according to three criteria: 1) the presence of hydrophytic vegetation, 2) hydric soil characteristics, and 3) wetland hydrology. Wetlands are protected under the Clean Water Act, and are regulated by the USACE.

According to the FAA *Airport Environmental Handbook*, a proposal is considered to affect wetlands if it would involve development in a wetlands area; involve dredging, filling, draining, channelizing, diking, impounding, or otherwise directly impact a wetlands area; involve disturbing the water table of an area in which a wetland lies; or indirectly affect a wetland by impacting regions upstream or downstream or inducing secondary development. If there is uncertainty about whether an area is a wetland, the U.S. Fish and Wildlife Service or the local or state natural resource agency shall be contacted for further information.

Determination of the presence or absence of potential waters of the U.S. within the project area was accomplished using National Wetlands Inventory (NWI) maps produced by the U.S. Fish and Wildlife Service, USGS topographic quadrangle maps, and USDA (NRCS) Soil Survey maps. According to NWI maps covering the area of the airport, there are six potential wetland areas within or adjacent to airport land. All six are of the Palustrine system, open water class with unknown bottoms, and are permanently flooded, diked, and/or impounded (typical of stock ponds). Three of these polygons are less than one acre, two are one acre, and one is between five and ten acres in surface area. None of these immediately borders a river, creek, or stream; therefore, none of these wetlands are likely to be considered USACE-jurisdictional.

White Creek is located to the east and south of the airport outside of airport boundaries, and part of White Creek passes through the RSA for Runway 28, one of the proposed areas of improvement. According to NWI maps, White Creek in this area is considered palustrine, temporarily flooded, and forested with broad-leaved deciduous trees. According to USGS topographic quadrangle maps of the project area, there are linear water features to the east and west of the airport that are not included on NWI maps. These may be perennial tributaries of White Creek, but their status as linear water or wetland features, and whether or not they would be considered USACE jurisdictional, must be confirmed during a field investigation as part of a formal EA. If any of these features are determined to be jurisdictional, permits must be obtained from USACE prior to construction in or other disturbance of these areas. Preliminary plans indicate that improvements to the RSA on the approach to Runway 28 would require the relocation of approximately 1,000 linear feet of streambed, which would likely require an Individual Permit from the USACE.

According to Soil Survey data (NRCS, 2002), there are no hydric soils in the project area; but the Sandow (Sa) soil unit, which is found in the area of the proposed new access road and in the Runway 28 proposed RSA extension, may contain hydric inclusions (**Figures 6-5 and 6-6**). The presence of any wetlands within the project area should be confirmed in a field delineation prior to construction. The proposed new access road crosses a floodplain area and may cross a creek; this will also need to be confirmed during a field delineation. Construction of a single roadway crossing of a creek would likely be permitted under a Nationwide Permit #14 - Linear Transportation Projects.

6.4.12 FLOODPLAINS

The project area was investigated for floodplain areas identified and designated by the Federal Emergency Management Agency (FEMA). Floodplains are defined in Executive Order 11988 *Floodplain Management* as “the lowland and relatively flat areas adjoining inland and coastal waters including flood-prone areas of offshore islands, including at a minimum, that area subject to a one (1) percent or greater chance of flooding in any given year,” (i.e., those areas that would be inundated by a 100-year flood event). FEMA produces Flood Insurance Rate Maps (FIRMs), as part of the National Flood Insurance Program (NFIP), that delineate designated floodplains. FIRMs encompassing the area of the airport (panel numbers 48041C 0181C and 0143C) indicate that the eastern boundary of the airport lies adjacent to a special flood hazard area inundated by the 100-year flood associated with White Creek and its tributaries, with no base flood elevations determined. The alignment of the proposed new access road to the

Brayton Fire School and the proposed improvements to the Runway 28 RSA appear to cross this flood hazard area. The rest of the project area falls outside of the 500-year floodplain (**Figure 6-6**). This issue will require further analysis as part of an environmental assessment.

6.4.13 COASTAL ZONE MANAGEMENT PROGRAM

The Coastal Zone Management Program (CZMP) is authorized by the Coastal Zone Management Act of 1972 and administered at the federal level by the Coastal Programs Division (CPD) within the National Oceanic and Atmospheric Administration's Office of Ocean and Coastal Resource Management (OCRM). The CPD is responsible for advancing national coastal management objectives and maintaining and strengthening state and territorial coastal management capabilities. The Texas Coastal Management Program (CMP), created during the period between 1989 and 1995 and federally approved in 1997, establishes the Coastal Coordination Council as the forum for coordinating state, local, and federal programs for the management of Texas coastal resources.

Easterwood Airport is located entirely in Brazos County in southeast-central Texas and is not within the Coastal Zone Management Boundary. Therefore, the Texas Coastal Management Program rules do not apply.

6.4.14 COASTAL BARRIERS

The Coastal Barriers Resources Act of 1982 (CBRA) prohibits, with some exceptions, federal financial assistance for development within the Coastal Barrier Resources System, which consists of undeveloped coastal barriers along the Atlantic and Gulf coasts. Because it is well removed from any coastal areas, there are no coastal barriers associated with Easterwood Airport.

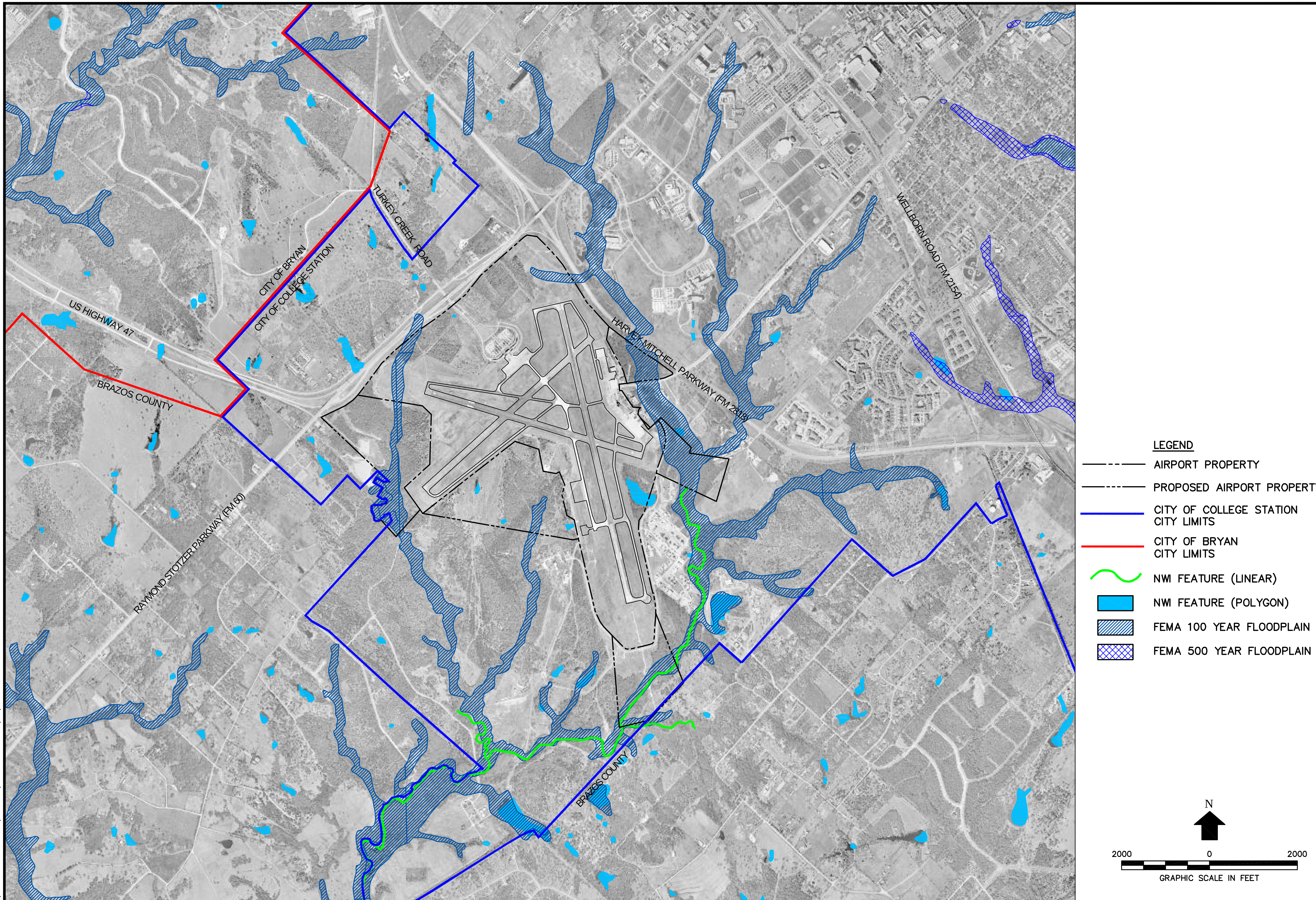

FIGURE 6-6

NWI FEATURES AND FEMA 100-YEAR FLOODPLAIN

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6.4.15 WILD AND SCENIC RIVERS

The Wild and Scenic Rivers Act (PL 90 542 as amended) describes those river areas eligible to be included in a system afforded protection under the Act as free flowing and possessing "…outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values." According to the USFWS and the TCEQ, there are no rivers designated under the Wild and Scenic Rivers Act, as amended, associated with Easterwood Airport, nor does any proposed project cross or affect and designated wild and scenic rivers.

6.4.16 FARMLAND

Soil types in the project area were assessed in accordance with the Farmland Protection Policy Act (FPPA) of 1981, which is intended to minimize the impact Federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. For the purpose of FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. The U.S. Department of Agriculture defines prime farmland as those soils best suited for production of food, forage, fiber, and oilseed crops. Prime farmlands only need acceptable farm techniques for crop production, without the high use of fertilizers and irrigation used on other soils. Farmland subject to FPPA requirements does not currently have to be used for cropland, but it cannot be water or urban built-up land. Projects are subject to FPPA requirements if they may irreversibly convert farmland (directly or indirectly) to nonagricultural use and are completed by a Federal agency or with assistance from a Federal agency (NRCS, 2002).

None of the soil types in the project area are considered prime farmland by the NRCS (2002). All of the proposed improvements are in an area committed to urban use; thus, the FPPA does not apply.

6.4.17 ENERGY SUPPLY AND NATURAL RESOURCES

The proposed projects are not expected to require significant increases in energy supply or natural resources. The majority of the proposed projects, such as paving projects, do not involve energy consumption. Projects that would involve energy consumption, such as installation of lighting and buildings, would not involve substantial increases above the existing energy consumption.

6.4.18 LIGHT EMISSIONS

The proposed lighting projects include the installation of apron lighting on the air carrier ramp and general aviation ramp, the installation of REILs on Runway 10, the installation of PAPIs on Runway 16/34, and the installation of a MALS on Runway 16. According to the FAA guidelines presented in FAA Order 5050.4A, *Airport Environmental Handbook*, actions that typically require the preparation of an EA, and potentially an EIS, include the establishment or relocation of an instrument landing system or an approach lighting system. Thus, the installation of the approach lighting system on Runway 16 may require further environmental review. However, the remaining projects appear to have low potential to cause significant impacts.

The PAPIs will be located far from any surrounding land use and do not generate substantial light emissions when viewed from the ground. The REILS on Runway 10 will generate a high intensity flashing light that may be visible at residences on the north side of FM 60. However, shielding should eliminate any impacts. This issue should be addressed during the design phase. Finally, the ramp lighting will be far removed from any adjoining land uses and will cast light inward toward the airfield. Therefore, ramp lighting will not cause any impacts to adjoining businesses or residences.

6.4.19 SOLID WASTE IMPACTS

As the proposed development projects are mainly improvements to existing airport facilities and infrastructure, no significant solid waste impacts are expected. The volume of waste generated would not be expected to increase appreciably. The existing wastewater treatment facilities in the vicinity of the airport (see **Figure 6-3**) would not be impacted by any of the proposed improvements.

City and county planning should assure that future landfills are not located within 10,000 feet of any part of the airport site (no active landfills are presently identified within that radius). Furthermore, new, federally funded airport construction or airport expansion projects near habitats or other land uses that may attract hazardous wildlife, such as landfills, must conform to the siting criteria established in the FAA AC 150/5200-33, Section 1-3. Should a potential wildlife hazard due to the existence of landfills in close proximity be identified at Easterwood Airport, it may require the development of a specific wildlife hazard management plan that will meet applicable FAA, USAF, and other relevant requirements.

6.4.20 CONSTRUCTION IMPACTS

FAA AC 150/5370-10, *Standards for Specifying Construction of Airports*, and Item P-156, *Temporary Air and Water Pollution, Soil Erosion and Siltation Control* were referenced to determine potential impacts of construction noise, air pollution, water pollution, and solid waste removal. The following construction impacts can be expected from the proposed improvements at the airport:

- Increase in particulate and gaseous air pollution levels generated by construction activity and vehicle emissions from equipment and automobiles
- Generation of solid and sanitary waste from workers at the site
- Increases in traffic volumes in the airport vicinity due to workers' activities
- Increased noise levels during the operation of heavy equipment

- Temporary erosion, scarring of land surfaces and loss of vegetation in areas that are excavated or otherwise disturbed during construction.

Where appropriate, the provisions of the TCEQ TPDES requirements and of FAA AC150/5370-10, *Standards for Specifying Construction of Airports* and Item P-156, *Temporary Air and Water Pollution, Soil Erosion, and Siltation Control* should be incorporated into project specifications to minimize potential adverse effects from construction activity.

6.4.21 CONTAMINATION/HAZARDOUS MATERIALS

According to the TCEQ LPST database, one minor spill event occurred on airport land in July 1992. The responsible party was Texas A&M, and the spill involved minor soil contamination and no water contamination. No remedial action was required, final concurrence was issued, and the case officially closed. Based on available information, none of the proposed projects would have the potential to encounter contaminated soil or require remediation. The proposed demolition of the old control tower and airport maintenance building may require an asbestos survey, if one has not already been conducted.

6.5 SUMMARY AND CONCLUSIONS

The consultant examined the 21 impact categories designated by the FAA to establish baseline conditions at the airport. Based on this threshold assessment, it is not possible to determine at this time whether the proposed development actions will have significant environmental impacts. Where potential for impact has been noted, as in the case of new roadway and building construction and the construction of the RSA for Runway 28, additional research will be required. This should include a field inspection of wetlands and some preliminary engineering to assess the extent of the potential impacts of Runway 28 RSA construction on White Creek and its associated tributaries and floodplains. The preparation of a formal EA is recommended as the best mechanism for assessing the extent of any impacts.

6.6 REFERENCES

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SECTION 7 DEVELOPMENT PLANS

7.1 INTRODUCTION

This section of the study presents the plans for the future development of Easterwood Airport. The development shown on these plans is based upon information contained in the preceding section of this report, as well as input from airport management and interested parties. These plans present how the airport could be developed through 2023. All facilities are drawn to scale and represent the implementation of recommendations presented in the previous sections.

The plans include the following drawings:

- Airport Layout Plan
- Terminal Area Plan
- Airport Airspace Plan
- Runway 16 Inner Approach Zone Plan
- Runway 34 Inner Approach Zone Plan
- Runway 10 Inner Approach Zone Plan
- Runway 28 Inner Approach Zone Plan
- Runway 4/22 Inner Approach Zone Plan
- On Airport Land Use Plan
- Airport Property Map

The airport layout plan, terminal area plan, land use plan and property map are discussed on the following pages. Full size (30-inch by 42-inch) drawings of all plans are presented in the airport layout plan drawing set published in conjunction with this report.

7.2 AIRPORT LAYOUT PLAN

The airport layout plan (ALP) serves as a guide for development at the airport through 2023. It provides a scaled depiction of all existing and proposed facilities, their location on the airport and the associated FAA design standards. A reduced size version of the ALP is illustrated in **Figure 7-1**. A brief discussion of the major elements of the ALP is provided in the following paragraphs.

7.2.1 RUNWAYS

The plan recommends that the airport's three runways be maintained at their current length and width. The runway length analysis conducted in Section 4 revealed that the primary runway's length of 7,000 feet is sufficient to accommodate the needs of aircraft currently using and expected to use the airport on a regular basis. The only improvements recommended for the airport's runways are regular pavement maintenance and an increase in the strength of Runway 16/34. Runway 16/34 currently has a strength of 64,000 pounds single-wheel loading, 95,000 pounds dual-wheel loading, and 152,000 pounds dual tandem loading. The plan recommends that the dual-wheel strength of the runway be increased to approximately 155,000 pounds to accommodate the 737-700 aircraft or the type of aircraft that is the most critical for pavement loading at the time of the rehabilitation. The existing runway strength, while lower than recommended, is sufficient to accommodate the very small number of air carrier operations currently being experienced at the airport. It is recommended that the increase of pavement strength be undertaken in conjunction with a rehabilitation of the runway's pavements. If the number of operations by air carrier aircraft increases, or considerably heavier aircraft begin to use the airport, this issue should be reexamined.

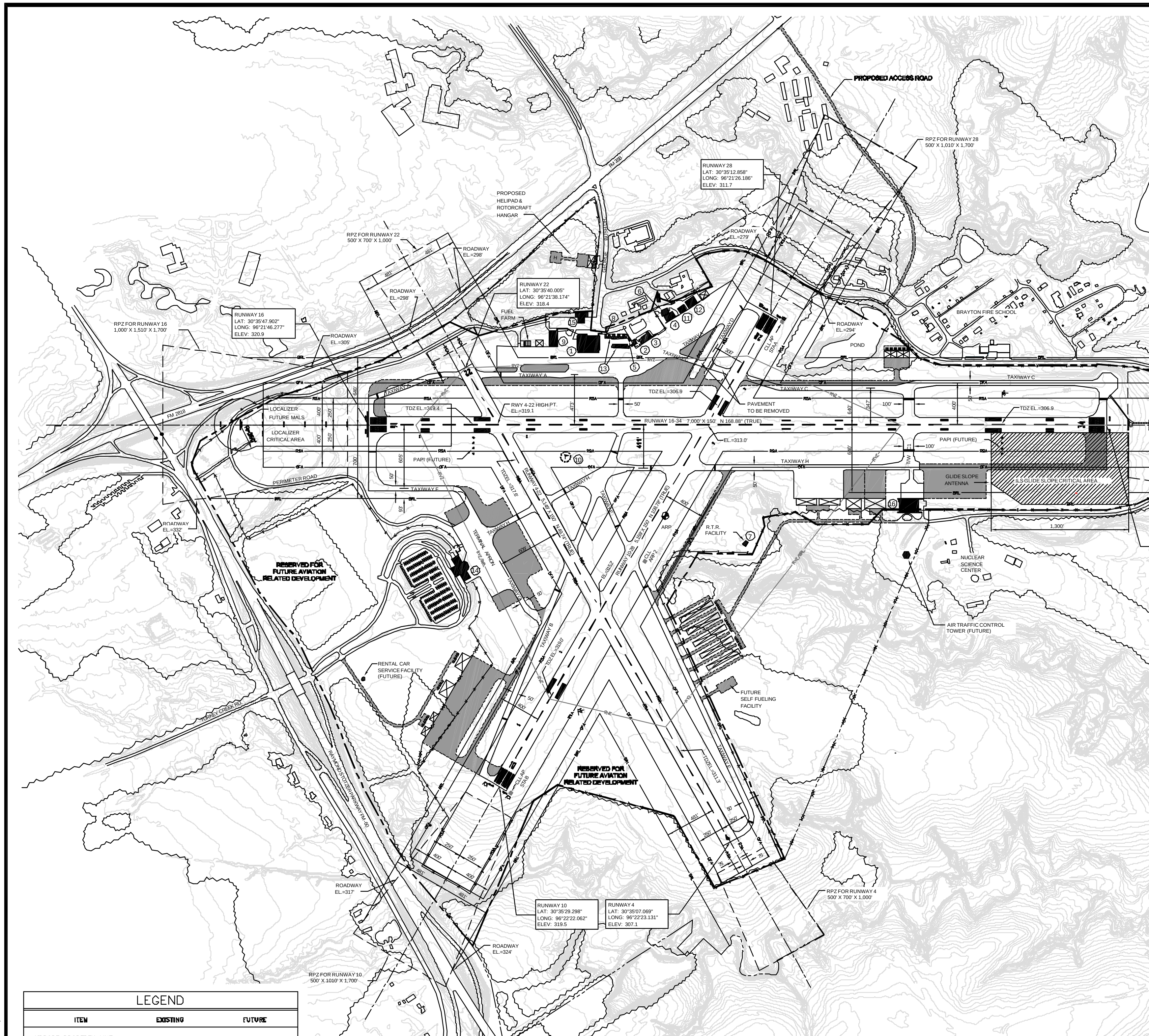
Runway Safety Areas

The plan recommends that the runway safety area for Runway 10/28 be improved to meet FAA standards for length, width and grade. As noted in the preceding sections, the runway safety area for Runway 28 does not meet FAA standards due to the steep grade, trees and the presence of Nuclear Science Road. Therefore, the plan proposes a project to close the portion of Nuclear Science Road within the runway safety area, clear the safety area of trees and provide fill to re-grade the area to meet FAA standards. This project will require a drainage structure over a portion of White Creek east of Nuclear Science Road and will require an environmental assessment.

7.2.2 TAXIWAYS

The plan recommends a series of taxiway projects to meet operational requirements and FAA geometric standards. As shown on **Figure 7-1**, these projects include a southward extension of Taxiway H from H-1 to the approach end of Runway 34. This project would reduce the number of aircraft that would have to cross Runway 16/34 to taxi from the approach end of Runway 34 to the McKenzie Terminal or vice versa. Reducing the number of aircraft crossing runways is a major safety goal of the FAA. Therefore, this project will have a high funding priority.

Other recommended taxiway projects include a proposed future Taxiway J that would connect Taxiway H and Taxiway E. This taxiway segment would allow future hangar and ramp development along the west side of the airport to have direct access to Runway 34 and Runway 4.



4°46'00"E
(SEPTEMBER 2003)

MAGNETIC NORTH
MAGNETIC DECLINATION = 4° 46'
SEPTEMBER 2003
ANNUAL RATE OF CHANGE – 0°6' W/YEAR
SOURCE: NATIONAL GEOPHYSICAL DATA CENTER

400 200 0 400 800
GRAPHIC SCALE IN FEET

HORIZONTAL DATUM – NAD 83
VERTICAL DATUM – NAVD 88

TEXAS A&M UNIVERSITY APPROVAL

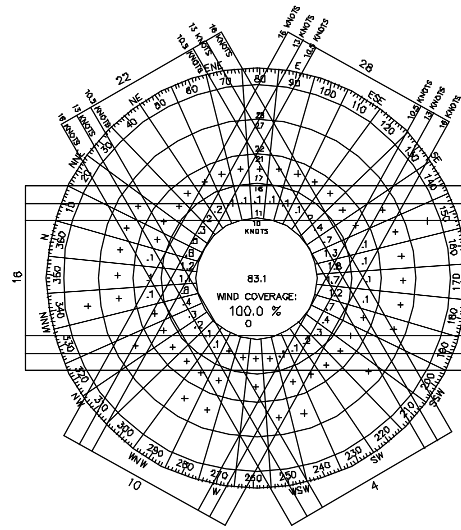
THIS AIRPORT LAYOUT PLAN APPROVED BY:

(SIGNATURE) [redacted] DATE: 11/30/04
NAME: JOHN H. HAPP, JR.
TITLE: DIRECTOR OF AVIATION

NOTES:

1. NO OFZ OBJECT PENETRATIONS.
2. ROTATING BEACON LOCATED ON TOP OF AIR TRAFFIC CONTROL TOWER.
3. NO THRESHOLD SITING SURFACE OBJECT PENETRATIONS EXCEPT ON RUNWAY 28, AS DEPICTED ON ALP AND DRAWING 6 OF 10.
4. THE AIRPORT REFERENCE CODE FOR RUNWAY 16/34 IS C-III. HOWEVER, EASTERWOOD AIRPORT OCCASIONALLY SERVES 757 AIRCRAFT (i.e., DESIGN GROUP IV) ASSOCIATED WITH ATHLETIC CHARTERS FOR TEXAS A&M. THE ANNUAL NUMBER OF OPERATIONS BY 757 AIRCRAFT IS NOT SUFFICIENT TO WARRANT A DESIGN GROUP IV DESIGNATION. HOWEVER, CERTAIN PROJECTS, SUCH AS TAXIWAY FILLETS, ETC. MAY BE DESIRABLE TO INSURE THE AIRFIELD CAN PROPERLY ACCOMODATE THESE OPERATIONS.

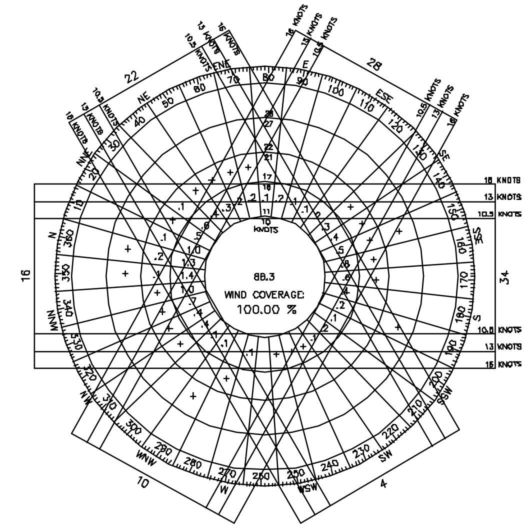
ALL WEATHER WINDROSE



WIND COVERAGE				
CROSSWIND COMPONENT	RUNWAY 16–34	RUNWAY 10–28	RUNWAY 4–22	COMBINED
10.5 KNOTS	98.3%	89.2%	89.8%	99.9%
13 KNOTS	99.3%	94.7%	94.9%	100%
16 KNOTS	99.9%	99.2%	99.2%	100%

SOURCE: NOAA, National Climatic Data Center
Station: 72244 College Station, TX
Observation Period: 1993 – 2002

IFR WINDROSE



WIND COVERAGE				
CROSSWIND COMPONENT	RUNWAY 16–34	RUNWAY 10–28	RUNWAY 4–22	COMBINED
10.5 KNOTS	97.9%	91.7%	92.3%	99.9%
13 KNOTS	99.1%	95.9%	98.2%	100%
16 KNOTS	99.8%	98.3%	99.6%	100%

SOURCE: NOAA, National Climatic Data Center
Station: 72244 College Station, TX
Observation Period: 1993 – 2002

LEGEND

ITEM	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
AIRFIELD PAVEMENT		
BUILDINGS		
ROADS & PARKING		
SECURITY FENCE		
RUNWAY SAFETY AREA	RSA	(RSA)
RUNWAY OBJECT FREE AREA	OFA	(OFA)
TREE LINE/GREEN BELT		N/A
THRESHOLD LIGHTS		
REIL		
VASI		
LOCALIZER		
ARP		
AIRPORT BEACON		
LIGHTED WIND SOCK AND SEGMENTED CIRCLE		

RUNWAY DATA

ITEM	RUNWAY 16/34				RUNWAY 10/28				RUNWAY 4/22			
	EXISTING		FUTURE		EXISTING		FUTURE		EXISTING		FUTURE	
RUNWAY LENGTH AND WIDTH (FT.)	7,000/150		7,000/150		5,159/150		5,159/150		5,149/150		5,149/150	
AIRPORT REFERENCE CODE	C–III		C–II (SEE NOTE 4)		C–II		C–II		B–II		B–II	
CRITICAL AIRCRAFT	727–200		737–700 (SEE NOTE 4)		BUSINESS JET		BUSINESS JET		BUSINESS JET		BUSINESS JET	
RUNWAY GRADIENT (%)	0.23		0.23		0.15		0.15		0.22		0.22	
PAVEMENT TYPE	ASPHALT, CONCRETE, GROOVED		ASPHALT, CONCRETE, GROOVED		ASPHALT		ASPHALT		CONCRETE		CONCRETE	
PAVEMENT STRENGTH (LBS.) SINGLE–WHEEL	64,000		64,000		45,000		SAME		25,000		SAME	
DUAL–WHEEL	95,000		155,000		64,000				34,000			
DUAL–WHEEL TANDEM	152,000		255,000		104,000				65,000			
RUNWAY LIGHTING	HIRL		HIRL		MIRL		MIRL		NONE		NONE	
RUNWAY MARKING	PRECISION		PRECISION		NON–PRECISION		NON–PRECISION		VISUAL		VISUAL	
RUNWAY ENDS	16	34	16	34	10	28	10	28	4	22	4	22
APPROACH AIDS	VASI	MALSR	PAPI, MALSF	PAPI, MALSR	VASI	REIL, VASI	REIL, VASI	REIL, VASI	NONE	NONE	NONE	NONE
APPROACH VISIBILITY MINIMUMS	519/1	200/0.5	350/0.75	200/0.5	401/1	446/1	401/1	446/1	N/A	N/A	N/A	N/A
RSA LENGTH FROM END OF RUNWAY	1,000	1,000	1,000	1,000	1,000	300	1,000	1000	300	300	300	300
RSA WIDTH	500	500	500	500	500	500	500	500	150	150	150	150
OFA LENGTH FROM END OF RUNWAY	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	300	300	300	300
OFA WIDTH	800	800	800	800	800	800	800	800	500	500	500	500
TAKEOFF RUNWAY AVAILABLE (TORA)	7,000	7,000	7,000	7,000	5,159	5,159	5,159	5,159	5,149	5,149	5,149	5,149
TAKEOFF DISTANCE AVAILABLE (TODA)	7,000	7,000	7,000	7,000	5,159	5,159	5,159	5,159	5,149	5,149	5,149	5,149
ACCELERATE–STOP DISTANCE AVAILABLE (ASDA)	7,000	7,000	7,000	7,000	5,159	5,159	5,159	5,159	5,149	5,149	5,149	5,149
LANDING DISTANCE AVAILABLE (LDA)	7,000	7,000	7,000	7,000	5,159	5,159	5,159	5,159	5,149	5,149	5,149	5,149

AIRPORT DATA

AIRPORT ID: CLL

CITY: COLLEGE STATION COUNTY: BRAZOS STATE: TX

ITEM	EXISTING	FUTURE
AIRPORT ELEVATION (AMSL)	320	320
AIRPORT REFERENCE (ARP) LAT. / LONG.	30°35'18.912" / 96°21'49.770"	30°35'18.912" / 96°21'49.770"
AIRPORT PROPERTY (ACRES)	638	931
TEMPERATURE, MEAN MAX., HOTTEST MONTH	96.2°F (AUGUST)	96.2°F (AUGUST)
TERMINAL NAVAIDS	VORTAC, NDB ILS (34)	VORTAC, NDB ILS (34)
VISUAL AIDS	ROTATING BEACON VASI (16, 10, 28) REILS (28) MALSR (34)	ROTATING BEACON VASI (16, 10, 28) REILS (28) MALSR (34)
NPIAS AIRPORT ROLE	COMMERCIAL SERVICE PRIMARY	COMMERCIAL SERVICE PRIMARY
AIRPORT REFERENCE CODE	C–III	C–III
CRITICAL AIRCRAFT	727	737

AIRPORT STRUCTURE INVENTORY

NO.	LEASE/OWNER	FACILITIES	ELEV.
1	T.A.M.U	HANGAR (210' X 147') (#756)	338
2	F.A.A.	CONTROL TOWER W/BEACON	388
3	T.A.M.U	GA TERMINAL BUILDING (#755)	326
4	T.A.M.U	HANGAR (#1091)	336
5	T.A.M.U	ELECTRICAL VAULT (#1261)	313
6	T.A.M.U	BUILDING TS4 EQUIPMENT BARN	316
7	F.A.A.	R.T.R. FACILITY	375
8	T.A.M.U	STORAGE SHED	313
9	T.A.M.U	HANGAR (#1092)	343
10	F.A.A.	WEATHER INSTRUMENTS	337
11	T.A.M.U	HANGAR (#1259)	334
12	T.A.M.U.	HANGAR (#1260)	335
13	T.A.M.U	T–HANGARS	327
14	T.A.M.U	COMMERCIAL TERMINAL BUILDING	345
15	T.A.M.U	ARFF BUILDING	343
16	T.A.C.	HANGAR	347

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FIGURE 7-1

AIRPORT LAYOUT PLAN

Easterwood Airport Master Plan Update

Another taxiway project is the proposed realignment of Taxiway B from the air carrier ramp to the threshold of Runway 10. This portion of the taxiway currently angles inward toward the threshold of Runway 10. Consequently, it does not meet FAA geometric standards for taxiway centerline to runway centerline separation and impinges upon the safety area for Runway 10/28. This project would reconstruct this portion of the taxiway to provide a taxiway centerline separation of 400 feet from the centerline of Runway 10/28.

The plan also proposes the realignment of Taxiway A from the threshold of Runway 22 to the threshold of Runway 16. Like Taxiway B, this portion of Taxiway A angles inward toward the Runway 16 threshold and consequently does not meet the FAA geometric standard for taxiway centerline to runway centerline separation of 400 feet. This project will reconstruct the taxiway at the proper separation.

The last taxiway project recommended in the plan is the realignment of Taxiway C from C-1 to Runway 10/28. This portion of taxiway has a runway centerline to taxiway centerline separation of 350 feet which is 50 feet less than the FAA standard of 400 feet. This project would include the reconstruction of the taxiway to provide the proper separation. It is recommended that this project be undertaken in conjunction with the proposed ramp project that will relocate the portion of Taxiway A from Taxiway B to Runway 28. Once this taxiway project is completed, a parallel taxiway having a separation of 400 feet will exist along the entire east side of Runway 16/34. It is recommended that the Taxiway A designation be used for the entire taxiway. It is also recommended that the portion of Taxiway C between Runway 10/28 and Taxiway D be eliminated.

7.2.3 HOLDING BAYS

As noted in Section 4, air traffic control personnel expressed a desire for holding bays at each end of Runway 16/34. However, site constraints, including topography limitations, preclude the ability to construct a holding bay near the threshold of Runway 16. Therefore, the plan recommends a wide taxiway connector from Taxiway A to the threshold of Runway 16 and from Taxiway H to the threshold of Runway 34. The same type of connector was desired by airport management from Taxiway B to the threshold of Runway 10 and is shown on the plan. These wide connectors would allow one aircraft to bypass another aircraft while still being able to use the entire runway for takeoff.

7.2.4 AIRFIELD LIGHTING

Three airfield lighting projects are recommended by the plan. These projects include the installation of REILS on the approach end of Runway 10, the installation of PAPI's on both ends of Runway 16/34, and the installation of a MALS on Runway 16. As noted in the demand/capacity section of this report, air traffic control personnel requested the installation of REILS on Runway 10. No other approach lighting would be visible when approaching the airport from the west and these lights would allow for rapid pilot identification of this runway end.

The PAPI's would replace an outdated VASI on Runway 16 and would provide vertical guidance on Runway 34 for aircraft not using the ILS. The MALS on Runway 16 would assist in runway end identification and would allow for a reduction in visibility minimums for instrument approaches to Runway 16.

7.3 TERMINAL AREA PLAN

The terminal area plan recommends a series of projects to address required improvements to the passenger terminal area, as well as the existing and proposed general aviation areas. The terminal area plan is depicted in **Figure 7-2**.

7.3.1 PASSENGER TERMINAL AREA

The plan includes a series of projects in the passenger terminal area. These projects include the reconstruction of the upper level driveways leading to the departures level of the terminal. As described in Section 4, these driveways have experienced drainage problems that have resulted in erosion problems beneath the concrete slabs and uneven settlement of the slabs. A project is proposed to correct the drainage problems and reconstruct the slabs.

Another project is to install new roadway signage throughout the passenger terminal roadway and parking areas. Existing signage is insufficient and not consistent in terms of hierarchy. A project is proposed to install new signage that will provide better information to drivers and provide a clear, consistent look and hierarchy to the signs. This project will also improve the aesthetics of the terminal area.

Another project recommended for the terminal area is a landscaping program that will improve the aesthetics of the entrance and exit road and the area surrounding the terminal.

Passenger Terminal

Alternatives were explored in Section 5 for improvements to various functions inside the passenger terminal including the departure holdroom, baggage make-up area and vertical circulation. Preferred alternatives were selected for each of these areas. The terminal area plan proposes projects to relocate the departure holdroom to the second floor, modify the baggage make-up area to reduce collisions of baggage carts with walls, and improve vertical circulation through the installation of an escalator.

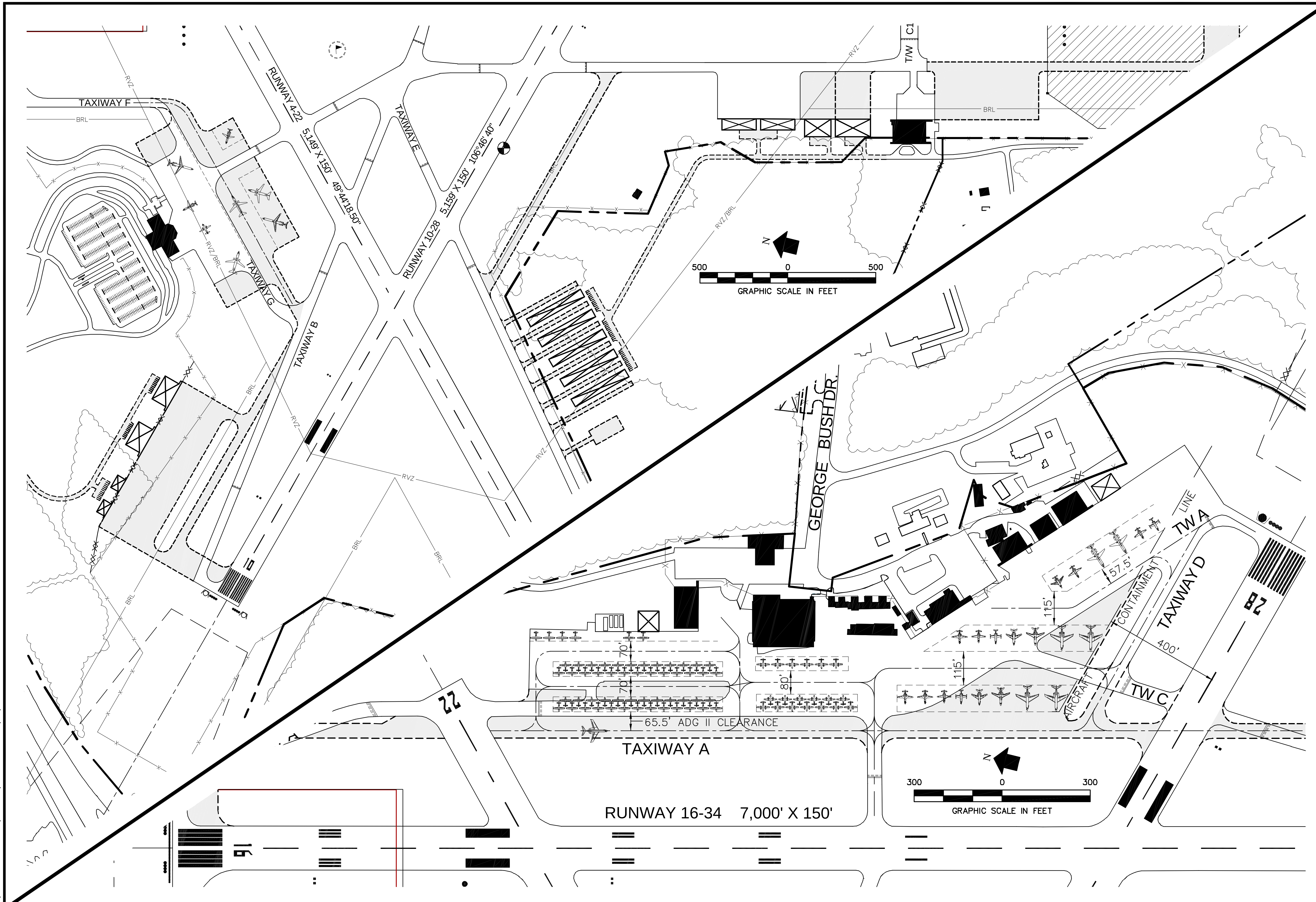

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FIGURE 7-2

TERMINAL AREA PLAN

Easterwood Airport Master Plan Update

Aircraft Apron

The terminal area plan recommends the expansion of the aircraft apron in front of the McKenzie Terminal. This expansion would provide additional space for accommodating charter operations and aircraft that divert to Easterwood Airport due to poor weather at their intended destination. The expansion could be accomplished in phases as demand dictates. The initial expansion would shift Taxiway G outward to increase the depth of the apron and would add approximately 150 feet of additional apron at each end to increase the width of the apron. Long-term additional apron could be provided on the southeast side of Taxiway G if additional demand materializes.

Roadway Access

The plan does not recommend any changes to roadway access to McKenzie Terminal other than a series of improvements to the pavements and drainage. As described in Section 4, the existing roadway requires rehabilitation to correct pavement settlement problems and prevent stormwater from forming ponds.

Automobile Parking

No changes are recommended to the parking lots in the passenger terminal area other than the removal of the rental car service facilities once a new facility is constructed and becomes operational. The existing parking lot has sufficient capacity to accommodate parking demand throughout the study period.

Rental Car Facilities

The plan proposes the construction of a new rental car service facility west of the McKenzie Terminal access road. The new facility would provide a place for rental cars to be cleaned and serviced and will increase the capacity of the public parking lot.

7.3.2 GENERAL AVIATION AREAS

The terminal area plan proposes a series of improvements to general aviation facilities including changes to access and parking, new aircraft parking apron, and additional hangars. These facilities are described in the following paragraphs.

Roadway Access

The plan recommends several changes to roadway access for the area near general aviation facilities. The plan recommends that Nuclear Science Road be closed past the Texas A&M Heat Transfer Lab in order to allow the necessary improvements to be made to the Runway 28 safety area. A new access road is recommended for access to the Brayton Fire School and the general aviation facilities on the west side of the airport. The proposed road would begin at the intersection of FM 2818 and West Luther Street and continue past the Texas A&M Poultry

Science Research Center and through the Brayton Fire School to the existing Nuclear Science Road.

The plan also recommends that the existing access road to the TAC Hangar be extended to provide access to proposed hangars and aircraft aprons on the west side of the airport and a proposed new air traffic control tower.

Automobile Parking

Rehabilitation and reconfiguration of the parking area near the general aviation terminal is recommended by the plan. This project will improve traffic flow and provide a more logical layout for parking facilities.

Aircraft Apron

In the existing general aviation area, the terminal area plan recommends the relocation of Taxiway A and the phased expansion of the aircraft apron to enable more aircraft to be parked in that area. A significant amount of additional aircraft parking can be created by relocating Taxiway A to the FAA standard of 400 feet from the centerline of Runway 16/34 and expanding the existing apron. The apron expansion is recommended to occur in phases as demand dictates.

Additional aircraft parking apron is planned for the west side of the airport, north of the TAC hangar. This apron will cover an area of approximately 220 feet by 870 feet and will provide aircraft parking space during peak periods when the ramp in the east general aviation area is full.

In the long-term, additional aircraft parking apron is planned west of McKenzie Terminal along Taxiway B. This ramp could be used for multiple purposes including general aviation, cargo or for overflow during weather diversions. This apron will only be constructed if demand dictates.

Hangars

The terminal area plan also recommends additional hangars on the north and south ramps in the existing general aviation area. A hangar on the north ramp is proposed for the area between Hangar 1092 and the fuel farm. A hangar 60 feet by 145 feet is planned for this area. A hangar on the south ramp is proposed for the area south of Hangar 1260. A hangar 60 feet by 80 feet is planned for this location.

Additional hangars are planned for the west ramp and a rotorcraft hangar is planned for the area east of Runway 16/34 near the Brayton Fire School. The rotorcraft hangar would be approximately 60 feet by 120 feet and would provide storage space for two rotorcraft. The plan shows the ability to duplicate this facility adjacent to the proposed hangar if demand for a second hangar materializes. The hangar on the west ramp would be 100 feet by 200 feet and would provide storage space for general aviation aircraft. This hangar would be located north of the TAC hangar on the west ramp.

Long-term additional hangars could be constructed on the west side of the airport south of Runway 4/22. The terminal area plan shows a location that would be suitable for the construction of T-hangars or corporate hangars along Taxiway E. Access to this area would occur via an extension of the road that serves the TAC hangar.

Another long-term location for hangars is along the aircraft apron proposed west of McKenzie Terminal along Taxiway B. The type of hangars constructed in this area will depend upon demand. Possible uses include corporate hangars and/or cargo.

Rotorcraft Facility

Airport management expressed a potential future need to construct a rotorcraft facility for medical purposes at the airport. Therefore, a potential rotorcraft hangar and helipad has been included in the plan on the west side of FM 2818 just north of West George Bush Drive.

7.4 AIRSPACE PLAN

An airport's airspace requirements are specified by Part 77 of the Federal Aviation Regulations. These regulations define a series of imaginary surfaces that extend upward and outward from an airport's runways. The purpose of these surfaces is to define the volume of airspace required to ensure the safe and efficient use of navigable airspace by aircraft. Objects that penetrate Part 77 surfaces are considered obstructions and may be hazards to air navigation. Therefore, it is desirable to maintain Part 77 surfaces clear of all obstructions. **Figure 7-3** presents the airport's airspace plan.

Easterwood Airport's FAR Part 77 surfaces are protected by a height zoning ordinance adopted by the Easterwood Joint Airport Zoning Board in 1968. Representatives from the cities of Bryan and College Station and Brazos County comprise the zoning board. The height zoning ordinance includes an official airport zoning map that depicts the airport's FAR Part 77 surfaces.

A review of the Part 77 surfaces shown on the zoning map versus those shown on the airspace drawing depicted in **Figure 7-3** reveals that the surfaces are nearly the same except for those associated with Runway 4/22. The surfaces for Runway 4/22 are slightly larger on the airspace plan than those depicted on the official zoning map. It appears that the surfaces on the official zoning map assumed that use of Runway 4/22 is limited to small aircraft (i.e., aircraft weighing less than 12,500 pounds). The airspace plan prepared for this master plan assumes that large aircraft (i.e., aircraft weighing more than 12,500 pounds) can and will occasionally use Runway 4/22. That difference is the reason why the surfaces on the airspace plan are larger than those on the zoning map.

Since the Part 77 surfaces in the airspace plan are more critical, consideration should be given to updating the airport's height zoning ordinance. This update would consist of producing and adopting a new zoning map that depicts the current Part 77 surfaces for Runway 4/22.

7.5 AIRPORT LAND USE PLAN

The land use plan depicts how airport property is to be used. It also shows planned land use surrounding the airport and the airport's noise contours. The version of the drawing presented in **Figure 7-4** provides a detailed view of on-airport land use and is based upon the proposed airport property line.

On-airport land use is a combination of airfield operations, passenger terminal area, general aviation area, aviation and non-aviation related development, and open space. **Table 7.1** provides a listing of these land uses and the approximate number of acres devoted to each use.

Table 7.1
Airport Land Use

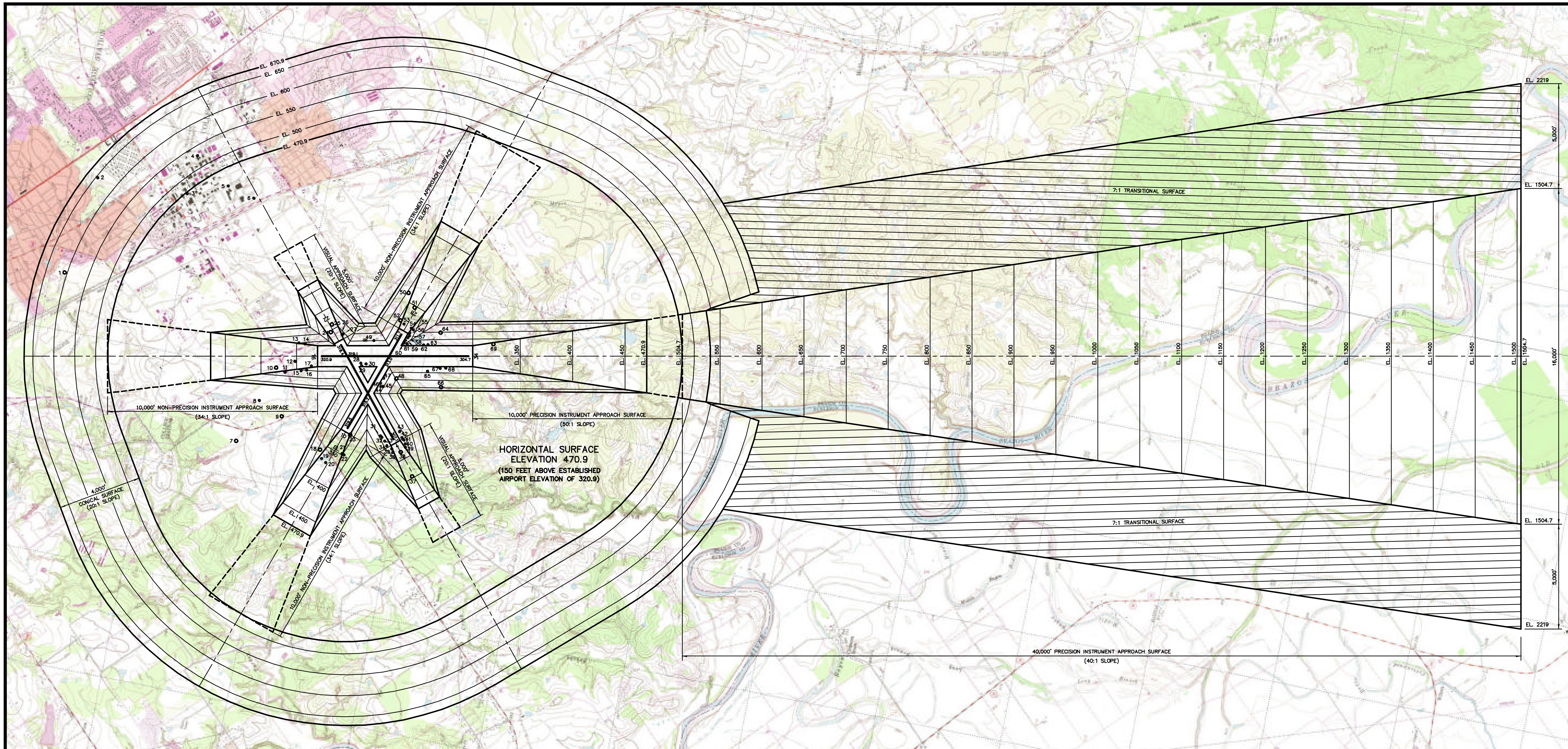
Land Use	Quantity (in acres)	Percent of Airport Property
Airfield Operations	487	52.4%
Passenger Terminal Area	38	4.1%
General Aviation	93	10.0%
Aviation Related Development	94	10.1%
Non-Aviation Related Development	2	0.2%
Open Space	216	23.2%
Total	930	100.0%

Source: URS Corporation, Inc., 2004.

More than 50 percent of airport property is devoted to airfield operations. This includes all land within the building restriction line. Another 20 percent of airport property is devoted to existing and future general aviation uses and future aviation-related uses. These areas and the existing passenger terminal area comprise the balance of land that is readily available for development. Approximately 23 percent of land is devoted to open space. This land use designation is applied to land that is within the runway approaches or areas of the airport that are less suitable for development due to terrain changes and or drainage issues.

AIRSPACE PLAN

Easterwood Airport Master Plan Update



OBSTRUCTION TABLE

NO.	DESCRIPTION	OBSTACLE ELEVATION FEET (MSL)	LOWEST AFFECTED FAR PART 77 SURFACE	PENETRATION (FEET)	RECOMMENDED ACTION	LIGHTED
1	OBSTRUCTION LIGHT ON TOWER	575	CONICAL SURFACE	−31	NO ACTION	YES
2	ANTENNA ON OBSTRUCTION LIGHTED TOWER	684	CONICAL SURFACE	38	NO ACTION	YES
3	ROD ON STACK	547	HORIZONTAL SURFACE	76	LIGHT	NO
4	ROD ON OBSTRUCTION LIGHTED BUILDING	584	CONICAL SURFACE	55	NO ACTION	YES
5	ANTENNA ON OBSTRUCTION LIGHTED BUILDING	541	HORIZONTAL SURFACE	70	NO ACTION	YES
6	ANTENNA ON OBSTRUCTION LIGHTED BUILDING	564	HORIZONTAL SURFACE	93	NO ACTION	YES
7	ANTENNA ON TOWER	469	HORIZONTAL SURFACE	−2	NO ACTION	NO
8	ROD ON TOWER	475	HORIZONTAL SURFACE	4	LIGHT	NO
9	ROD ON TOWER	464	HORIZONTAL SURFACE	−7	NO ACTION	NO
10	TREE	374	INNER APPROACH RW 16	−5	NO ACTION	NO
11	TREE	380	7:1 TRANSITIONAL SURFACE	5	TRIM OR REMOVE	NO
12	ANTENNA ON BUILDING	353	INNER APPROACH RW 16	1	NO ACTION	NO
13	TREE	352	7:1 TRANSITIONAL SURFACE	5	TRIM OR REMOVE	NO
14	TREE	341	7:1 TRANSITIONAL SURFACE	3	TRIM OR REMOVE	NO
15	TREE	365	7:1 TRANSITIONAL SURFACE	10	TRIM OR REMOVE	NO
16	TREE	364	7:1 TRANSITIONAL SURFACE	15	TRIM OR REMOVE	NO
17	TREE	363	INNER APPROACH RW 16	34	TRIM OR REMOVE	NO
18	TREE	370	7:1 TRANSITIONAL SURFACE	−15	NO ACTION	NO
19	TREE	379	INNER APPROACH RW 10	10	TRIM OR REMOVE	NO
20	TREE	373	INNER APPROACH RW 10	2	TRIM OR REMOVE	NO
21	TREE	360	INNER APPROACH RW 10	12	TRIM OR REMOVE	NO
22	TREE	363	7:1 TRANSITIONAL SURFACE	1	TRIM OR REMOVE	NO
23	FENCE	318	7:1 TRANSITIONAL SURFACE	−3	NO ACTION	NO
24	TREE	341	INNER APPROACH RW 22	−6	NO ACTION	NO
25	TREE	353	INNER APPROACH RW 22	−9	NO ACTION	NO
26	TREE	346	7:1 TRANSITIONAL SURFACE	12	TRIM OR REMOVE	NO
27	TREE	348	7:1 TRANSITIONAL SURFACE	8	TRIM OR REMOVE	NO
28	OBSTRUCTION LIGHT ON LIGHTED WINDSOCK	336	PRIMARY SURFACE RW 16/34	19	NO ACTION	YES
29	ROD ON OBSTRUCTION LIGHTED POLE	343	PRIMARY SURFACE RW 16/34	26	NO ACTION	YES
30	ROD ON OBSTRUCTION LIGHTED ANEMOMETER	337	PRIMARY SURFACE RW 16/34	21	NO ACTION	YES
31	TREE	351	7:1 TRANSITIONAL SURFACE	6	TRIM OR REMOVE	NO
32	TREE	347	7:1 TRANSITIONAL SURFACE	5	TRIM OR REMOVE	NO
33	TREE	346	7:1 TRANSITIONAL SURFACE	2	TRIM OR REMOVE	NO
34	TREE	341	7:1 TRANSITIONAL SURFACE	9	TRIM OR REMOVE	NO
35	TREE	331	7:1 TRANSITIONAL SURFACE	13	TRIM OR REMOVE	NO

OBSTRUCTION TABLE

NO.	DESCRIPTION	OBSTACLE ELEVATION FEET (MSL)	LOWEST AFFECTED FAR PART 77 SURFACE	PENETRATION (FEET)	RECOMMENDED ACTION	LIGHTED
36	TREE	341	7:1 TRANSITIONAL SURFACE	11	TRIM OR REMOVE	NO
37	TREE	356	INNER APPROACH RW 4	−40	NO ACTION	NO
38	TREE	328	INNER APPROACH RW 4	−4	NO ACTION	NO
39	TREE	336	7:1 TRANSITIONAL SURFACE	5	TRIM OR REMOVE	NO
40	TREE	339	7:1 TRANSITIONAL SURFACE	2	TRIM OR REMOVE	NO
41	TREE	339	7:1 TRANSITIONAL SURFACE	5	TRIM OR REMOVE	NO
42	TREE	341	7:1 TRANSITIONAL SURFACE	12	TRIM OR REMOVE	NO
43	TREE	339	7:1 TRANSITIONAL SURFACE	2	TRIM OR REMOVE	NO
44	TREE	349	7:1 TRANSITIONAL SURFACE	17	TRIM OR REMOVE	NO
45	TREE	350	7:1 TRANSITIONAL SURFACE	4	TRIM OR REMOVE	NO
46	TREE	347	7:1 TRANSITIONAL SURFACE	27	TRIM OR REMOVE	NO
47	TREE	348	7:1 TRANSITIONAL SURFACE	27	TRIM OR REMOVE	NO
48	ANTENNA ON OBSTRUCTION LIGHTED RTR TOWER	375	7:1 TRANSITIONAL SURFACE	−17	NO ACTION	YES
49	ANTENNA & BEACON ON OBSTRUCTION LIGHTED ATCT	388	7:1 TRANSITIONAL SURFACE	35	NO ACTION	YES
50	OBSTRUCTION LIGHT ON ELEVATOR	366	7:1 TRANSITIONAL SURFACE	−24	NO ACTION	YES
51	TREE	347	INNER APPROACH RW 28	−1	NO ACTION	NO
52	TREE	332	7:1 TRANSITIONAL SURFACE	−2	NO ACTION	NO
53	TREE	324	INNER APPROACH RW 28	4	TRIM OR REMOVE	NO
54	TREE	330	INNER APPROACH RW 28	10	TRIM OR REMOVE	NO
55	TREE	337	7:1 TRANSITIONAL SURFACE	4	TRIM OR REMOVE	NO
56	TREE	345	7:1 TRANSITIONAL SURFACE	31	TRIM OR REMOVE	NO
57	TREE	350	7:1 TRANSITIONAL SURFACE	22	TRIM OR REMOVE	NO
58	TREE	348	7:1 TRANSITIONAL SURFACE	24	TRIM OR REMOVE	NO
59	TREE	345	7:1 TRANSITIONAL SURFACE	26	TRIM OR REMOVE	NO
60	TREE	346	7:1 TRANSITIONAL SURFACE	26	TRIM OR REMOVE	NO
61	TREE	349	7:1 TRANSITIONAL SURFACE	27	TRIM OR REMOVE	NO
62	TREE	337	7:1 TRANSITIONAL SURFACE	28	TRIM OR REMOVE	NO
63	TREE	343	7:1 TRANSITIONAL SURFACE	25	TRIM OR REMOVE	NO
64	STACK	353	7:1 TRANSITIONAL SURFACE	−44	NO ACTION	NO
65	DISH ON BUILDING	351	7:1 TRANSITIONAL SURFACE	13	LIGHT	NO
66	OBSTRUCTION LIGHTED STACK	391	7:1 TRANSITIONAL SURFACE	−55	NO ACTION	YES
67	ROD ON OBSTRUCTION LIGHTED DF ANTENNA	325	7:1 TRANSITIONAL SURFACE	8	NO ACTION	YES
68	ROD ON OBSTRUCTION LIGHTED GLIDE SLOPE	330	7:1 TRANSITIONAL SURFACE	16	NO ACTION	YES
69	TREE	320	INNER APPROACH RW 34	−5	NO ACTION	NO

NOTES:

1. ALL ELEVATIONS PRESENTED IN FEET ABOVE MEAN SEA LEVEL.
2. VALUES IN THE "PENETRATING" COLUMN INDICATE THE HEIGHT OF THE OBJECT ABOVE THE MOST CRITICAL PART 77 SURFACE. NEGATIVE VALUES INDICATE THE NUMBER OF FEET THE OBJECT IS BELOW THE MOST CRITICAL PART 77 SURFACE.

   SOURCE: U.S. DEPARTMENT OF COMMERCE, NATIONAL GEODETIC SURVEY, EASTERWOOD AIRPORT, COLLEGE STATION, TEXAS, AUGUST, 2003

   DATUM: NAD 83, NAVD 88
3. REFER TO THE INNER PORTION OF THE APPROACH SURFACE PLAN VIEW DETAILS FOR CLOSE-IN OBSTRUCTIONS.
4. EASTERWOOD AIRPORT ZONING ORDINANCE ADOPTED BY THE EASTERWOOD JOINT AIRPORT ZONING BOARD ON FEBRUARY 20, 1968.

● DENOTES OBJECT THAT PENETRATES SPECIFIED SURFACE
○ DENOTES OBJECT THAT DOES NOT PENETRATE SPECIFIED SURFACE

N

2000 0 2000 4000
GRAPHIC SCALE IN FEET

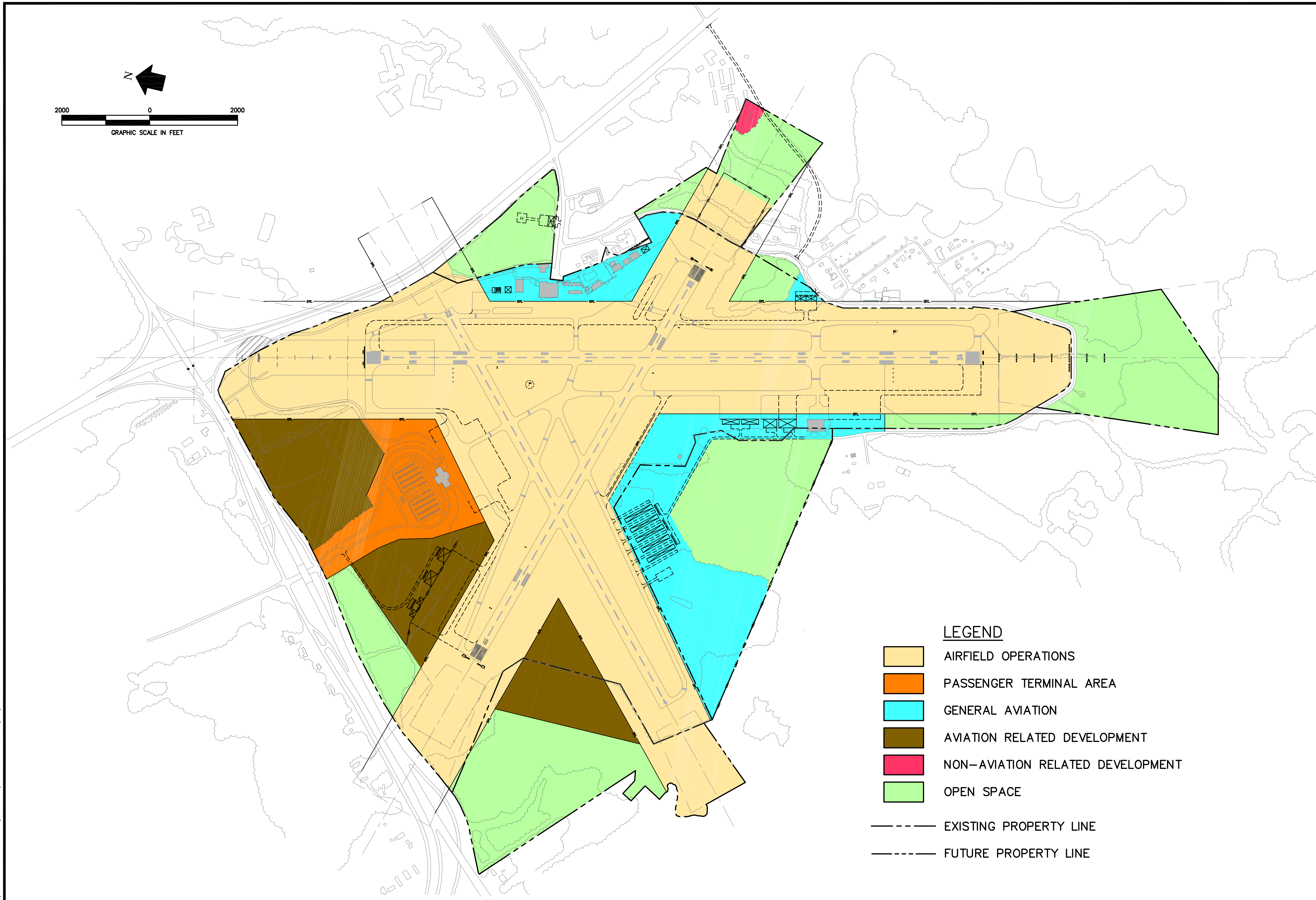


FIGURE 7-4

AIRPORT LAND USE

Easterwood Airport
Master Plan Update

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7.6 AIRPORT PROPERTY MAP

The airport property map, depicted in **Figure 7-5**, indicates the various parcels that comprise the airport. No land acquisition is required to accommodate the projects proposed by this master plan. The land that would accommodate the proposed access road to the Brayton Fire School and the land that would accommodate the construction of proposed development on the west side of the airport is already owned by Texas A&M. However, not all of this land is presently designated as airport property. Approximately 95 acres of land extending from the TAC hangar west of Runway 16/34 to the approach end of Runway 4 will need to be designated as airport property in order to allow the projects proposed for that area to be constructed. Proposed projects include the relocation of the airport's control tower, the construction of the control tower access road, as well as additional hangars and aircraft parking aprons.

Other areas of land that the plan proposes for designation as airport property include the following:

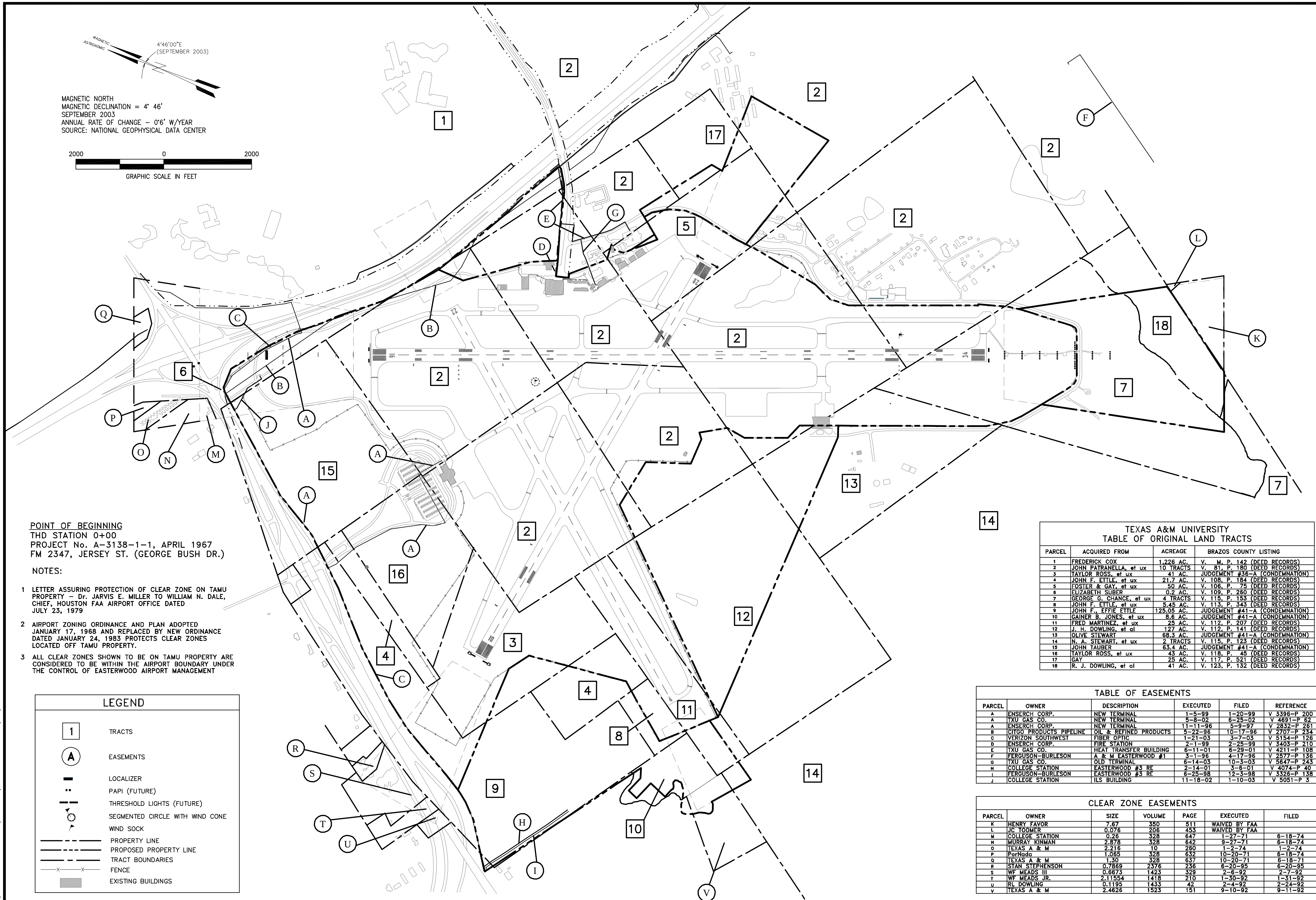
- Approximately 92 acres between Runway 10 and Runway 4. This parcel includes land within the approach to Runway 4.
- Approximately 19 acres of land on the northwest corner of FM 2818 and West George Bush Boulevard. This area could support a future rotorcraft hangar and helipad facility.
- Approximately 0.2 acres of land behind Hangar 1260 in the general aviation area. This land would provide sufficient space for access to a proposed hangar on the south ramp.
- Approximately 33 acres of land within the approach to Runway 28. This land encompasses the area where the Runway 28 safety area would be constructed.
- Approximately 53 acres in the approach to Runway 34 to control land use and ensure compatibility with airport operations.

In total the plan recommends that 293 acres of Texas A&M land be designated as airport property.

According to the property map, avigation easements have been obtained for all properties with the runway protection zones that are not owned by Texas A&M. Therefore, no additional avigation easements are required.

FIGURE 7-5

PROPERTY MAP



POINT OF BEGINNING
THD STATION 0+00
PROJECT No. A–3138–1–1, APRIL 1967
FM 2347, JERSEY ST. (GEORGE BUSH DR.)

NOTES:

1. LETTER ASSURING PROTECTION OF CLEAR ZONE ON TAMU PROPERTY – Dr. JARVIS E. MILLER TO WILLIAM N. DALE, CHIEF, HOUSTON FAA AIRPORT OFFICE DATED JULY 23, 1979
2. AIRPORT ZONING ORDINANCE AND PLAN ADOPTED JANUARY 17, 1968 AND REPLACED BY NEW ORDINANCE DATED JANUARY 24, 1983 PROTECTS CLEAR ZONES LOCATED OFF TAMU PROPERTY.
3. ALL CLEAR ZONES SHOWN TO BE ON TAMU PROPERTY ARE CONSIDERED TO BE WITHIN THE AIRPORT BOUNDARY UNDER THE CONTROL OF EASTERWOOD AIRPORT MANAGEMENT

TEXAS A&M UNIVERSITY
TABLE OF ORIGINAL LAND TRACTS

PARCEL	ACQUIRED FROM	ACREAGE	BRAZOS COUNTY LISTING
1	FREDERICK COX	1,226 AC.	V. M, P. 142 (DEED RECORDS)
2	JOHN PATRANELLA, et ux	10 TRACTS	V. 81, P. 180 (DEED RECORDS)
3	TAYLOR ROSS, et ux	41 AC.	JUDGEMENT #36–A (CONDEMNATION)
4	JOHN F. ETTLE, et ux	21.7 AC.	V. 108, P. 184 (DEED RECORDS)
5	FOSTER & GAY, et ux	50 AC.	V. 106, P. 75 (DEED RECORDS)
6	ELIZABETH SUBER	0.2 AC.	V. 109, P. 260 (DEED RECORDS)
7	GEORGE G. CHANCE, et ux	4 TRACTS	V. 115, P. 153 (DEED RECORDS)
8	JOHN F. ETTLE, et ux	5.45 AC.	V. 113, P. 343 (DEED RECORDS)
9	JOHN F., EFFIE ETTLE	125.05 AC.	JUDGEMENT #41–A (CONDEMNATION)
10	GAINER B. JONES, et ux	8.6 AC.	JUDGEMENT #41–A (CONDEMNATION)
11	FRED MARTINEZ, et ux	25 AC.	V. 112, P. 207 (DEED RECORDS)
12	J. H. DOWLING, et al	127 AC.	V. 112, P. 141 (DEED RECORDS)
13	OLIVE STEWART	68.3 AC.	JUDGEMENT #41–A (CONDEMNATION)
14	N. A. STEWART, et ux	2 TRACTS	V. 115, P. 123 (DEED RECORDS)
15	JOHN TAUBER	63.4 AC.	JUDGEMENT #41–A (CONDEMNATION)
16	TAYLOR ROSS, et ux	43 AC.	V. 118, P. 45 (DEED RECORDS)
17	GAY	25 AC.	V. 117, P. 521 (DEED RECORDS)
18	R. J. DOWLING, et al	41 AC.	V. 123, P. 132 (DEED RECORDS)

TABLE OF EASEMENTS

PARCEL	OWNER	DESCRIPTION	EXECUTED	FILED	REFERENCE
A	ENSERCH CORP.	NEW TERMINAL	1–5–99	1–20–99	V 3396–P 200
A	TXU GAS CO.	NEW TERMINAL	5–8–02	6–25–02	V 4691–P 62
A	ENSERCH CORP.	NEW TERMINAL	11–11–96	5–9–97	V 2832–P 261
B	CITGO PRODUCTS PIPELINE	OIL & REFINED PRODUCTS	5–22–96	10–17–96	V 2707–P 234
C	VERIZON SOUTHWEST	FIBER OPTIC	1–21–03	3–7–03	V 5154–P 126
D	ENSERCH CORP.	FIRE STATION	2–1–99	2–25–99	V 3403–P 210
E	TXU GAS CO.	HEAT TRANSFER BUILDING	6–11–01	6–29–01	V 4211–P 108
F	FERGUSON–BURLESON	A & M EASTERWOOD #1	3–1–96	4–17–96	V 2577–P 136
G	TXU GAS CO.	OLD TERMINAL	6–14–03	10–3–03	V 5647–P 243
H	COLLEGE STATION	EASTERWOOD #3 RE	2–14–01	3–6–01	V 4074–P 40
I	FERGUSON–BURLESON	EASTERWOOD #3 RE	6–25–98	12–3–98	V 3326–P 138
J	COLLEGE STATION	ILS BUILDING	11–18–02	1–10–03	V 5051–P 3

CLEAR ZONE EASEMENTS

PARCEL	OWNER	SIZE	VOLUME	PAGE	EXECUTED	FILED
K	HENRY FAVOR	7.67	350	511	WAIVED BY FAA	
L	JC TOOMER	0.076	206	453	WAIVED BY FAA	
M	COLLEGE STATION	0.26	328	647	1–27–71	6–18–74
N	MURRAY KINMAN	2.878	328	642	9–27–71	6–18–74
O	TEXAS A & M	2.216	10	260	1–2–74	1–2–74
P	PorNada	1.065	328	632	10–20–71	6–18–74
Q	TEXAS A & M	1.30	328	637	10–20–71	6–18–71
R	STAN STEPHENSON	0.7869	2376	236	6–20–95	6–20–95
S	WF MEADS III	0.6673	1423	329	2–6–92	2–7–92
T	WF MEADS JR.	2.11554	1418	210	1–30–92	1–31–92
U	RL DOWLING	0.1195	1433	42	2–4–92	2–24–92
V	TEXAS A & M	2.4626	1523	151	9–10–92	9–11–92

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SECTION 8 PROJECT IDENTIFICATION, STAGING AND COST ESTIMATES

8.1 INTRODUCTION

This section identifies the capital improvement projects that comprise the development plans presented in the preceding section. Projects were identified on the basis of safety, capacity shortfalls, as well as airport management and tenant priorities. The ultimate implementation of projects will be decided on the basis of funding availability, environmental approvals, and management and tenant priorities.

Certain projects shown on the ALP and discussed in the preceding section are not contained in the capital improvement program presented in this section, nor the financial implementation analysis in the subsequent section. Projects not contained in these sections are items that are speculative and will be constructed only if demand and financing capability materializes in the future.

This section also provides conceptual cost estimates for all projects in 2003 dollars. Cost estimates include construction costs and program costs. Construction costs include all physical items and the labor associated with their installation. Program costs include design fees, construction management, change order contingency, design services during construction, geotechnical fees and surveying fees. Details of the cost estimates are provided in Appendix F.

Staging periods for these projects have been established as follows: short-term (2004 through 2008), intermediate-term (2009 through 2013), and long-term (2014 through 2023). The ultimate timing of these projects will be determined by funding availability, environmental approvals, and management and tenant priorities.

8.2 SHORT-TERM PROJECTS (2004 – 2008)

Project priorities during the short-term include projects related to safety and security, such as the extension of Taxiway H and the construction of an extended runway safety area on the approach end of Runway 28, and the replacement of airfield fencing. Drainage improvements and the construction of new hangars are also high priority projects during this period.

Obtaining environmental approval for these projects is a critical element. Therefore, an environmental assessment is proposed to address this requirement. Short-term projects are described below and are illustrated in **Figure 8-1**. Estimated costs for these projects are shown in **Table 8.1**.

Table 8.1
Short-Term (2004-2008)
Project Cost Estimates

Project Number	Project Name	Estimated Cost
1	Construct Westside Apron	$1,276,755
2	Install Passenger Loading Bridges	$700,000
3	Relocate Security to 2nd Floor	$100,000
4	McKenzie Terminal Roadway Landscaping - Phase I	$141,000
5	Extend Taxiway H	$1,976,762
6	Conduct EA on Master Plan Improvements	$300,000
7	Install McKenzie Terminal Roadway Signage	$72,041
8	Construct Drainage Improvements (R/W 16 RSA)	$377,510
9	Construct Drainage Improvements (Near RTR)	$164,033
10	Construct Drainage Improvements (McKenzie Access Road)	$155,000
11	Construct Runway 28 Runway Safety Area	$2,986,683
12	Install High Mast Lights	$299,957
13	McKenzie Terminal Roadway Landscaping - Phase II	$116,400
14	Construct Drainage Improvements (Lake)	$246,837
15	Install Airfield Perimeter Fencing – Phase I	$625,008
16	Demolish Airport Maintenance Building	$18,234
17	Construct New Airport Maintenance Building	$291,785
18	Overlay Runway 16/34	$2,756,535
19	Install Airfield Perimeter Fencing – Phase II	$623,567
20	Construct Rotorcraft Hangar	$833,878
21	Construct West Terminal Area Access Road – Phase I	$66,651
22	Construct Rental Car Service Facility	$329,668
23	Reconstruct McKenzie Terminal Access Road	$727,647
24	Rehabilitate GA Area Automobile Parking Lot	$641,216
25	Construct Hangar on South Ramp	$451,664
	Total	$16,278,831

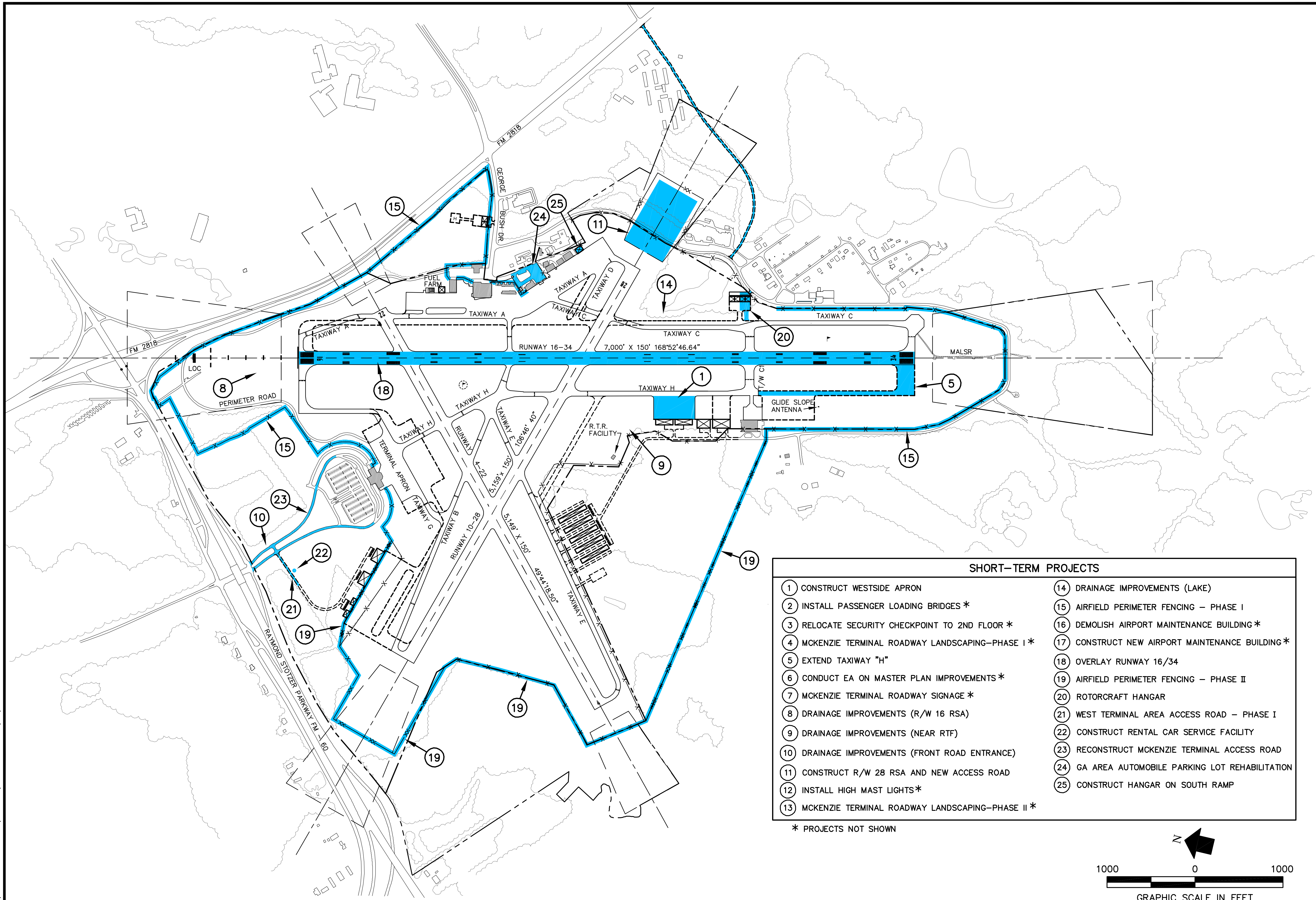
Source: URS Corporation, Inc., 2004.

8.2.1 CONSTRUCT WESTSIDE APRON

This project consists of constructing apron planned for the area west of Runway 16/34. This apron will provide space for parking aircraft and rotorcraft during peak periods, thereby reducing the need to close runways for aircraft parking.

FIGURE 8-1

CAPITAL IMPROVEMENT PROGRAM
SHORT TERM PROJECTS (2004-2008)



SHORT-TERM PROJECTS

1. CONSTRUCT WESTSIDE APRON
2. INSTALL PASSENGER LOADING BRIDGES *
3. RELOCATE SECURITY CHECKPOINT TO 2ND FLOOR *
4. MCKENZIE TERMINAL ROADWAY LANDSCAPING–PHASE I *
5. EXTEND TAXIWAY "H"
6. CONDUCT EA ON MASTER PLAN IMPROVEMENTS *
7. MCKENZIE TERMINAL ROADWAY SIGNAGE *
8. DRAINAGE IMPROVEMENTS (R/W 16 RSA)
9. DRAINAGE IMPROVEMENTS (NEAR RTF)
10. DRAINAGE IMPROVEMENTS (FRONT ROAD ENTRANCE)
11. CONSTRUCT R/W 28 RSA AND NEW ACCESS ROAD
12. INSTALL HIGH MAST LIGHTS *
13. MCKENZIE TERMINAL ROADWAY LANDSCAPING–PHASE II *
14. DRAINAGE IMPROVEMENTS (LAKE)
15. AIRFIELD PERIMETER FENCING – PHASE I
16. DEMOLISH AIRPORT MAINTENANCE BUILDING *
17. CONSTRUCT NEW AIRPORT MAINTENANCE BUILDING *
18. OVERLAY RUNWAY 16/34
19. AIRFIELD PERIMETER FENCING – PHASE II
20. ROTORCRAFT HANGAR
21. WEST TERMINAL AREA ACCESS ROAD – PHASE I
22. CONSTRUCT RENTAL CAR SERVICE FACILITY
23. RECONSTRUCT MCKENZIE TERMINAL ACCESS ROAD
24. GA AREA AUTOMOBILE PARKING LOT REHABILITATION
25. CONSTRUCT HANGAR ON SOUTH RAMP

* PROJECTS NOT SHOWN

Easterwood Airport
Master Plan Update

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8.2.2 INSTALL PASSENGER LOADING BRIDGES

This project consists of installing two passenger loading bridges on the second floor of McKenzie Terminal. Installation of these loading bridges would allow the departure lounge to be relocated from its existing location on the first floor. This project would improve the flow and function of the terminal in accordance with its original design. Departing passengers could arrive via the upper level roadways and proceed directly to ticketing or the departure lounge without changes levels. This will also provide more balanced use of the terminal's restrooms and improve passenger flow past the terminals concessions.

8.2.3 RELOCATE SECURITY CHECKPOINT TO 2ND FLOOR

Once the passenger loading bridges are installed, the existing security checkpoint could be relocated from the ground floor to the second floor. This would provide a fully functional departure lounge on the second floor.

8.2.4 MCKENZIE TERMINAL ROADWAY LANDSCAPING – PHASE I

This project consists of the installation of new landscaping along the entrance roadway to the passenger terminal to improve the aesthetics of the airport.

8.2.5 EXTEND TAXIWAY H

This project consists of extending Taxiway H from H-1 to the threshold of Runway 34. The project includes a wide entrance to Runway 34 that will allow one aircraft to bypass another aircraft. This project is a critical safety item because it would reduce the number of aircraft crossing Runway 16/34, thereby reducing the risk of a runway incursion.

8.2.6 CONDUCT ENVIRONMENTAL ASSESSMENT

This project consists of conducting an Environmental Assessment (EA) for short-term master plan projects. Items that are likely to be included in the EA include the construction of the runway safety area for Runway 28, the construction of a new access road to the fire school, the construction of the control tower access road, and the construction of the control tower and other aviation facilities on the west side of the airport. Longer-term projects should not be included in the EA because environmental approval is only applicable for a three-year period.

8.2.7 MCKENZIE TERMINAL ROADWAY SIGNAGE

This project consists of the installation of new directional and informational signage along the terminal access road to improve passenger orientation and way finding, as well as airport aesthetics.

8.2.8 MISCELLANEOUS AIRFIELD DRAINAGE IMPROVEMENTS

Three drainage projects are proposed. The first project consists of installing a pipe beneath the extended runway safety area to the approach end of Runway 16 to drain an area that occasionally ponds and could become an attractant for birds. The second project consists of installing new drainage pipe near the FAA's remote transmitter facility. This project would assist landside development in this area and would reduce soil erosion that is currently occurring in that area. The third project consists of short-term drainage improvements to the existing McKenzie Terminal access road. This road currently suffers from the retention of rainwater in ponds after storms because there are no drains along the roadway. This project would provide drainage inlets that would serve as a short-term improvement until more extensive reconstruction of the roadway could occur.

8.2.9 CONSTRUCT RUNWAY 28 RUNWAY SAFETY AREA AND NEW ACCESS ROAD

This project consists of closing a portion of Nuclear Science Road and placing a large amount of fill beyond the end of Runway 28 to bring the extended runway safety area into conformance with FAA grade requirements. This project will also include tree clearing and the rerouting of a portion of White Creek. The purpose of this project will be to improve the safety of Runway 10/28 by providing a runway safety area that meets FAA standards.

This project also includes the construction of the new roadway from the intersection of West Luther Street and FM2818 to the Brayton Fire School. This new roadway will allow a portion of Nuclear Science Road to be closed for the construction of the runway safety area.

8.2.10 INSTALL HIGH-MAST LIGHTS

This project consists of the replacement of four high mast lights along the north edge of the McKenzie Terminal aircraft parking apron. These lights would improve ramp visibility for airline employees. This project also includes the installation of four high mast lights along the aircraft parking aprons in the general aviation area.

8.2.11 MCKENZIE TERMINAL ROADWAY LANDSCAPING – PHASE II

This project consists of the second phase of new landscaping along the entrance roadway to the passenger terminal. This project is proposed to improve the aesthetics of the airport.

8.2.12 DRAINAGE IMPROVEMENTS

This project consists of extending an existing drainage pipe near the small lake south of Runway 10/28 and east of Taxiway C. Extending this pipe to the edge of the lake would allow this area to be properly graded and maintained with lawn mowers.

8.2.13 INSTALL AIRFIELD PERIMETER FENCING – PHASE I

This project consists of the installation of a 10-foot chain link fence with 3-strand barbed wire along the route where corral-style vinyl fencing is currently located. This area extends from just east of the ARFF station, north along Highway 2818, west along Highway 60 to a point just east of McKenzie Terminal. This phase also includes a portion of fencing that extends around the south end of Runway 16/34 from a point on the east side of the airport perpendicular to Taxiway C-1 to a point on the west side of the airport perpendicular to Taxiway H-1.

8.2.14 DEMOLISH AIRPORT MAINTENANCE BUILDING

This project consists of the removal of the existing airport maintenance building located behind Hangar 1091.

8.2.15 CONSTRUCT NEW AIRPORT MAINTENANCE BUILDING

This project consists of the construction of a new airport maintenance facility in the same place as the existing maintenance facility.

8.2.16 OVERLAY RUNWAY 16/34

This project consists of a pavement overlay of Runway 16/34. For cost estimating purposes, the overlay is assumed to consist of 4 inches of grooved asphalt. However, the need for an increase in pavement strength should be reevaluated at the time of this project's design. There are numerous options for the extent of the pavement rehabilitation and it is possible that the final design will differ from the 4-inch overlay assumed.

8.2.17 AIRFIELD PERIMETER FENCING – PHASE II

This project consists of the replacement of existing fence with new chain-link fence that would extend from the west side of McKenzie Terminal around the perimeter of the airport to a point on the west side of the airport that is perpendicular to Hotel-1.

8.2.18 CONSTRUCT ROTORCRAFT HANGAR

This project consists of constructing a 60-foot by 120-foot rotorcraft hangar south of the existing general aviation area in an area east of Taxiway C and south of the small lake adjacent to Nuclear Science Road. Construction of airfield access, a parking apron in front of the hangar, and automobile parking behind the hangar would also be part of this project.

8.2.19 CONSTRUCT WEST TERMINAL ACCESS ROAD - PHASE I

This project consists of the construction of a new road from the McKenzie Terminal access road to a proposed Rental Car Service Facility.

8.2.20 CONSTRUCT RENTAL CAR SERVICE FACILITY

This project consists of constructing a three-bay building suitable for washing and servicing rental cars. The building would be constructed west of the McKenzie Terminal access road along the proposed access road described above.

8.2.21 RECONSTRUCTION OF MCKENZIE TERMINAL ACCESS ROAD

This project consists of the removal and replacement of the concrete slabs that comprise the existing access road to the passenger terminal and the installation of appropriate drainage.

8.2.22 REHABILITATE GA AREA AUTOMOBILE PARKING LOT

The existing automobile parking lot for the general aviation area requires improvements to improve the flow and orientation of parking and improve the area's aesthetics. This project would provide an asphalt overlay and reconfigure the existing parking areas. Appropriate curbing and planting areas would be incorporated into the design.

8.2.23 CONSTRUCT HANGAR ON SOUTH RAMP

This project consists of constructing a 60-foot by 80-foot hangar at the edge of the south general aviation ramp. This hangar would be located adjacent to Hangar 1260.

8.3 INTERMEDIATE-TERM PROJECTS (2009 – 2013)

Project priorities during the intermediate-term include expansions of aircraft parking apron at both the McKenzie Terminal and the general aviation area, the construction of a new control tower, and improvements to the terminal access roadways and elevated automobile driveways to the upper level of the McKenzie Terminal. Intermediate-term projects are described below and are illustrated in **Figure 8-2**. Estimated costs for these projects are shown in **Table 8.2**.

8.3.1 CONSTRUCT HANGAR ON WEST RAMP

This project consists of the construction of a new 100-foot by 200-foot aircraft hangar along the edge of the westside apron. The hangar would be located north of the existing TAC Hangar.

8.3.2 RECONSTRUCTION OF MCKENZIE TERMINAL UPPER LEVEL DRIVEWAYS

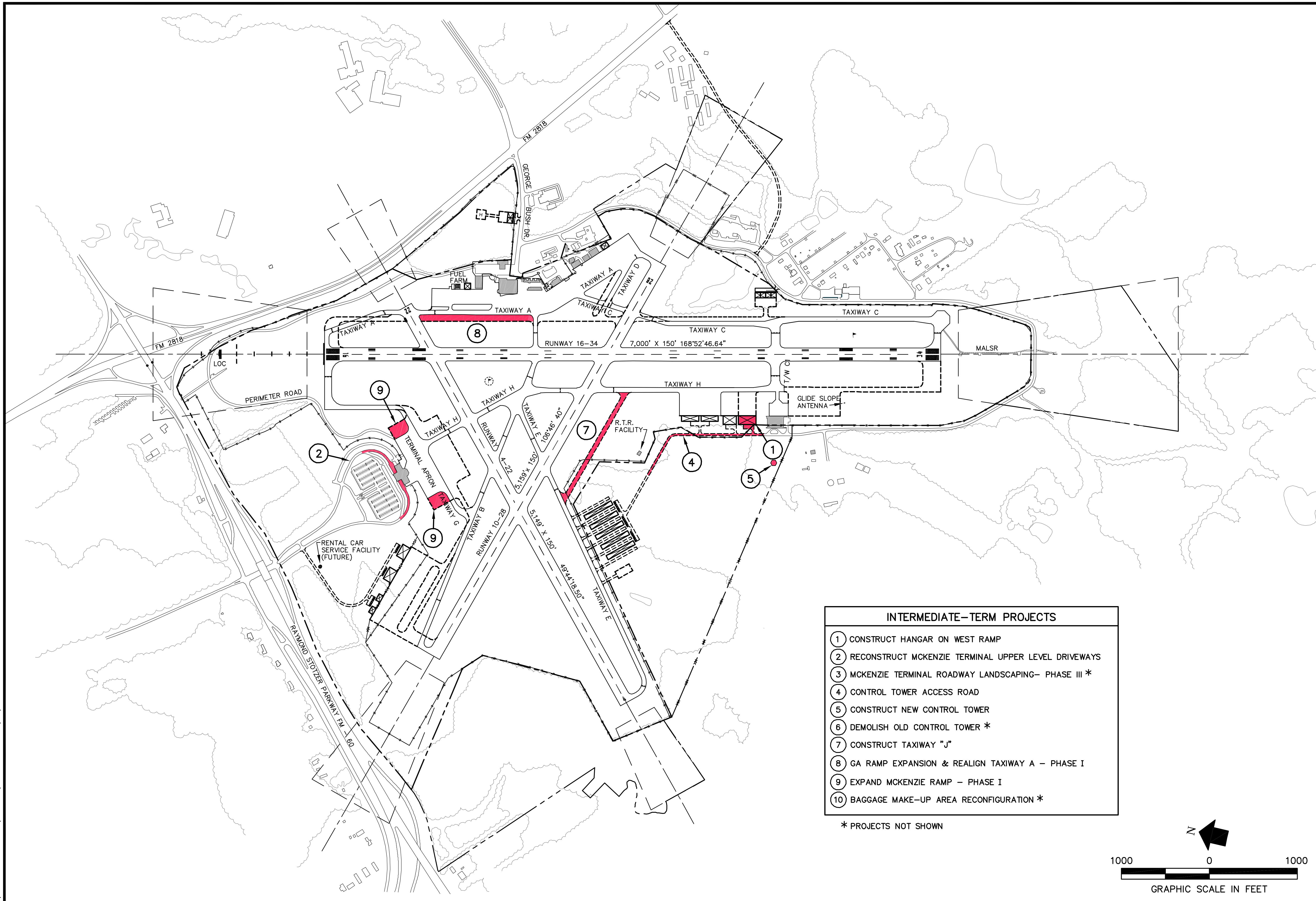
The existing upper level driveways have experienced settlement and foundation erosion problems. This project consists of the removal of the existing concrete roadway slabs, stabilization of the base, repair of the front retaining wall, and the construction of new driveways.

8.3.3 MCKENZIE TERMINAL ROADWAY LANDSCAPING – PHASE 3

This project consists of the installation of additional landscaping along the entrance roadway to the passenger terminal to improve airport aesthetics.

FIGURE 8-2

CAPITAL IMPROVEMENT PROGRAM INTERMEDIATE TERM PROJECTS (2009-2013)



INTERMEDIATE-TERM PROJECTS
1 CONSTRUCT HANGAR ON WEST RAMP
2 RECONSTRUCT MCKENZIE TERMINAL UPPER LEVEL DRIVEWAYS
3 MCKENZIE TERMINAL ROADWAY LANDSCAPING– PHASE III *
4 CONTROL TOWER ACCESS ROAD
5 CONSTRUCT NEW CONTROL TOWER
6 DEMOLISH OLD CONTROL TOWER *
7 CONSTRUCT TAXIWAY "J"
8 GA RAMP EXPANSION & REALIGN TAXIWAY A – PHASE I
9 EXPAND MCKENZIE RAMP – PHASE I
10 BAGGAGE MAKE-UP AREA RECONFIGURATION *

* PROJECTS NOT SHOWN

Easterwood Airport Master Plan Update

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Table 8.2 Intermediate-Term (2009-2013) Project Cost Estimates		
Project Number	**Project Name**	**Estimated Cost**
1	Construct Hangar on West Ramp	$1,836,033
2	Reconstruct McKenzie Terminal Upper Level Driveways	$911,299
3	McKenzie Terminal Roadway Landscaping - Phase III	$240,400
4	Construct Control Tower Access Road	$590,098
5	Construct New Control Tower	$4,075,500
6	Demolish Old Control Tower	$57,946
7	Construct Taxiway J	$871,643
8	GA Ramp Expansion & Realignment of Taxiway A	$1,490,699
9	Expand McKenzie Ramp – Phase I	$1,968,553
10	Baggage Make-Up Area Reconfiguration	$190,748
	Total	$12,232,919

Source: URS Corporation, Inc., 2004.

8.3.4 CONSTRUCT CONTROL TOWER ACCESS ROAD

This project consists of the construction of a new roadway from the west aircraft ramp around to the proposed site for a new control tower.

8.3.5 CONSTRUCT NEW CONTROL TOWER

This project consists of building a new control tower to replace the existing tower that does not meet ADA requirements and has numerous other deficiencies.

8.3.6 DEMOLISH OLD CONTROL TOWER

This project consists of the removal of the existing control tower and its associated offices.

8.3.7 CONSTRUCT TAXIWAY J

This project consists of constructing a new taxiway that would connect Taxiway H to Taxiway E. The taxiway would be constructed at a separation of 400 feet from Runway 4/22. Construction of this taxiway would allow direct airfield access from proposed landside development to Runway 34.

8.3.8 GA Apron Expansion and Realignment of Taxiway A – Phase I

This project consists of an expansion of the general aviation ramp near Runway 4/22. The expansion would provide additional space for parking smaller general aviation aircraft and would realign the portion of Taxiway A that extends from Runway 4/22 to Taxiway B. After the realignment, the taxiway would have a separation of 400 feet from Runway 16/34.

8.3.9 Expand McKenzie Apron – Phase I

This project consists of expanding each end of the existing ramp by approximately 150 feet to provide additional ramp for charter flights and diversion of airline flights from other airports.

8.3.10 Reconfigure Baggage Make-up Area

This project consists of modification to the baggage make up area to provide easier maneuvering space for the baggage tugs and carts. The project includes an expansion of the back wall of the terminal along with widening of exits and the relocation of the metal partitions between each airline’s area.

8.4 LONG-TERM PROJECTS (2014 – 2023)

Project priorities in the long-term include a series of taxiway projects to meet FAA geometric standards, navaid lighting and further expansion of aircraft parking apron to meet anticipated demand. Additional terminal projects are also proposed. Long-term projects are described below and are illustrated in **Figure 8-3**. Cost estimates for long-term projects are shown in **Table 8.3**.

8.4.1 Construct Hangar on North Ramp

This project consists of the construction of a new 60-foot by 145-foot aircraft storage hangar between the existing fuel farm and Hangar 1092.

8.4.2 Airfield Perimeter Fencing - Phase III

This project consists of removal of existing fencing from a point on the east side of the airport near the Brayton Fire School to a point immediately east of the ARFF station. The existing fencing will be replaced with chain link and barbed wire fencing.

8.4.3 GA Apron Expansion and Realignment of Taxiway A – Phase II

This project consists of expanding the portion of the general aviation ramp from Taxiway B to Runway 10/28 and constructing an extension of the realigned Taxiway A constructed in the Phase I expansion. This expansion would provide space for parking additional aircraft close to the general aviation terminal. It will also provide a full parallel taxiway for Runway 16/34.

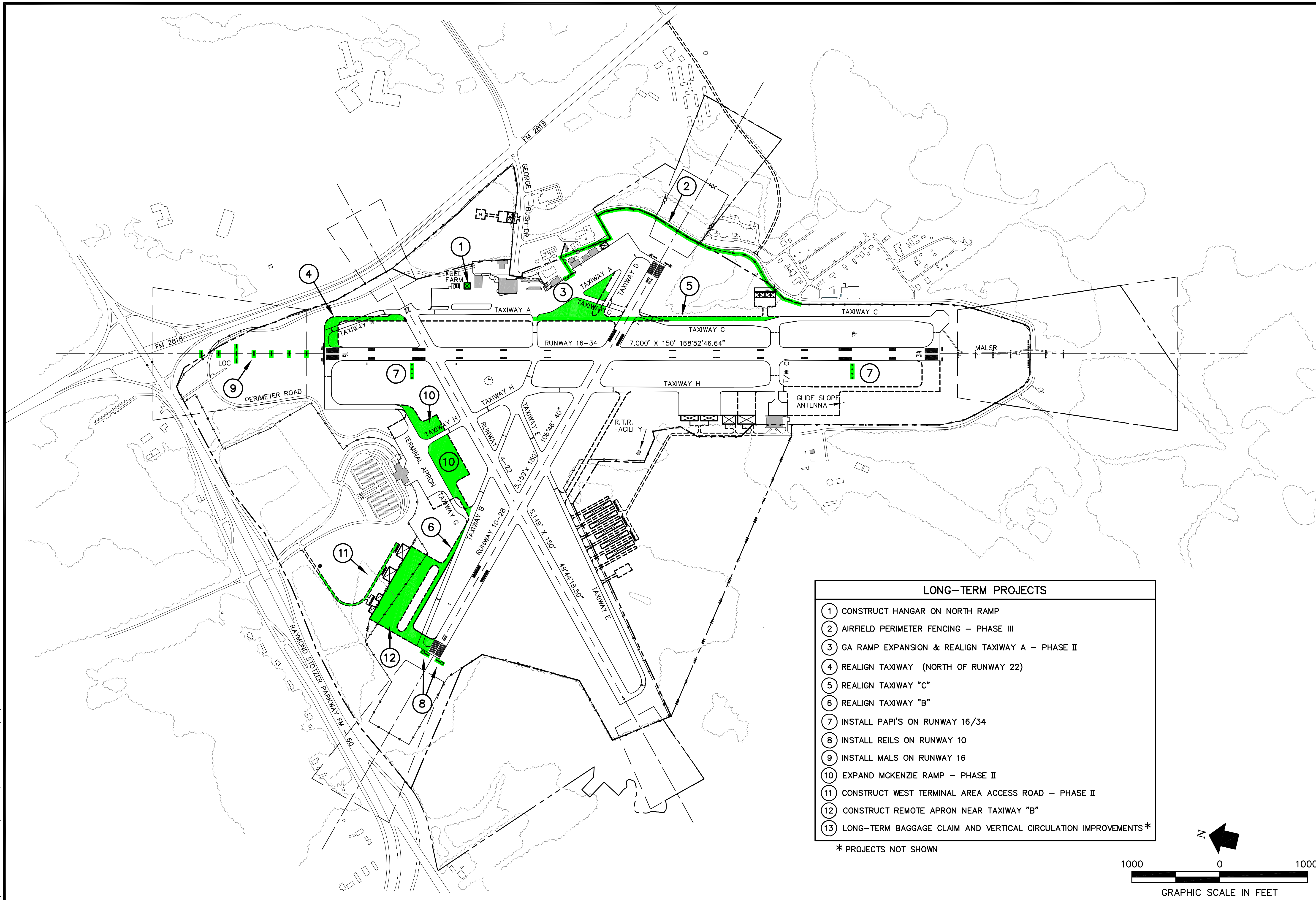


FIGURE 8-3

CAPITAL IMPROVEMENT PROGRAM
LONG TERM PROJECTS (2014-2023)

Easterwood Airport
Master Plan Update

Table 8.3 Long-Term (2014-2023) Project Cost Estimates		
Project Number	**Project Name**	**Estimated Cost**
1	Construct Proposed Hangar on North Ramp	$797,519
2	Install Airfield Perimeter Fencing - Phase III	$203,780
3	GA Ramp Expansion & Realign Taxiway A – Phase II	$2,075,280
4	Realign Taxiway A (North of Runway 22)	$982,876
5	Realign Taxiway C	$1,021,106
6	Realign Taxiway B	$1,077,920
7	Install PAPI's on Runway 16/34	$123,420
8	Install REILS's on Runway 10	$74,989
9	Install MALS on Runway 16	$468,683
10	Expand McKenzie Ramp – Phase II	$1,413,758
11	Construct West Terminal Access Road – Phase II	$310,757
12	Construct Remote Apron Near Taxiway B	$3,002,421
13	Baggage Claim and Vertical Circulation Improvements	$701,201
	Total	$12,253,710

Source: URS Corporation, Inc., 2004.

8.4.4 REALIGN TAXIWAY A (NORTH OF RUNWAY 4/22)

This project consists of rebuilding Taxiway A north of Runway 22 at a separation of 400 feet from the centerline of Runway 16/34. The realigned taxiway would meet FAA geometric standards and eliminate the encroachment of Taxiway A into the runway safety area near the threshold of Runway 16. This project also includes a wide entrance to Runway 16 that will allow one aircraft to bypass another as requested by air traffic control personnel.

8.4.5 REALIGN TAXIWAY C

This project consists of reconstructing Taxiway C from Runway 10/28 to Taxiway C-1 at a separation of 400 feet from the Runway 16/34 centerline. This portion of Taxiway C is currently situated 350 feet from the runway centerline and does not meet FAA standards for runway centerline to taxiway centerline separation.

8.4.6 REALIGN TAXIWAY B

This project consists of reconstructing the portion of Taxiway B that extends from the entrance to the McKenzie Terminal ramp to the threshold of Runway 10 at a separation of 400 feet from the centerline of Runway 10/28. This project would allow the taxiway to meet FAA geometric requirements and would eliminate the taxiway's encroachment into the runway safety area near the threshold to Runway 10.

8.4.7 INSTALL PAPI'S ON RUNWAY 16/34

This project consists of the installation of a Precision Approach Path Indicators on both ends of Runway 16/34. These lights would provide visual approach path guidance on both ends of the runway. Although there is currently a VASI on Runway 16, it is anticipated that it will be at the end of its useful life at the time the PAPI would be installed.

8.4.8 INSTALL REILS ON RUNWAY 10

This project consists of the installation of Runway End Identification Lights on Runway 10. Consultation with air traffic control personnel revealed that these lights would improve pilots' identification of Runway 10 at night.

8.4.9 INSTALL MALS ON RUNWAY 16

This project consists of the installation of a Medium Approach Lighting System on the approach end of Runway 16. This lighting system would enable lower instrument approach minimums to be attained on Runway 16.

8.4.10 EXPAND MCKENZIE RAMP – PHASE II

This project consists of further expansion of the McKenzie ramp toward Runway 4/22. This project would provide additional ramp for charter activity and diverted flights.

8.4.11 CONSTRUCT WEST TERMINAL ACCESS ROAD – PHASE II

This project consists of the extension of the Phase I road to provide access to future facilities including aircraft ramp and hangars along the west end of Taxiway B.

8.4.12 CONSTRUCT REMOTE APRON NEAR TAXIWAY B

This project consists of the construction of a new aircraft apron near the far west end of Taxiway B. This ramp could be used for several purposes (i.e., cargo, FBO or overflow aircraft parking) depending upon future needs.

8.4.13 LONG-TERM BAGGAGE CLAIM AND VERTICAL CIRCULATION IMPROVEMENTS

This project consists of the installation of a new baggage claim carousel along the rear wall of the terminal and elimination of the current baggage claim area. An escalator would be installed next to the existing center stairway. The purpose of this project is to improve vertical access in the terminal and provide additional space for baggage claim. The project would also provide the additional benefit of reducing baggage cart movement through the terminal, thereby reducing current problems associated with baggage carts damaging walls.

SECTION 9 FINANCIAL IMPLEMENTATION ANALYSIS

9.1 INTRODUCTION

The purpose of this section is to evaluate Easterwood Airport's capability to fund the Master Plan Capital Improvement Program (CIP) and finance operations during three phases of capital development. The phases include a five-year period from 2004 to 2008 (Short Term), a five-year period from 2009 to 2013 (Intermediate Term) and a ten-year period from 2014 to 2023 (Long Term). The analysis includes development of a detailed Financial Implementation Plan prepared annually for the Short Term period and in summary for the Intermediate and Long Term periods. Objectives for developing the Plan include presenting the results of the implementation evaluation and providing practical guidelines for matching an appropriate amount and timing of financial resources with the planned use of capital funds. Detailed tables of projections for the capital program, operating expenses, operating revenues and cash flow are provided in support of the results of this evaluation.

9.2 OVERALL APPROACH

The overall approach for conducting the Financial Implementation Analysis included the following steps:

- Gathering and reviewing key airport documents related to historical financial results, capital improvement plans, operating budgets, regulatory requirements and airport policies;
- Interviewing key airport management personnel to gain an understanding of the existing operating and financial environment and overall financial management philosophy;
- Reviewing the aviation traffic forecast previously developed in the Master Plan;
- Reviewing the Master Plan CIP, cost estimates and development schedule anticipated for the planning period and projecting the overall financial requirements for the program;
- Determining and analyzing the sources and timing of capital funds available to meet the financial requirements for funding the capital program;
- Analyzing historical and budgeted operating expenses, developing operations and maintenance expense assumptions, reviewing assumptions with airport management and projecting future operating costs for the planning period;

- Analyzing historical and budgeted revenue sources, developing revenue growth assumptions, reviewing assumptions with airport management and projecting future revenues for the planning period; and

- Completing results of the analysis and evaluation in a Financial Plan Summary that provides conclusions regarding the airport's capability to finance the planned capital improvement program.

9.3 CAPITAL FUNDING SOURCES

The development of the Master Plan CIP is anticipated to be funded from several sources. These sources include FAA entitlement and discretionary grants, passenger facility charges, the Government Entities Fund, private third party financing and funds generated from airport operations. Each of these sources of funds is described in the following paragraphs.

9.3.1 FAA AIRPORT IMPROVEMENT PROGRAM GRANTS

The airport receives grants from the Federal Aviation Administration (FAA) to finance the eligible costs of certain capital improvements. These federal grants are allocated to commercial passenger service airports through the Airport Improvement Program (AIP). AIP grants include entitlement grants, which are allocated among airports by a formula that is based on passenger enplanements, and discretionary grants which are awarded in accordance with FAA guidelines. Under the AIP reauthorization legislation enacted in 2002 (and further extended in 2003 for authorization from 2004 through 2007), the airport is projected to receive current entitlements of $1 million per year and future grants which grow to about $1.1 million by 2023 based on Master Plan forecast enplanements. Non-Hub airports (those with annual enplanements up to about 330,000) can accumulate up to four years of unspent entitlements before awards are revoked. Easterwood Airport has spent about $264,000 of its 2004 AIP entitlement on prior year projects that are not included in the Master Plan CIP. Consequently, about $736,000 of the 2004 entitlement is available to fund projects during the Short Term planning period.

The approval of AIP discretionary funding is based on a project eligibility ranking method the FAA uses to award grants, at their discretion, based on a project's priority and importance to the national airport and airway system. For 2004, 2005 and 2006, the projection includes FAA discretionary funding of $7.5 million to the airport for an environmental assessment, extension of Taxiway Hotel, construction of Runway 28 runway safety area and overlay of Runway 16/34. If this projected discretionary funding is not awarded by the FAA in the time frames indicated, these projects are likely to be delayed until such funding is available. The airport has received discretionary grants in past years and it is reasonable to assume that the airport will receive additional discretionary funding during the planning period for higher priority, eligible projects such as runway, taxiway and apron pavement improvements, security projects and ATCT improvements. It was assumed that about $7.5 million in discretionary grants would be provided during the Short Term planning period, $4.8 million during the Intermediate Term and $580,000 during the Long Term.

9.3.2 PASSENGER FACILITY CHARGES

The Aviation Safety and Capacity Expansion Act of 1990 established the authority for commercial service airports to apply to the FAA for imposing and using a Passenger Facility Charge (PFC) of up to $3.00 per enplaned passenger. With the passage of AIR-21 in June 2000, airports can apply for an increase in the PFC collection amount from $3.00 per eligible enplaned passenger to $4.50. The proceeds from PFCs are eligible to be used for AIP eligible projects and for certain additional projects that preserve or enhance capacity, safety or security; mitigate the effects of aircraft noise; or enhance airline competition. PFCs may also be used to pay debt service on bonds (including principal, interest and issue costs) and other indebtedness incurred to carry out eligible projects. In addition to funding future planned projects, the legislation permits airports to collect PFCs to reimburse the eligible costs of projects that began on or after November 5, 1990.

Since 1996, Easterwood Airport has submitted four PFC applications (combining collection and use applications for the same projects). Applications #2 through #4 are currently in effect and have a total collection authority of $2,555,004. The Master Plan CIP includes a loading bridge project that was authorized in Application #4. These applications have an authorized expiration date of November 2005 but are not projected to reach their collection authority until September 2008 based on the Master Plan enplanement forecast.

The implementation analysis assumes that the airport will submit additional PFC applications and amendments, as required, to ensure that the collection of PFC revenues continues beyond the authorized expiration date throughout the planning period. PFC revenues are assumed to be used throughout the planning period for numerous eligible projects identified in the Master Plan CIP.

9.3.3 GOVERNMENT ENTITIES FUND

In the past, the Cities of College Station and Bryan, Texas have provided a limited amount of funds to Easterwood Airport to support designated capital projects that are not eligible for AIP or PFC funding. These contributions recognized the importance of the airport’s function to the community and its economic impact on the regional area it serves. Airport management anticipates requesting additional Governmental Entities funding of approximately $500,000 to be provided for CIP projects from this funding source throughout the 20-planning period.

9.3.4 PRIVATE THIRD PARTY FINANCING

Many airports use private third party financing when the planned improvements will be primarily used by a private business or other organization and the airport does not want to make such an investment. Projects of this kind typically include hangars, FBO facilities, rental car facilities, cargo facilities, exclusive aircraft parking aprons, industrial development areas, non-aviation commercial areas and various other projects. Such projects are not eligible for federal funding. The implementation analysis assumes that private third parties will provide a total of about $3.3 million in funding for the rental car facility and hangar projects during the Short, Intermediate and Long Term planning periods.

9.3.5 AIRPORT OPERATING FUNDS

The implementation analysis projects that positive net revenues will be generated by airport operations throughout the 20-planning period. Cash reserves of about $2.7 million were also available to support capital expenditures at the beginning of 2004. The projection assumes that about $4.2 million in cash reserves and net operating revenues will be used to fund various projects during the Master Plan 20-year planning period.

9.4 FINANCIAL ANALYSIS AND IMPLEMENTATION PLAN FOR THE MASTER PLAN CAPITAL IMPROVEMENT PROGRAM

This analysis and the accompanying detailed tables provide the results of evaluating the financial reasonableness of implementing the Master Plan Capital Improvement Program during the planning period from 2004 through 2023.

9.4.1 ESTIMATED PROJECT COSTS AND DEVELOPMENT SCHEDULE

The estimated project costs and development schedule is derived from previous results of the Master Plan development analysis. The program for capital expansion and improvement projects is projected for the Short Term planning period for years 2004 through 2008, for the Intermediate Term period for years 2009 through 2013 and for the Long Term period for years 2014 through 2023. For each of these planning periods, **Table 9.1** presents the capital program for the identified projects. The estimated timing and costs are presented in this table along with the amounts and timing of the projected funding sources. As shown in **Table 9.1**, the total estimated cost of capital projects is $40,762,460 in 2004 dollars. The estimated costs for projects scheduled during the period 2005 through 2023 are adjusted by an assumed 2% rate of annual inflation. The resulting total escalated costs are $46,872,248. **Table 9.2** presents a summary of **Table 9.1** and provides a comparison of 2004 base year costs with escalated costs adjusted for inflation for each of the planning periods.

Table 9.1
Estimated Project Costs and Development Schedule

Capital Improvement Program	Funding Schedule: Short Term 2004	2005	2006	2007	2008	Total	Mid Term 2009-2013	Long Term 2014-2023	Total Funding
Funds Used for Capital Improvement Projects									
AIP Entitlement Grants	$735,693	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$4,735,693	$5,000,000	$10,582,387	$20,318,080
AIP Discretionary Grants	2,162,924	2,894,096	2,439,335	0	0	7,496,355	4,835,168	580,484	12,912,007
Passenger Facility Charges	0	0	131,194	282,306	286,500	700,000	1,497,317	3,319,096	5,516,413
Government Entities Fund	141,000	0	121,103	0	0	262,103	273,423	0	535,526
Private Third Party Financing	0	0	0	1,234,764	0	1,234,764	2,088,246	0	3,323,010
Airport Operating Funds	116,717	140,066	138,407	136,655	155,159	687,005	1,084,449	4,017,895	5,789,349
Funds Available Current Year	3,156,334	4,034,162	3,830,039	2,653,725	1,441,659	15,115,920	14,778,603	18,499,862	48,394,385
Funds Carried Over from Prior Year	2,714,153	1,378,970	1,582,759	882,110	1,568,607	2,714,153	1,039,669	1,904,938	2,714,153
Funds Used Current Year	(4,491,517)	(3,830,373)	(4,530,688)	(1,967,229)	(1,970,597)	(16,790,404)	(13,913,334)	(16,168,510)	(46,872,248)
Funds Carried Over to Next Year	$1,378,970	$1,582,759	$882,110	$1,568,607	$1,039,669	$1,039,669	$1,904,938	$4,236,291	$4,236,291

	Capital Project Description	2004 Base Year Costs	Estimated Project Costs and Development Schedule: Short Term 2004	2005	2006	2007	2008	Total	Mid Term 2009-2013	Long Term 2014-2023	Total Escalated Costs
Short Term Projects (2004-2008)											
1	Conduct EA on Master Plan Improvements	$300,000	$300,000					$300,000			$300,000
4	Construct Westside Apron	1,273,755	1,273,755					1,273,755			1,273,755
5	Extend Taxiway Hotel	1,976,762	1,976,762					1,976,762			1,976,762
6&7	Construct R/W 28 RSA	2,986,683		3,046,417				3,046,417			3,046,417
18	Install McKenzie High Mast Lights	299,957			312,075			312,075			312,075
21	Construct Rental Car Service Facility	329,668				349,846		349,846			349,846
22	McKenzie Terminal Roadway Signage	72,041		73,482				73,482			73,482
23A	McKenzie Terminal Roadway Landscaping-Phase I	141,000	141,000					141,000			141,000
23B	McKenzie Terminal Roadway Landscaping-Phase II	116,400			121,103			121,103			121,103
24	Demolish Airport Maintenance Building	18,234			18,971			18,971			18,971
25	Construct New Airport Maintenance Building	291,785			303,573			303,573			303,573
26	West Terminal Area Access Road - Phase 1	66,651				70,731		70,731			70,731
29A	Airfield Perimeter Fencing - Phase I	625,008			650,258			650,258			650,258
30	Rotorcraft Hangar	833,878				884,918		884,918			884,918
34A	Loading Bridges (PFC #4)	700,000	700,000					700,000			700,000
34B	Relocate Security to 2nd Floor	100,000	100,000					100,000			100,000
35	GA Area Automobile Parking Lot Rehabilitation	641,216					694,073	694,073			694,073
37	Proposed Hangar on South Ramp	451,664					488,896	488,896			488,896
39A	Drainage Improvements (R/W 16 RSA)	377,510		385,060				385,060			385,060
39B	Drainage Improvements (Near RTF)	164,033		167,314				167,314			167,314
39C	Drainage Improvements (Lake)	246,837			256,809			256,809			256,809
39D	Drainage Improvements (Front Road Entrance)	155,000		158,100				158,100			158,100
40	Overlay Runway 16/34	2,756,535			2,867,899			2,867,899			2,867,899
29B	Airfield Perimeter Fencing - Phase II	623,567				661,734		661,734			661,734
2	Reconstruct McKenzie Terminal Access Road	727,647					787,629	787,629			787,629
Total Short Term Projects		$16,275,831	$4,491,517	$3,830,373	$4,530,688	$1,967,229	$1,970,597	$16,790,404	$0	$0	$16,790,404

Table 9.1 – Page 1 of 3

Table 9.1
Estimated Project Costs and Development Schedule

Capital Improvement Program	Funding Schedule: Short Term 2004	2005	2006	2007	2008	Total	Mid Term 2009-2013	Long Term 2014-2023	Total Funding
Funds Used for Capital Improvement Projects									
AIP Entitlement Grants	$735,693	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$4,735,693	$5,000,000	$10,582,387	$20,318,080
AIP Discretionary Grants	2,162,924	2,894,096	2,439,335	0	0	7,496,355	4,835,168	580,484	12,912,007
Passenger Facility Charges	0	0	131,194	282,306	286,500	700,000	1,497,317	3,319,096	5,516,413
Government Entities Fund	141,000	0	121,103	0	0	262,103	273,423	0	535,526
Private Third Party Financing	0	0	0	1,234,764	0	1,234,764	2,088,246	0	3,323,010
Airport Operating Funds	116,717	140,066	138,407	136,655	155,159	687,005	1,084,449	4,017,895	5,789,349
Funds Available Current Year	3,156,334	4,034,162	3,830,039	2,653,725	1,441,659	15,115,920	14,778,603	18,499,862	48,394,385
Funds Carried Over from Prior Year	2,714,153	1,378,970	1,582,759	882,110	1,568,607	2,714,153	1,039,669	1,904,938	2,714,153
Funds Used Current Year	(4,491,517)	(3,830,373)	(4,530,688)	(1,967,229)	(1,970,597)	(16,790,404)	(13,913,334)	(16,168,510)	(46,872,248)
Funds Carried Over to Next Year	$1,378,970	$1,582,759	$882,110	$1,568,607	$1,039,669	$1,039,669	$1,904,938	$4,236,291	$4,236,291

Capital Project Description	2004 Base Year Costs	Estimated Project Costs and Development Schedule: Short Term 2004	2005	2006	2007	2008	Total	Mid Term 2009-2013	Long Term 2014-2023	Total Escalated Costs
Intermediate Term Projects (2009-2013)										
3 Reconstruct McKenzie Terminal Upper Level Driveways	$911,299						$0	$1,036,483		$1,036,483
8 Construct New Control Tower	4,075,500						0	4,635,344		4,635,344
9 Demolish Old Control Tower	57,946						0	65,906		65,906
13A GA Ramp Expansion & Realign Taxiway A (Phase 1)	1,490,699						0	1,695,474		1,695,474
14 Construct Taxiway Juliet	871,643						0	991,379		991,379
19 Expand McKenzie Ramp - Phase 1	1,968,553						0	2,238,970		2,238,970
23C McKenzie Terminal Roadway Landscaping-Phase III	240,400						0	273,423		273,423
28 Control Tower Access Road	590,098						0	671,159		671,159
31 Baggage Make-up Area Reconfiguraton	190,748						0	216,951		216,951
38 Proposed Hangar on West Ramp	1,836,033						0	2,088,246		2,088,246
Total Intermediate Term Projects	$12,232,919	$0	$0	$0	$0	$0	$0	$13,913,334	$0	$13,913,334

Table 9.1 – Page 2 of 3

Table 9.1
Estimated Project Costs and Development Schedule

Capital Improvement Program	Short Term 2004	2005	2006	2007	2008	Total	Mid Term 2009-2013	Long Term 2014-2023	Total Funding
Funds Used for Capital Improvement Projects									
AIP Entitlement Grants	$735,693	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$4,735,693	$5,000,000	$10,582,387	$20,318,080
AIP Discretionary Grants	2,162,924	2,894,096	2,439,335	0	0	7,496,355	4,835,168	580,484	12,912,007
Passenger Facility Charges	0	0	131,194	282,306	286,500	700,000	1,497,317	3,319,096	5,516,413
Government Entities Fund	141,000	0	121,103	0	0	262,103	273,423	0	535,526
Private Third Party Financing	0	0	0	1,234,764	0	1,234,764	2,088,246	0	3,323,010
Airport Operating Funds	116,717	140,066	138,407	136,655	155,159	687,005	1,084,449	4,017,895	5,789,349
Funds Available Current Year	3,156,334	4,034,162	3,830,039	2,653,725	1,441,659	15,115,920	14,778,603	18,499,862	48,394,385
Funds Carried Over from Prior Year	2,714,153	1,378,970	1,582,759	882,110	1,568,607	2,714,153	1,039,669	1,904,938	2,714,153
Funds Used Current Year	(4,491,517)	(3,830,373)	(4,530,688)	(1,967,229)	(1,970,597)	(16,790,404)	(13,913,334)	(16,168,510)	(46,872,248)
Funds Carried Over to Next Year	$1,378,970	$1,582,759	$882,110	$1,568,607	$1,039,669	$1,039,669	$1,904,938	$4,236,291	$4,236,291

Estimated Project Costs and Development Schedule

Capital Project Description	2004 Base Year Costs	Short Term 2004	2005	2006	2007	2008	Total	Mid Term 2009-2013	Long Term 2014-2023	Total Escalated Costs
Long Term Projects (2014-2023)										
13B GA Ramp Expansion & Realign Taxiway A (Phase 2)	$2,075,280						$0		$2,738,288	$2,738,288
10 Realign Taxiway Alpha (North of Runway 22)	982,876						0		1,296,884	1,296,884
11 Realign Taxiway Bravo	1,077,920						0		1,422,293	1,422,293
12 Realign Taxiway Charlie	1,021,106						0		1,347,328	1,347,328
15 Install PAPI's on Runway 16/34	123,420						0		162,850	162,850
16 Install MALS on Runway 16	468,683						0		618,417	618,417
17 Install REILS on Runway 10	74,989						0		98,946	98,946
20 Expand McKenzie Ramp - Phase 2	1,413,758						0		1,865,424	1,865,424
27 West Terminal Area Access Road - Phase 2	310,757						0		410,037	410,037
29C Airfield Perimeter Fencing - Phase III	203,780						0		268,883	268,883
32 Long-Term Baggage Claim and Vertical Circulation Improvements	701,201						0		925,220	925,220
33 Remote Apron Near Taxiway Bravo	3,002,421						0		3,961,631	3,961,631
36 Proposed Hangar on North Ramp	797,519						0		1,052,309	1,052,309
Total Long Term Projects	$12,253,710	$0	$0	$0	$0	$0	$0	$0	$16,168,510	$16,168,510
Total Project Costs	$40,762,460	$4,491,517	$3,830,373	$4,530,688	$1,967,229	$1,970,597	$16,790,404	$13,913,334	$16,168,510	$46,872,248

Source: Leibowitz & Horton AMC Anaylsis

Table 9.1 – Page 3 of 3

Table 9.2 Summary of Base Year and Escalated Costs for the Capital Program		
Planning Periods	**2004 Base Year Costs**	**Total Escalated Costs**
Short Term Projects (2004 to 2008)	$16,275,831	$16,790,404
Intermediate Term Projects (2009 to 2013)	12,232,919	13,913,334
Long Term Projects (2014 to 2023)	12,253,710	16,168,510
Total Project Costs	$40,762,460	$46,872,248

Source: Leibowitz & Horton AMC Analysis

9.4.2 SOURCES AND USES OF CAPITAL FUNDING

As discussed in previous sections of this analysis, a variety of sources are available for funding capital improvements at the airport. The funding structure of the capital program depends on many factors, including project eligibility for the various funding sources, the ultimate type and use of facilities to be developed, the amounts and timing of funds available and the priorities for scheduling project completion. For planning purposes, assumptions were made related to the funding source of each capital improvement. The detailed capital funding analysis is provided in **Table 9.3**. A summary of the capital plan with escalated project cost estimates and funding sources is presented in **Table 9.4**.

Table 9.4 Summary of Sources and Uses of Capital Funding		
Sources of Capital Funding (2004 to 2023):		
	AIP Entitlement Grants	$ 20,318,080
	AIP Discretionary Grants	12,912,007
	Passenger Facility Charges	5,516,413
	Government Entities Fund	535,528
	Private Third Party Financing	3,323,010
	Airport Operating Funds/Cash Reserves	4,267,212
	Total Sources of Capital Financing	$46,872,248
Uses of Capital Funding:		
	Short Term Projects (2004 to 2008)	$ 16,790,404
	Intermediate Term Projects (2009 to 2013)	13,913,334
	Long Term Projects (2014 to 2023)	16,168,510
	Total Project Costs	$46,872,248
Note: Addition errors are due to rounding of calculated amounts.		

Source: Leibowitz & Horton AMC Analysis

As shown in **Table 9.4**, a substantial amount of funding will be needed from federal sources including an average of about $1 million per year throughout the planning period from AIP entitlement grants and $12.9 million in AIP discretionary grants. PFCs are projected to provide a total of $5.5 million throughout the planning period. Rental car and hangar projects are projected to be funded from about $3.3 million in private third party financing. To fund portions of ineligible projects and the local match for AIP eligible projects, the airport is projected to provide capital of about $2.4 million in the Short Term, $170,000 in the Intermediate Term and $1.7 million in the Long Term for a total of $4.3 million throughout the planning period. The Government Entities Fund is also projected to provide about $535,000 in capital funds for ineligible projects.

9.4.3 PROJECTED OPERATIONS AND MAINTENANCE EXPENSES

Operations and maintenance expense projections for the Short Term (2004 to 2008), the Intermediate Term (2009 to 2013) and the Long Term (2014 to 2023) planning periods are based on the airport's current budget, the anticipated impacts of inflation, aviation traffic increases, facility improvements and the recent experience of other similarly sized airports.

9.4.3.1 Operations and Maintenance Expense Projection Assumptions

Operations and maintenance expense growth assumptions, as reflected in **Table 9.5**, were developed to project the airport’s operating expenses during the planning period. Actual amounts for 2001 through 2003 and the budgeted amounts for 2004 provide a comparison with expenses that are projected for the period 2005 through 2023. Beginning in 2005, the projection for the following expense categories is based on 2004 budgeted amounts and an annual growth rate of 2%:

- Personnel Expenses
- Supplies & Materials
- Utilities
- Maintenance & Repairs
- Contractual Services
- Minor Equipment Expenses
- Other Operating Expenses

Table 9.3
Projected Capital Funding Sources

Capital Improvement Projects		Total Escalated Costs	AIP Entitlement Funding	AIP Discretionary Funding	Total AIP Funding	Passenger Facility Charges	Gov't. Entities Funds	Private Third Party Financing	Airport Operating Funds	Total Funding
Short Term Projects (2004-2008)										
1	Conduct EA on Master Plan Improvements	$300,000		$285,000	$285,000				$15,000	$300,000
4	Construct Westside Apron	1,273,755	1,210,067		1,210,067				63,688	1,273,755
5	Extend Taxiway Hotel	1,976,762		1,877,924	1,877,924				98,838	1,976,762
6&7	Construct R/W 28 RSA	3,046,417		2,894,096	2,894,096				152,321	3,046,417
18	Install McKenzie High Mast Lights	312,075	296,471		296,471				15,604	312,075
21	Construct Rental Car Service Facility	349,846			0			349,846	0	349,846
22	McKenzie Terminal Roadway Signage	73,482	69,808		69,808				3,674	73,482
23A	McKenzie Terminal Roadway Landscaping-Phase I	141,000			0		141,000		0	141,000
23B	McKenzie Terminal Roadway Landscaping-Phase II	121,103			0		121,103		0	121,103
24	Demolish Airport Maintenance Building	18,971			0				18,971	18,971
25	Construct New Airport Maintenance Building	303,573			0				303,573	303,573
26	West Terminal Area Access Road - Phase 1	70,731			0				70,731	70,731
29A	Airfield Perimeter Fencing - Phase I	650,258	617,745		617,745				32,513	650,258
30	Rotorcraft Hangar	884,918			0			884,918	0	884,918
34A	Loading Bridges (PFC #4)	700,000			0	700,000			0	700,000
34B	Relocate Security to 2nd Floor	100,000			0				100,000	100,000
35	GA Area Automobile Parking Lot Rehabilitation	694,073			0				694,073	694,073
37	Proposed Hangar on South Ramp	488,896			0				488,896	488,896
39A	Drainage Improvements (R/W 16 RSA)	385,060	365,807		365,807				19,253	385,060
39B	Drainage Improvements (Near RTF)	167,314	158,948		158,948				8,366	167,314
39C	Drainage Improvements (Lake)	256,809	243,968		243,968				12,840	256,809
39D	Drainage Improvements (Front Road Entrance)	158,100	150,195		150,195				7,905	158,100
40	Overlay Runway 16/34	2,867,899	285,169	2,439,335	2,724,504				143,395	2,867,899
29B	Airfield Perimeter Fencing - Phase II	661,734	628,648		628,648				33,087	661,734
2	Reconstruct McKenzie Terminal Access Road	787,629	708,866		708,866				78,763	787,629
Total Short Term Projects		$16,790,404	$4,735,693	$7,496,355	$12,232,048	$700,000	$262,103	$1,234,764	$2,361,489	$16,790,404
Intermediate Term Projects (2009-2013)										
3	Reconstruct McKenzie Terminal Upper Level Driveways	$1,036,483	$932,834		$932,834	$103,648			$0	$1,036,483
8	Construct New Control Tower	4,635,344		4,171,810	4,171,810	463,534			0	4,635,344
9	Demolish Old Control Tower	65,906		59,315	59,315	6,591			0	65,906
13A	GA Ramp Expansion & Realign Taxiway A (Phase 1)	1,695,474	1,525,926		1,525,926				169,547	1,695,474
14	Construct Taxiway Juliet	991,379	892,241		892,241	99,138			0	991,379
19	Expand McKenzie Ramp - Phase 1	2,238,970	2,015,073		2,015,073	223,897			0	2,238,970
23C	McKenzie Terminal Roadway Landscaping-Phase III	273,423			0		273,423		0	273,423
28	Control Tower Access Road	671,159		604,043	604,043	67,116			0	671,159
31	Baggage Make-up Area Reconfiguraton	216,951	195,256		195,256	21,695			0	216,951
38	Proposed Hangar on West Ramp	2,088,246			0			2,088,246		2,088,246
Total Intermediate Term Projects		$13,913,334	$5,561,330	$4,835,168	$10,396,499	$985,619	$273,423	$2,088,246	$169,547	$13,913,334

Table 9.3 – Page 1 of 2

Table 9.3
Projected Capital Funding Sources

Capital Improvement Projects		Total Escalated Costs	AIP Entitlement Funding	AIP Discretionary Funding	Total AIP Funding	Passenger Facility Charges	Gov't. Entities Funds	Private Third Party Financing	Airport Operating Funds	Total Funding
Long Term Projects (2014-2023)										
13B	GA Ramp Expansion & Realign Taxiway A (Phase 2)	$2,738,288	$2,464,459		$2,464,459				$273,829	$2,738,288
10	Realign Taxiway Alpha (North of Runway 22)	1,296,884			0	1,296,884			0	1,296,884
11	Realign Taxiway Bravo	1,422,293		338,489	338,489	1,083,804			0	1,422,293
12	Realign Taxiway Charlie	1,347,328	687,359		687,359	659,969			0	1,347,328
15	Install PAPI's on Runway 16/34	162,850	146,565		146,565	16,285			0	162,850
16	Install MALS on Runway 16	618,417	556,576		556,576	61,842			0	618,417
17	Install REILS on Runway 10	98,946	89,052		89,052	9,895			0	98,946
20	Expand McKenzie Ramp - Phase 2	1,865,424	1,678,881		1,678,881	186,542			0	1,865,424
27	West Terminal Area Access Road - Phase 2	410,037			0				410,037	410,037
29C	Airfield Perimeter Fencing - Phase III	268,883		241,995	241,995	26,888			0	268,883
32	Long-Term Baggage Claim and Vertical Circulation Improvements	925,220	832,698		832,698	92,522			0	925,220
33	Remote Apron Near Taxiway Bravo	3,961,631	3,565,468		3,565,468	396,163			0	3,961,631
36	Proposed Hangar on North Ramp	1,052,309			0				1,052,309	1,052,309
Total Long Term Projects		$16,168,510	$10,021,057	$580,484	$10,601,541	$3,830,794	$0	$0	$1,736,175	$16,168,510
Total Project Costs		$46,872,248	$20,318,080	$12,912,007	$33,230,087	$5,516,413	$535,526	$3,323,010	$4,267,212	$46,872,248

Source: Leibowitz & Horton AMC Anaylsis

Table 9.3 – Page 2 of 2

Table 9.5
Actual, Budgeted and Projected Operations & Maintenance Expenses

Operations & Maintenance Expenses	Actual 2001	Actual 2002	Actual 2003	Short Term: Budgeted 2004	Short Term: Projected 2005	Short Term: Projected 2006	Short Term: Projected 2007	Short Term: Projected 2008	Short Term: Total	Mid Term 2009-2013	Long Term 2014-2023
Cost of Goods Sold:											
Cost of Aviation Fuel/Oil	$1,434,125	$1,136,215	$1,415,187	$1,320,000	$1,344,307	$1,369,062	$1,394,273	$1,432,724	$6,860,367	$7,777,690	$19,037,694
Cost of Merchandise	2,538	1,576	957	800	815	830	845	868	4,158	4,714	11,538
Cost of Catering	25,992	20,223	17,791	22,673	23,091	23,516	23,949	24,609	117,837	133,594	327,001
Total Cost of Goods Sold	1,462,655	1,158,014	1,433,935	1,343,473	1,368,213	1,393,408	1,419,067	1,458,201	6,982,362	7,915,997	19,376,233
Annual Growth Rate	-	-20.8%	23.8%	-6.3%	1.8%	1.8%	1.8%	2.8%	0.3%	2.7%	2.7%
Personnel Expenses	823,592	899,133	1,038,375	1,159,692	1,182,886	1,206,544	1,230,674	1,255,288	6,035,084	6,663,220	15,479,162
Annual Growth Rate	-	9.2%	15.5%	11.7%	2.0%	2.0%	2.0%	2.0%	3.9%	2.0%	2.0%
Supplies & Materials	43,745	18,296	23,982	16,250	16,575	16,907	17,245	17,590	84,566	93,367	216,899
Annual Growth Rate	-	-58.2%	31.1%	-32.2%	2.0%	2.0%	2.0%	2.0%	-6.0%	2.0%	2.0%
Utilities	188,573	193,226	194,082	175,632	179,145	182,728	186,382	190,110	913,996	1,009,125	2,344,274
Annual Growth Rate	-	2.5%	0.4%	-9.5%	2.0%	2.0%	2.0%	2.0%	-0.4%	2.0%	2.0%
Maintenance & Repairs	105,751	133,981	324,083	180,000	183,600	187,272	191,017	194,838	936,727	1,034,223	2,402,577
Annual Growth Rate	-	26.7%	141.9%	-44.5%	2.0%	2.0%	2.0%	2.0%	-9.7%	2.0%	2.0%
Contractual Services	305,260	226,275	248,740	263,400	268,668	274,041	279,522	285,113	1,370,744	1,513,412	3,515,771
Annual Growth Rate	-	-25.9%	9.9%	5.9%	2.0%	2.0%	2.0%	2.0%	2.8%	2.0%	2.0%
Minor Equipment Expenses	5,024	0	25,696	61,000	62,220	63,464	64,734	66,028	317,446	350,487	814,207
Annual Growth Rate	-	-100.0%	-	137.4%	-	2.0%	2.0%	2.0%	20.8%	2.0%	2.0%
Other Operating Expenses	42,805	111,757	74,167	136,650	139,383	142,171	145,014	147,914	711,132	785,147	1,823,956
Annual Growth Rate	-	161.1%	-33.6%	84.2%	2.0%	2.0%	2.0%	2.0%	14.8%	2.0%	2.0%
Total Operations & Maintenance Expenses and Minor Capital Outlays	$2,977,405	$2,740,682	$3,363,060	$3,336,097	$3,400,689	$3,466,534	$3,533,656	$3,615,081	$17,352,057	$19,364,979	$45,973,079
Annual Growth Rate	-	-8.0%	22.7%	-0.8%	1.9%	1.9%	1.9%	2.3%	1.5%	2.3%	2.3%
Operating Expenses Per Enplaned Pax:											
Easterwood Airport	$12.75	$14.43	$21.08	$21.98	$20.29	$20.75	$21.22	$21.39	$21.13	$21.92	$23.48
Non-Hub Industry Average	$19.05	$19.43	$19.82	$20.22	$20.62	$21.03	$21.45	$21.88	$21.04	$23.23	$26.73

Source: Leibowitz & Horton AMC Anaylsis

Beginning in 2005, the projection of expenditures for the cost of aviation products and services (including aviation fuel/oil, merchandise and catering) sold is based on 2004 budgeted amounts, growth at ½ the rate of annual enplanement growth and an annual inflation rate of 2%.

9.4.3.2 Projection of Operations & Maintenance Expenses and Operating Expenses Per Enplaned Passenger

The projection of operations & maintenance expenses is provided in **Table 9.5**. As shown in the table, total operating expenses are expected to grow from $3,336,097 budgeted for 2004 to $3,615,081 projected for 2008 with a total of $17,352,057 during the five-year Short Term period. During the five-year Intermediate Term period, expenses are projected to total $19,364,979 and during the 10-year Long Term period, expenses are projected to total $45,973,079. The overall growth rate of expenditures during the projection period is 2.1% per year.

Table 9.5 also provides a comparison of Easterwood Airport's total operating expenses per enplaned passenger versus the industry average for non-hub airports. Easterwood Airport's operating expense per enplaned passenger is projected to grow from $21.98 budgeted for 2004 to $24.98 by the end of the 20-year planning period. (These statistics exclude expenses related to the airport's FBO operation since the significant majority of commercial service airports do not provide these services or incur associated expenses.) During the same period, the industry average for non-hub airports ranges from $20.22 in 2004 to $29.45 during the Long Term period (Source: AAAE 2001-2002 Survey of Airport Rates and Charges with inflation adjustments after 2001). This indicates that operating expenses at Easterwood Airport are in line with other similarly sized airports and are projected to trend lower than the industry average throughout the 20-year projection period. This comparison implies that Easterwood Airport is projected to operate 1.6% (in 2005) to 17% (in 2003) more cost efficiently than other airports of similar size and operation. These positive results are remarkable in light of the airport's significant loss of passenger enplanements that began in 2000 and continued through 2003.

9.4.4 PROJECTED OPERATING REVENUES

Table 9.6 presents actual, budgeted and projected operating revenues for the airport for the period 2001 through 2023. Actual amounts for 2001 through 2003 and budgeted amounts for 2004 provide a comparison with revenues that are projected for the period 2005 through 2023. Beginning in 2005, revenue projection assumptions are presented in the following paragraphs.

9.4.4.1 Operating Revenue Projection Assumptions

Operating revenue projections for the Short Term (2004 to 2008), the Intermediate Term (2009 to 2013) and the Long Term (2014 to 2023) planning periods are based on the airport's current budget, the anticipated impacts of inflation, aviation traffic increases, facility expansions and the recent experience of other similarly sized airports. Annual growth assumptions from 2005 through 2023 for the revenue categories that follow are provided below.

- Airline Revenues

  - Landing Fees - Projections are based on the 2004 budget with a 2% annual inflation rate plus increases in aircraft landed weight using annual growth at ½ the rate of Master Plan forecast passenger enplanements. This reflects the airlines' practice of managing increased load factors before additional flights are provided.

  - Terminal Space Rent - Projections are based on the 2004 budget and 2% annual inflation thereafter.

- Non-Airline Revenues

  - FBO Sales (aviation fuel/oil, merchandise & catering) - Projections are based on the 2004 budget with a 2% annual inflation rate plus increases in aircraft landed weight using annual growth at ½ the rate of Master Plan forecast passenger enplanements.

  - Other Carrier Landing Fees - Projections are based on the 2004 budget with a 2% annual inflation rate plus increases in aircraft landed weight using annual growth at ½ the rate of forecast passenger enplanements.

  - Ramp Parking and Ramp Services - Based on the 2004 budget and 2% annual inflation plus ½ the annual rate of forecast enplanement growth.

  - Rental Car Space Rent - Based on the 2004 budget and 2% annual inflation thereafter.

  - Rental Car Concession Fees - Based on the 2004 budget and 2% annual inflation plus the annual rate of forecast enplanement growth.

  - Advertising Concession Fees - Based on the 2004 budget and 2% annual inflation thereafter.

  - TSA Rent - Based on the 2004 budget and 2% annual inflation thereafter.

  - Public Parking Fees - Based on the 2004 budget and 2% annual inflation plus the annual rate of forecast enplanement growth.

  - Other Terminal Rent - Based on the 2004 budget and 2% annual inflation thereafter.

Table 9.6
Actual, Budgeted and Projected Operating Revenues

				Short Term							
	Actual	Actual	Actual	Budgeted	Projected					Mid Term	Long Term
Operating Revenues	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**	**2009-2013**	**2014-2023**
Airline Revenues											
Landing Fees	$172,885	$149,966	$155,598	$166,482	$183,130	$186,502	$189,937	$195,175	$921,226	$1,059,526	$2,593,436
Terminal Rent	205,500	178,235	176,808	190,512	206,134	210,257	214,462	218,751	1,040,115	1,161,157	2,697,455
Total Airline Revenues	$378,385	$328,201	$332,406	$356,994	$389,264	$396,759	$404,399	$413,926	$1,961,341	$2,220,683	$5,290,891
Annual Growth Rate	-	-13.3%	1.3%	7.4%	9.0%	1.9%	1.9%	4.3%	4.5%	2.4%	2.3%
Airline Cost Per Enplaned Passenger:											
Easterwood Airport	$4.39	$4.18	$4.90	$5.28	$5.77	$5.90	$6.03	$6.08	$5.81	$6.25	$6.71
Non-Hub Industry Average	$5.54	$5.65	$5.76	$5.88	$6.00	$6.12	$6.24	$6.36	$6.12	$6.76	$7.85
Non-Airline Revenues											
FBO Sales:											
Aviation Fuel/Oil	$2,215,951	$1,920,835	$2,157,682	$2,200,000	$2,240,512	$2,281,771	$2,323,789	$2,387,873	$11,433,945	$12,962,816	$31,729,490
Merchandise	3,274	2,196	1,950	2,000	2,037	2,074	2,113	2,171	10,394	11,784	28,845
Catering	35,425	26,426	18,922	26,675	27,166	27,666	28,176	28,953	138,637	157,174	384,720
Total FBO Sales	$2,254,650	$1,949,457	$2,178,554	$2,228,675	$2,269,715	$2,311,512	$2,354,077	$2,418,997	$11,582,976	$13,131,775	$32,143,055
Other Operating Revenues:											
Other Carrier Landing Fees	$6,300	$6,000	$6,200	$6,600	$6,722	$6,845	$6,971	$7,164	$34,302	$38,889	$95,190
Ramp Parking	38,858	16,914	13,080	14,160	14,421	14,686	14,957	15,369	73,593	83,433	204,223
Ramp Services	95,120	81,430	63,060	63,035	64,196	65,378	66,582	68,418	327,609	371,414	909,122
Rental Car Space Rent	14,400	14,400	14,400	14,400	14,688	14,982	15,281	15,587	74,938	82,738	192,206
Rental Car Concession Fees	335,492	241,631	257,988	150,361	152,891	155,465	158,081	163,638	780,436	908,437	2,342,670
Advertising Concession Fees	23,000	21,000	22,700	22,731	23,186	23,649	24,122	24,605	118,293	130,605	303,405
TSA Rent	0	25,884	34,512	34,512	35,202	35,906	36,624	37,357	179,602	198,295	460,654
Public Parking Fees	343,198	329,249	298,210	323,267	328,707	334,239	339,864	351,812	1,677,890	1,953,084	5,036,597
Other Terminal Rent	0	0	7,200	7,200	7,344	7,491	7,641	7,794	37,469	41,369	96,103
Vending Machines	5,400	5,200	5,500	5,640	5,735	5,831	5,930	6,138	29,274	34,075	87,873
Hangar Rent	78,918	59,710	62,662	89,840	91,637	93,470	95,339	97,246	467,531	516,192	1,199,153
Office Rent	35,159	43,203	67,741	19,500	19,890	20,288	20,694	21,107	101,479	112,041	260,279
Interest Income	74,193	63,741	50,556	53,000	53,000	53,000	53,000	53,000	265,000	265,000	530,000
TSA Security Reimbursement	0	0	63,391	48,399	49,367	50,354	51,361	52,389	251,870	278,085	646,013
Miscellaneous Income	39,619	41,818	22,585	14,500	14,790	15,086	15,388	15,695	75,459	83,312	193,541
Total Other Operating Revenues	$1,089,657	$950,180	$989,785	$867,145	$881,776	$896,671	$911,835	$937,319	$4,494,745	$5,096,969	$12,557,028
Total Non-Airline Revenues	$3,344,307	$2,899,637	$3,168,339	$3,095,820	$3,151,491	$3,208,182	$3,265,912	$3,356,315	$16,077,721	$18,228,744	$44,700,083
Annual Growth Rate	-	-13.3%	9.3%	-2.3%	1.8%	1.8%	1.8%	4.6%	1.2%	2.8%	2.7%
Total Revenues	$3,722,692	$3,227,838	$3,500,745	$3,452,814	$3,540,755	$3,604,941	$3,670,311	$3,770,241	$18,039,062	$20,449,427	$49,990,974
Annual Growth Rate	-	-13.3%	8.5%	-1.4%	2.5%	1.8%	1.8%	4.6%	1.5%	2.7%	2.7%
Operating Revenues Per Enplaned Pax:											
Easterwood Airport	$17.04	$16.30	$19.48	$18.09	$18.84	$19.24	$19.64	$19.86	$19.13	$20.58	$22.65
Non-Hub Industry Average	$15.53	$15.84	$16.15	$16.48	$16.80	$17.14	$17.48	$17.83	$17.15	$18.93	$21.99

Source: Leibowitz & Horton AMC Anaylsis

- Vending Machines - Based on the 2004 budget and 2% annual inflation plus the annual rate of forecast enplanement growth.
- Hangar Rent - Based on the 2004 budget and 2% annual inflation thereafter.
- Office Rent - Based on the 2004 budget and 2% annual inflation thereafter.
- Interest Income - Based on the 2004 budget and remains fixed at $53,000 per year thereafter.
- TSA Security Reimbursement - Based on the 2004 budget and 2% annual inflation thereafter.
- Miscellaneous Income - Based on the 2004 budget and 2% annual inflation thereafter.

9.4.4.2 Projection of Operating Revenues, Airline Cost Per Enplaned Passenger and Operating Revenues Per Enplaned Passenger

The projection of operating revenues is provided in **Table 9.6**. As shown in the table, airline revenues are expected to grow from $356,994 budgeted for 2004 to $413,926 projected for 2008 with a total of $1,961,341 during the five-year Short Term planning period. During the five year Intermediate Term period, airline revenues are projected to total $2,220,683 and during the ten-year Long Term period, revenues are projected to total $5,290,891. The overall annual growth rate for airline revenues is 2.5%. Non-Airline revenues are expected to grow from $3,095,820 budgeted for 2004 to $3,356,315 projected for 2008 with a total of $16,077,721 during the Short Term period. During the Intermediate Term period, non-airline revenues are projected to total $18,228,744 and during the Long Term period, revenues are projected to total $44,700,083. The overall annual growth rate for non-airline revenues is 2.5%. Total airport revenues are expected to grow from $3,452,814 budgeted for 2004 to $3,770,241 projected for 2008 with a total of $18,039,062 during the Short Term period. During the Intermediate Term period, revenues are projected to total $20,449,427 and during the Long Term period, revenues are projected to total $49,990,974. The overall annual growth rate for total revenues is 2.5%.

Table 9.6 also provides a comparison of the airport's airline cost per enplaned passenger versus the industry average for non-hub airports. The airline cost per enplaned passenger (airline fees and rentals divided by enplaned passengers) is a measure airlines use to compare their cost of operations among the airports they serve. Easterwood Airport's airline cost per enplaned passenger is projected to range from $5.28 budgeted for 2004 to $6.71 during the 20-year planning period. During the same period, the industry average for non-hub airports ranges from $5.88 in 2004 to $7.85 at the end of Long Term period (Source: AAAE 2001-2002 Survey of Airport Rates and Charges with inflation adjustments after 2001).

This result shows that airline rates and charges at Easterwood Airport are currently somewhat low and are projected to remain below those of other similarly sized airports throughout the planning period. If rates could be adjusted to more closely reflect the cost of providing airport facilities and services, an additional source of capital funding would be generated. However, the current significant financial weakness in the airline industry effectively precludes any substantive increase in airline rates & charges. In future years, when airline financial conditions improve and stabilize, the airport could become more aggressive in revising airline rates to increase their coverage of the airport's cost of operations and capital.

Table 9.6 also provides a comparison of Easterwood Airport's total operating revenue per enplaned passenger versus the industry average for non-hub airports. Easterwood Airport's operating revenue per enplaned passenger is projected to grow from $18.09 budgeted for 2004 to $22.65 during the 20-year planning period. During the same period, the industry average for non-hub airports ranges from $16.48 in 2004 to $21.99 by the end of Long Term period (Source: AAAE 2000-2001 Survey of Airport Rates and Charges with adjustments for inflation after 2001). This shows that total revenues at Easterwood Airport are currently higher and are projected to remain above those of other similarly sized airports throughout the planning period. This result occurs primarily because of the profitability of Easterwood Airport's FBO and aviation fuel sales operation. Most commercial passenger service airports in the U.S. do not provide FBO services or sell aviation fuel to users. The viability of Easterwood Airport's financial management is largely dependent on the continuation of its FBO operation.

9.4.5 FINANCIAL PLAN SUMMARY

The Financial Plan Summary presented in **Table 9.7** includes projection totals for Operating Cash Flow and Capital Cash Flow. In the Operating Cash Flow section, revenues and expenses are summarized from **Tables 9.5 and 9.6**. As shown in **Table 9.7**, cash flow from operations is positive for every period of the projection. The Capital Cash Flow section indicates the matching of capital project expenditures with the availability of capital funds so that positive cash flows result throughout the 20-planning period.

The Capital Cash Flow section of **Table 9.7** summarizes the results of analysis from **Tables 9.1 and 9.3**. In **Table 9.1**, practical approaches were provided for scheduling capital expenditures to match the availability of capital financing. **Table 9.3** provided practical approaches for matching specific capital funding sources with each of the identified projects. Based on the assumptions underlying the Financial Implementation Analysis summarized in **Table 9.7**, implementation of the Master Plan CIP is financially reasonable if the airport can obtain awards for the indicated amount of needed AIP discretionary grant funding.

Table 9.7
Financial Plan Summary
Budgeted and Projected Net Revenues, Capital Funding, Capital Expenditures and Cash Flow

Operating/Capital Cash Flow	Short Term: Budgeted 2004	Short Term: Projected 2005	Short Term: Projected 2006	Short Term: Projected 2007	Short Term: Projected 2008	Short Term: Total	Mid Term 2009-2013	Long Term 2014-2023
Operating Cash Flow								
Revenues:								
Airline Revenues	$356,994	$389,264	$396,759	$404,399	$413,926	$1,961,341	$2,220,683	$5,290,891
Other Operating Revenues	867,145	881,776	896,671	911,835	937,319	4,494,745	5,096,969	12,557,028
Total Revenues	$1,224,139	$1,271,040	$1,293,430	$1,316,234	$1,351,244	$6,456,086	$7,317,653	$17,847,919
FBO Sales:								
Sales	$2,228,675	$2,269,715	$2,311,512	$2,354,077	$2,418,997	$11,582,976	$13,131,775	$32,143,055
Cost of Goods Sold	(1,343,473)	(1,368,213)	(1,393,408)	(1,419,067)	(1,458,201)	(6,982,362)	(7,915,997)	(19,376,233)
Net FBO Sales	$885,202	$901,503	$918,104	$935,010	$960,795	$4,600,614	$5,215,778	$12,766,822
Operations & Maintenance Expenses:	(1,992,624)	(2,032,476)	(2,073,126)	(2,114,589)	(2,156,880)	(10,369,695)	(11,448,982)	(26,596,845)
Total Operating Funds Available For Capital Expenditures	$116,717	$140,066	$138,407	$136,655	$155,159	$687,005	$1,084,449	$4,017,895
Capital Cash Flow								
Beginning Cash Balance	$2,714,153	$1,378,970	$1,582,759	$882,110	$1,568,607	$2,714,153	$1,039,669	$1,904,938
Other Capital Funding Sources:								
AIP Entitlement Grants	$735,693	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$4,735,693	$5,000,000	$10,582,387
AIP Discretionary Grants	2,162,924	2,894,096	2,439,335	0	0	7,496,355	4,835,168	580,484
Passenger Facility Charges	0	0	131,194	282,306	286,500	700,000	1,497,317	3,319,096
Government Entities Fund	141,000	0	121,103	0	0	262,103	273,423	0
Private Third Party Financing	0	0	0	1,234,764	0	1,234,764	2,088,246	0
Total Other Capital Funding Sources	3,039,617	3,894,096	3,691,632	2,517,070	1,286,500	14,428,915	13,694,155	14,481,967
Total Funds Available for Capital Expenditures	5,870,487	5,413,131	5,412,798	3,535,836	3,010,266	17,830,073	15,818,273	20,404,801
Capital Improvement Program Expenditures	4,491,517	3,830,373	4,530,688	1,967,229	1,970,597	16,790,404	13,913,334	16,168,510
Ending Cash Balance	$1,378,970	$1,582,759	$882,110	$1,568,607	$1,039,669	$1,039,669	$1,904,938	$4,236,291

Source: Leibowitz & Horton AMC Anaylsis

Key assumptions supporting the Financial Implementation Plan relate to the availability and timeliness of the funding sources that have been identified. Receiving awards for AIP discretionary grants in amounts of $7.5 million during the Short Term, $4.8 million during the Intermediate Term and $580,000 during the Long Term planning period (for a total of $12.9 million) are necessary for implementing the airfield and ATCT projects to which this funding relates. AIP discretionary funding is not certain until the actual award is received from the FAA. If the indicated level of AIP discretionary funding is not available in the time frames indicated, then specific projects to which the funding is applied may need to be delayed or cancelled. **Table 9.3** indicates that private third party financing will be applied to the rental car facility and hangar projects included in the CIP. If this funding is not available in the time frames needed, these projects may need to be delayed or canceled.

Additionally, the Financial Implementation Analysis relies on achievement of the Master Plan forecast of aviation activity. Actual aviation traffic may temporarily vary from the projected levels of activity without a significant adverse impact on the capital program. If decreased traffic levels occur and persist, implementation of all the proposed projects may not be financially feasible. It should also be noted, however, that if the forecast activity levels are not met, then a number of the planned capital improvements may not be necessary.

APPENDIX A

Tenant Survey

APPENDIX A

This appendix summarizes the additional comments given to the consultant team during the February 2003 inventory of Easterwood Airport. All other survey items have been included in the main body of the documented inventory.

MCKENZIE TERMINAL TENANTS SURVEY SUMMARY	
Tenants	Comments
Airlines	1. The cages in the baggage make-up area are restrictive. 2. New carts being used do not have a good radius of turn, as they are single axle as opposed to dual axle. 3. Additional operational office space is required for dispatch crews. 4. The grassy areas between the ramp and McKenzie Terminal should be paved over. This will help in the movement of tugs. 5. The upper level curbside is subsiding in a few places. 6. Additional ramp area for staging ground equipment is needed. 7. Additional airline office/ storage space is required. The requirements for TSA operations reduced airline space significantly. 8. The baggage make up area does not provide enough room for the safe circulation of tugs/carts. 9. The bag wells and chutes are in need of repair.
Rental Cars	1. Current location in the terminal is very satisfactory. 2. Additional storage space for office supplies/documents is needed. 3. A protective removable tarp to shield the wash bay area is needed during periods of high winds. 4. The Ready Rental/Return car spaces should be kept close to terminal. 5. The existing refueling and cleaning facilities are inadequate and need to be upgraded. Relocate wash area elsewhere and include a nearby fuelling/support area if possible. 6. A remote parking lot is not desired if it is located more than 1 to 2 miles away as this will add to operating costs. 7. There are liability concerns with leaving McKenzie Terminal to refuel at GA terminal area. 8. An automated car wash is desirable.

GENERAL AVIATION TERMINAL AREA TENANTS SURVEY SUMMARY	
Tenants	Comments
Community Hangar	1. The lack of radar terminal area control and its effect on flight safety is a cause for concern. Students occasionally do not report their correct position which affects safety. 2. There is insufficient hangar space for potential general aviation patrons.
ATCT	1. The general aviation ramp space is inadequate for busy game day operations. Parking occurs on Runways 10-28 and 04-22. 2. Two to four hard pavement helipads are needed. 3. The lack of radar control slows traffic flow. Students on cross-country training often get lost and need navigational assistance. 4. Hold pads/ run-up areas on all runway ends are desirable. 5. A reduction of vehicular traffic on the runways is needed. The future full perimeter access road should alleviate the problem. 6. The prevalent winds are southerly, therefore an ILS on Runway 16 would be helpful.

APPENDIX B

Weighted Hourly Capacity

APPENDIX B
WEIGHTED HOURLY CAPACITY

The methodology described in FAA Advisory Circular 150/5060-5 "Airport Capacity and Delay" was used to calculate the weighted hourly capacity and Annual Service Volume (ASV) of the airfield at Easterwood Airport.

The weighted hourly capacity was derived by utilizing the following equation:

$$Cw = \frac{(P_1{*}C_1{*}W_1)+(P_2{*}C_2{*}W_2)+(P_3{*}C_3{*}W_3)}{(P_1{*}W_1)+(P_2{*}W_2)+(P_3{*}W_3)}$$

Cw= Weighted hourly capacity

P = The percentage of time each runway-use configuration occurs

C = Hourly capacity for each runway-use configuration

W = ASV weighting factor

$$Cw = \frac{(.9{*}99{*}1)+(.08{*}57{*}12)+(.02{*}0{*}16)}{(.9{*}1)+(.08{*}12)+(.02{*}16)}$$

$$Cw = \frac{89.1+54.72+0}{.9+.96+.32}$$

$$Cw = \frac{143.82}{2.18}$$

$$Cw = 65.97\ (66)$$

Once the weighted hourly capacity is determined, the following equation is used to derive the airfield's ASV:

$$ASV=Cw*D*H$$

Cw = Weighted hourly capacity

D = Daily demand ratio (annual demand divided by average daily demand during peak month)

H = Hourly demand ratio (average daily demand divided by average peak hour demand during peak month)

$$D= \frac{72{,}126}{240} = 300$$

$$H= \frac{240}{53} = 4.53$$

$$ASV= 66*300*5 = 99{,}000$$

APPENDIX C

Runway Length Curves

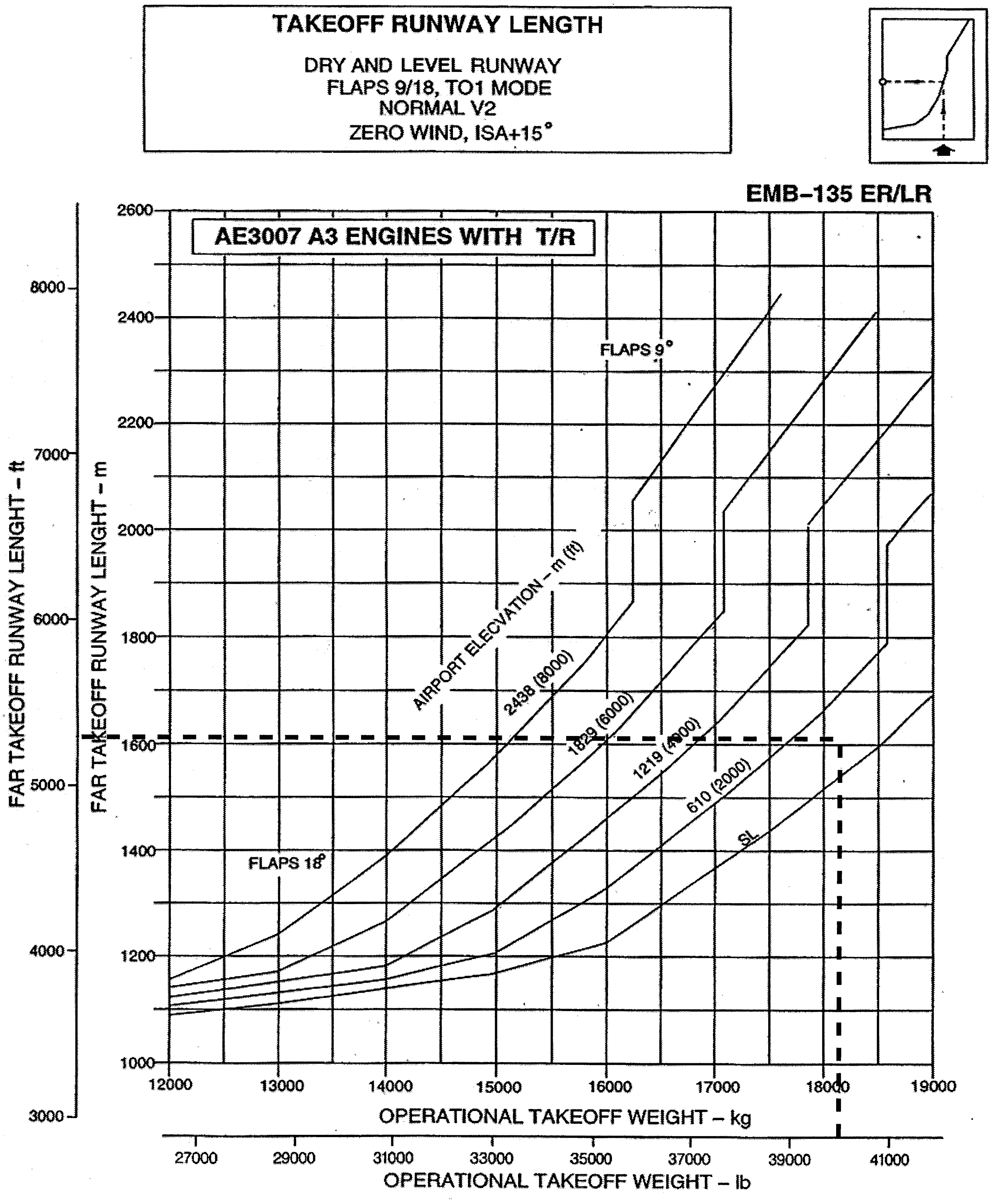


Figure 3.3.2 - FAR Takeoff Runway Length Requirements - ISA + 15°C Conditions Sheet 1

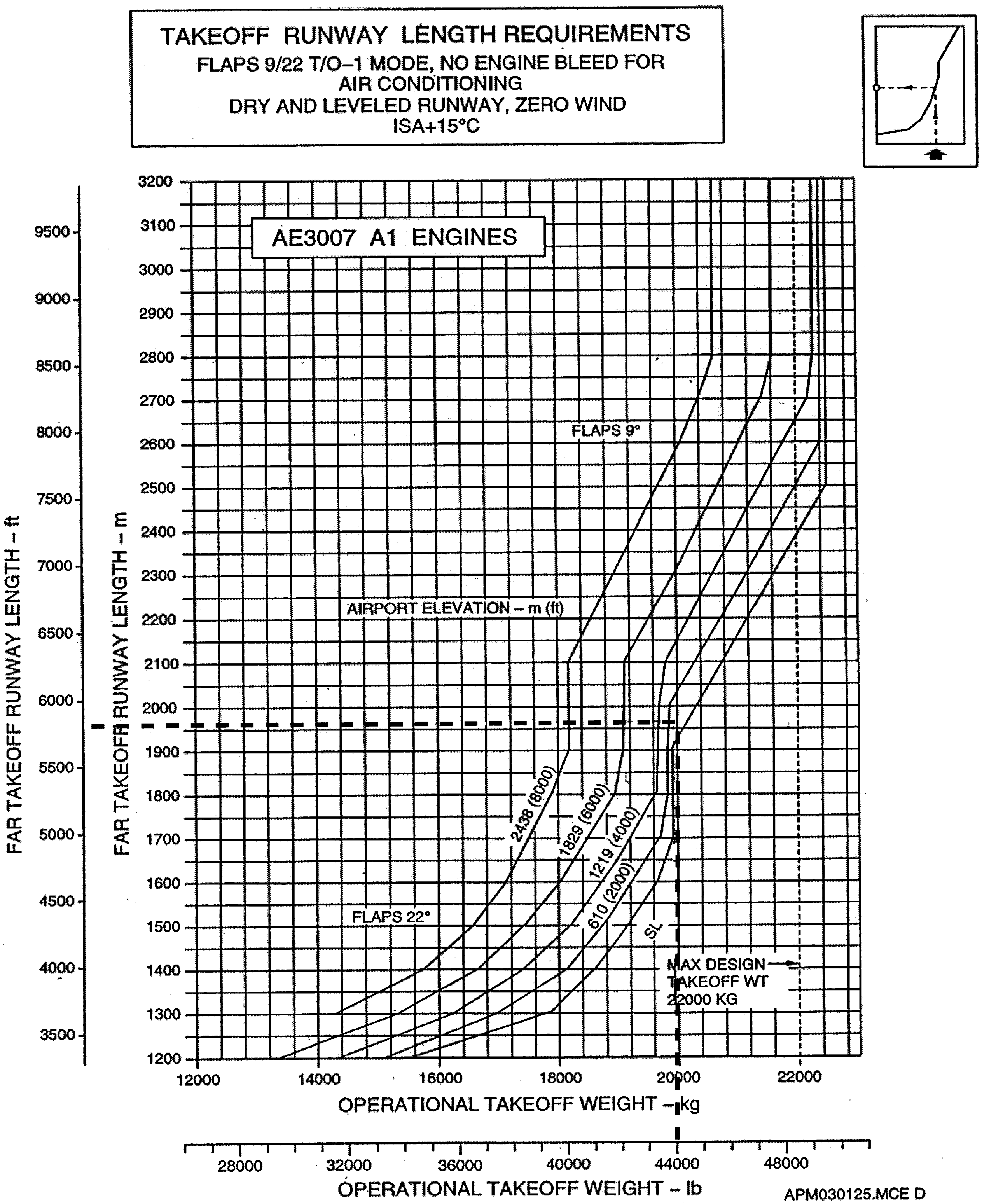
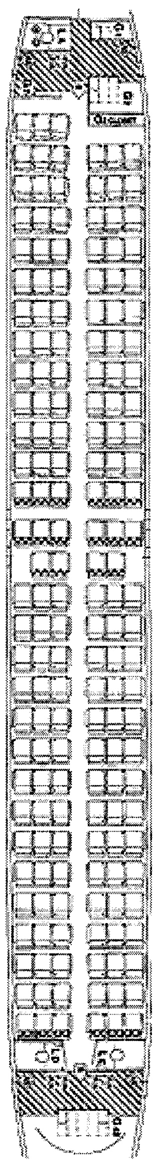


Figure 3.3.2 - FAR Takeoff Runway Length Requirements - ISA + 15°C Conditions
Sheet 1

ATA fleet

Boeing 737-800 | Boeing 757-200 | Boeing 757-300 |
Saab 340B - Chicago Express Airlines, Inc./ATA Connection

Boeing 737-800 [Back to Top]



ENGINE SPECIFICATIONS
Engine Type CFM 56-7 B27/B1
Thrust 27,300 lbs.
Approx. Range 3,065 nautical miles

MINIMUM CREW COMPLEMENT
Flight Deck 1 Captain, 1 First Officer
Flight Attendants 4
Extra Jump Seats 2 Cockpit 2 Flight Attendant

SEATING CONFIGURATION
Maximum Seating 175
Seat Layout 3-3
Width 17"
Pitch 31"-32"
Underseat 9"x15"x19"

LAVATORY CONFIGURATION

Forward-1, Aft-2

GALLEYS
Forward-1, Aft-1

FOOD SERVICE
Hot or Cold

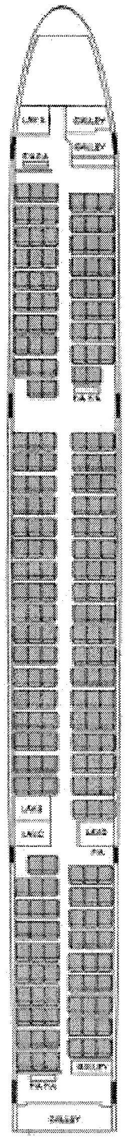
OPERATIONAL WEIGHTS
Max. Takeoff 174,200 lbs.
Max. Landing 146,300 lbs.
Max. Zero Fuel 138,300 lbs.
Fuel Capacity 46,063 lbs.
(usable) Max. Payload 41,500 lbs.

DIMENSIONS & CAPACITIES
Fuselage Length 129' 6"
Wingspan 117' 5"
Tail Height 41' 2"
Forward Cargo
Sill Height 4' 1"-4' 9"
Minimum Pavement Width for 180° Turn 75' 1"

DOOR SIZES
Main Cabin 72"x34"
Service Door 65"x30"
Forward Cargo 35"x48"
Aft Cargo 32"x48"

MAXIMUM CARGO CAPACITY BULK
Pits 1 & 2 7,846 lbs.
Pits 3 & 4 10,694 lbs.

Boeing B757-200 [Back to Top]



ENGINE SPECIFICATIONS
Engine Type RB211-535E4
Thrust 40,100 lbs. Approx.
Range 3,200 nautical miles

MINIMUM CREW COMPLEMENT
Flight Deck 1 Captain, 1 First Officer Flight Attendants 5
Extra Jump Seats 2 Cockpit, 2 Flight Attendant

SEATING CONFIGURATION
Maximum Seating 216
Seat Layout 3-3
Width 17"
Pitch 30"
Underseat 9"x15"x22"

LAVATORY CONFIGURATION
Forward-1, Aft-3

GALLEYS
Forward-1, Aft-1

FOOD SERVICE
Hot or Cold

OPERATIONAL WEIGHTS
Max. Takeoff 256,200 lbs.
Max. Landing 198,000 lbs.
Max. Zero Fuel 184,000 lbs.
Fuel Capacity 75,000 lbs. (usable)
Max. Payload 52,400 lbs.

DIMENSIONS & CAPACITIES
Fuselage Length 155' 3"
Wingspan 124' 10"
Tail Height 44' 6"
Forward Cargo
Sill Height 8' 1"-8' 3"
Minimum Pavement Width for 180° Turn 120'

DOOR SIZES
Main Cabin 76"x42"
Service Door 72"x30"
Forward Cargo 55"x42"
Aft Cargo 56"x42"

MAXIMUM CARGO CAPACITY BULK
Pits 1 & 2 10,300 lbs. Pits 3 & 4 16,300 lbs.

Boeing B757-300 [Back to Top]

ENGINE SPECIFICATIONS
Engine Type RB211-535E4
Thrust 43,000 lbs. Approx.
Range 3,500 nautical miles

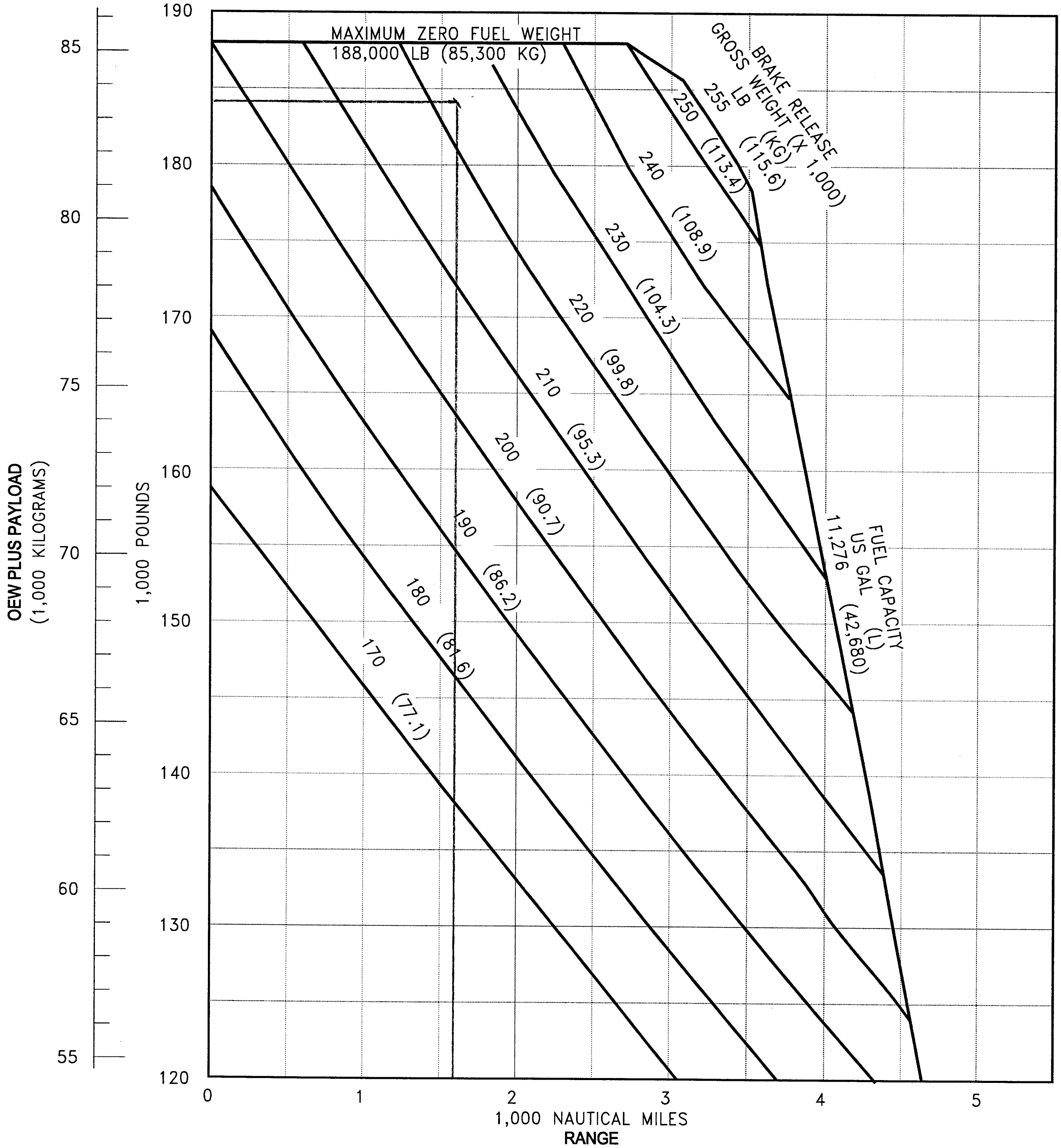
MINIMUM CREW COMPLEMENT
Flight Deck 1 Captain, 1 First Officer Flight Attendants 5
Extra Jump Seats 2 Cockpit, 2 Flight Attendant

SEATING CONFIGURATION
Maximum Seating 247

OPERATIONAL WEIGHTS
Max. Takeoff 270,200 lbs.
Max. Landing 224,000 lbs.
Max. Zero Fuel 210,000 lbs.
Fuel Capacity 76,923 lbs. (usable)
Max. Payload 66,440 lbs.

DIMENSIONS & CAPACITIES
Fuselage Length 177' 5"
Wingspan 124' 10"
Tail Height 44' 9"
Forward Cargo
Sill Height 7' 11"-8' 7"

NOTES:
* 0.80 MACH AT 35,000 AND 39,000 FT (10,668 AND 11,887 M)
* ATA DOMESTIC RESERVES
* STANDARD DAY
* NOMINAL PERFORMANCE
* CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE PRIOR TO FACILITY DESIGN



3.2.2. PAYLOAD/RANGE FOR LONG-RANGE CRUISE

MODEL 757-200 (RB211-53E4, -535E4B ENGINES)

--KCLL-- -- CLL--
ELEV. 321 FT 20 FLAPS EASTERWOOD
COLLEGE STATION, TX

RB211-535E4 ENG B-757-200
DATE: 29JUL03 TAKEOFF PERFORMANCE
A/C ON
RUNWAY CONDITION DRY

STRAIGHT-OUT DEPARTURES - CLIMB RWY HEADING TO MINIMUM SECTOR ALTITUDE (MSA)

RUNWAY NO / C	PERF LMT	16	34	16TMP	34TMP	EPR	F
-10	246.0	249.7*	240.7	249.7*	245.8	1.72	14
-5	246.0	249.8*	240.1	249.8*	245.3	1.72	23
0	246.0	250.0*	239.4	250.0*	244.9	1.72	32
5	246.0	250.1*	238.7	250.1*	244.4	1.72	41
10	246.0	250.3*	238.0	250.3*	244.0	1.72	50
12	245.9	250.3*	237.7	250.3*	243.8	1.72	53
14	245.9	250.3*	237.4	250.3*	243.6	1.72	57
16	245.9	250.0*	237.1	250.3*	243.4	1.72	60
18	245.9	249.3*	236.8	250.4*	243.1	1.72	64
20	245.9	248.6*	236.5	250.4*	242.9	1.72	68
22	245.9	247.9*	236.2	250.4*	242.7	1.72	71
24	245.9	247.2*	235.9	250.5*	242.5	1.72	75
26	245.9	246.5*	235.6	250.5*	242.3	1.72	78
28	245.9	245.9	235.3	250.5*	242.2	1.72	82
30	242.8	243.4*	232.8	247.4*	239.7	1.71	86
31	240.9	242.1*	231.2	245.4*	238.1	1.70	87
32	239.1	240.7*	229.7	243.4*	236.5	1.70	89
33	237.2	239.4*	228.2	241.5*	234.8	1.69	91
34	235.3	238.0*	226.6	239.7*	233.2	1.69	93
35	233.4	236.6*	225.0	238.0*	231.5	1.68	95
36	231.5	235.3*	223.4	236.2*	229.8	1.68	96
37	229.7	233.9*	221.8	234.3*	228.2	1.67	98
38	227.8	232.4*	220.2	232.4*	226.5	1.66	100
39	225.9	230.5*	218.7	230.5*	224.8	1.66	102
40	224.0	228.6*	217.2	228.6*	223.0	1.65	104
41	222.1	226.6*	215.5	226.6*	221.1	1.65	105
42	220.1	224.5*	213.8	224.5*	219.4	1.64	107
43	218.1	222.3*	212.2	222.3*	217.6	1.64	109
44	216.2	220.2*	210.4	220.2*	215.9	1.63	111
45	214.2	218.3*	208.7	218.3*	214.1	1.63	113
46	212.3	216.3*	207.0	216.3*	212.2	1.62	114
47	210.3	214.3*	205.3	214.3*	210.3*	1.61	116
48	208.4	212.2*	203.6	212.2*	208.5*	1.61	118
49	206.4	210.2*	201.8	210.1*	206.7*	1.60	120
50	204.5	208.1*	200.1	208.1*	204.8*	1.60	122
51	202.4	206.0*	198.2	206.0*	202.9*	1.59	123
52	200.4	203.8*	196.5	203.8*	200.9*	1.58	125
53	198.3	201.6*	194.7	201.6*	198.9*	1.58	127
54A	196.3	199.3*	192.9	199.3*	197.0*	1.57	129

	16	34	16TMP	34TMP
RUNWAY LENGTH	7000	7000	8000	8000
RUNWAY SLOPE	-0.22	0.22	-0.22	0.22
ADD LB/KT HW	0	210	0	160
SUB LB/KT TW	1970	1360	810	1100
LIMITED BY	RUNWAY	OBST	OBST	OBST
ACC HEIGHT	800	800	800	800

APPLY CORRECTIONS AS REQUIRED	QNH CORRECTION: LOW QNH, SUBTRACT 870 KG/Hpa; HIGH QNH, ADD 560 KG/Hpa	OBSERVE STRUCTURAL LIMITS

-- KCLL --
EASTERWOOD
COLLEGE STATION, TX

-- CLL --
ELEV 321 FT

FLAPS 25
B-757-200
LANDING PERFORMANCE

RB211-535E4 ENGINE

RUNWAY LIMITS

RWY LEN SLP	AUTOMATIC SPEED BRAKE TYPE	ZERO WIND	HW ADD KGS/KT	CRIT TW	SUB KG/KT ABOVE CRIT TW	MANUAL SPEED BRAKE TYPE	ZERO WIND	HW ADD KGS/KT	CRIT TW	SUB KG/KT ABOVE CRIT TW
16	ASO	99.8	0	-10	0	ASO	99.8	0	-10	0
7000	WET	99.8	0	-10	0	WET	99.8	0	-4	945
-0.22	ASI	73.8	480	0	945	ASI	65.2	417	0	909
	WET	62.6	405	0	879	WET	54.6	435	0	787
34	ASO	99.8	0	-10	0	ASO	99.8	0	-10	0
7000	WET	99.8	0	-10	0	WET	99.8	0	-4	945
0.22	ASI	73.8	480	0	945	ASI	65.2	417	0	909
	WET	62.6	405	0	879	WET	54.6	435	0	787
16TMP	ASO	99.8	0	-10	0	ASO	99.8	0	-10	0
7000	WET	99.8	0	-10	0	WET	99.8	0	-4	945
-0.22	ASI	73.8	480	0	945	ASI	65.2	417	0	909
	WET	62.6	405	0	879	WET	54.6	435	0	787
34TMP	ASO	99.8	0	-10	0	ASO	99.8	0	-10	0
7000	WET	99.8	0	-10	0	WET	99.8	0	-4	945
0.22	ASI	73.8	480	0	945	ASI	65.2	417	0	909
	WET	62.6	405	0	879	WET	54.6	435	0	787

MAXIMUM QUICK TURNAROUND WEIGHT

TEMP C	WEIGHT	TEMP C	WEIGHT	TEMP C	WEIGHT	TEMP C	WEIGHT
-5	99.8	10	99.8	25	99.8	40	99.8
0	99.8	15	99.8	30	99.8	45	99.8
5	99.8	20	99.8	35	99.8	48	99.6

RWY NO.	16	34	16TMP	34TMP
SLOPE CORR KGS	116	-104	116	-104

ADD 0 KGS/KT HEADWIND, SUBTRACT 87 KGS/KT TAILWIND

CLIMB LIMITS - A/C PACKS ON

TEMP C	CLIMB LIMIT	TEMP C	CLIMB LIMIT	TEMP C	CLIMB LIMIT	TEMP C	CLIMB LIMIT
-5	99.8	10	99.8	25	99.8	40	99.8
0	99.8	15	99.8	30	99.8	45	99.8
5	99.8	20	99.8	35	99.8	48	99.8

ISSUED: 29JUL03

-- KCLL -- -- CLL --

EASTERWOOD FLAPS 30 ELEV 321 FT

COLLEGE STATION, TX B-757-200

LANDING PERFORMANCE RB211-535E4 ENGINE

******************************** RUNWAY LIMITS ******************************

--- AUTOMATIC SPEED BRAKE ---						--- MANUAL SPEED BRAKE ---				
RWY LEN SLP	TYPE	ZERO WIND	HW ADD KGS/KT	CRIT TW	SUB KG/KT ABOVE CRIT TW	TYPE	ZERO WIND	HW ADD KGS/KT	CRIT TW	SUB KG/KT ABOVE CRIT TW
16	ASO	99.8	0	-10	0	ASO	99.8	0	-10	0
7000	WET	99.8	0	-10	0	WET	99.8	0	-6	793
-0.22	ASI	77.1	477	0	980	ASI	68.2	457	0	860
	WET	65.7	439	0	832	WET	58.1	412	0	745
34	ASO	99.8	0	-10	0	ASO	99.8	0	-10	0
7000	WET	99.8	0	-10	0	WET	99.8	0	-6	793
0.22	ASI	77.1	477	0	980	ASI	68.2	457	0	860
	WET	65.7	439	0	832	WET	58.1	412	0	745
16TMP	ASO	99.8	0	-10	0	ASO	99.8	0	-10	0
7000	WET	99.8	0	-10	0	WET	99.8	0	-6	793
-0.22	ASI	77.1	477	0	980	ASI	68.2	457	0	860
	WET	65.7	439	0	832	WET	58.1	412	0	745
34TMP	ASO	99.8	0	-10	0	ASO	99.8	0	-10	0
7000	WET	99.8	0	-10	0	WET	99.8	0	-6	793
0.22	ASI	77.1	477	0	980	ASI	68.2	457	0	860
	WET	65.7	439	0	832	WET	58.1	412	0	745

*********************** MAXIMUM QUICK TURNAROUND WEIGHT
****

TEMP C	WEIGHT	TEMP C	WEIGHT	TEMP C	WEIGHT	TEMP C	WEIGHT
-5	99.8	10	99.8	25	99.8	40	99.8
0	99.8	15	99.8	30	99.8	45	99.8
5	99.8	20	99.8	35	99.8	48	99.8

RWY NO.	16	34	16TMP	34TMP
SLOPE CORR KGS	113	-110	113	-110

ADD 0 KGS/KT HEADWIND, SUBTRACT 0 KGS/KT TAILWIND

*********************** CLIMB LIMITS - A/C PACKS ON
****

TEMP C	CLIMB LIMIT	TEMP C	CLIMB LIMIT	TEMP C	CLIMB LIMIT	TEMP C	CLIMB LIMIT
-5	99.8	10	99.8	25	99.8	40	99.8
0	99.8	15	99.8	30	99.8	45	99.8
5	99.8	20	99.8	35	99.8	48	99.8

ISSUED: 29JUL03

APPENDIX D

Passenger Terminal Space Program

EASTERWOOD AIRPORT - PASSENGER TERMINAL AREA REQUIREMENTS

PROGRAM COMPONENTS	2002	2007	2012	2017	2022	REMARKS
PASSENGER CHECK-IN AREA						
NUMBER OF AIRLINES	3	3	3	3	3	
TICKET COUNTER LENGTH (LINEAR FEET)	75	75	75	75	75	25 LINEAR FEET/AIRLINE
TICKET COUNTER AREA DEPTH	69	69	69	69	69	35 OFFICE/BAG MAKE-UP 9 COUNTER DEPTH 10 QUEUE 15 CIRCULATION
TICKET COUNTER AREA	5,175	5,175	5,175	5,175	5,175	
PUBLIC CIRCULATION						
PEAK-HOUR ORIGINATING PASSENGERS	65	75	81	87	93	
WELLWISHER/DEPARTURE HALL	268	309	334	359	384	15 SQ. FT./PASSENGER AND WELL WISHER WW/PASS = 0.1 15 MIN/PASSENGER DWELL TIME
SUBTOTAL CHECK-IN AREA	5,443	5,484	5,509	5,534	5,559	
PUBLIC SEATING AREA						
PEAK HOUR ORIGINATING PASSENGER	65	75	81	87	93	
PROVIDE SEATING FOR 20% PEAK HOUR PASSENGERS	13	15	17	18	19	20% OF TOTAL ORIGINATING PASSENGERS
VISITORS	2	2	2	2	2	0.1 VISITORS/ PASSENGER
PUBLIC SEATING POPULATION	15	17	19	20	21	
SUBTOTAL SEATING AREA BEFORE SECURITY	225	255	285	300	315	15 SQ. FT./SEAT
SECURITY SCREENING						
SURGE FACTOR = 40% OF PASSENGERS IN 20 MINUTES	78	90	98	105	112	1.2 X ORIGINATING PASSENGERS
DEPARTING VISITORS	-	-	-	-	-	0% OF TOTAL DEPARTING VISITORS X 1.2
ARRIVING VISITORS	-	-	-	-	-	0% OF TOTAL ARRIVING VISITORS X 1.2
TOTAL PEAK HOUR TRAFFIC THROUGH SECURITY	78	90	98	105	112	
SECURITY CHECK POINTS	1	1	1	1	1	125 PEOPLE/HOUR
CHECK POINT AREA	325	325	325	325	325	325 13 FT X 25FT
QUEUE AREA IN FRONT OF SECURITY	130	130	130	130	130	130 FT\CHECK POINT (10FT X 13 FT)
SUBTOTAL FOR SECURITY CHECK POINT AREA	455	455	455	455	455	
BAGGAGE CLAIM						
PEAK HOUR TERMINATING PASSENGERS	65	75	81	87	93	
PASSENGERS CLAIMING BAGGAGE	52	60	65	70	74	0.8 OF PEAK HOUR TERMINATING PASSENGERS
CONCURRENCY FACTOR	26	30	32	35	37	0.5 OF PASSENGERS CLAIMING BAGS
CLAIM DEVICE LINEAR FRONTAGE REQUIRED	39	45	49	53	56	1.5 LF PER PASSENGER CLAIMING BAGS
LENGTH / EQUIVALENT CLAIM UNIT	150	150	150	150	150	
EQUIVALENT CLAIM UNITS REQUIRED	1	1	1	1	1	
AREA/ EQUIVALENT CLAIM UNIT (SQ. FT.)	2,800	2,800	2,800	2,800	2,800	2800 SQ FT/UNIT
BAGGAGE CLAIM AREA	2,800	2,800	2,800	2,800	2,800	
CART STORAGE AREA	400	400	400	400	400	1 1 AREA X 10 FT WIDE X 40 FT LONG
BAGGAGE SERVICE OFFICE	208	240	259	278	298	4 SQ. FT./PASSENGER CLAIMING BAG
SUBTOTAL DOMESTIC BAG CLAIM	3,408	3,408	3,408	3,408	3,408	
MEETER/GREETER AREA						
PASSENGER DWELLING TIME	10 MIN	10 MIN	10 MIN	10 MIN	10 MIN	
GREETER DWELLING TIME	30 MIN	30 MIN	30 MIN	30 MIN	30 MIN	
TERMINATING PASSENGERS	11	13	14	15	16	100% OF TERMINATING PASSENGER DIVIDED BY 6
GREETERS	4	4	5	5	5	100% OF VISITORS DIVIDED BY 2
SUBTOTAL GREETER AREA	300	340	380	400	420	20 SQ FT/PASSENGER AND GREETER

EASTERWOOD AIRPORT - PASSENGER TERMINAL AREA REQUIREMENTS

	PROGRAM COMPONENTS	2002	2007	2012	2017	2022	REMARKS
59	**GROUND TRANSPORT**						
60	NUMBER OF RENTAL CAR AGENCIES/ GROUND TRANS.	4	5	5	5	5	
61	LENGTH OF RENTAL CAR COUNTER	80	100	100	100	100	20 L.F. X NUMBER OF AGENCIES
62	DEPTH OF CAR RENTAL COUNTER	37	37	37	37	37	15 FT OFFICE, 7 FT WORK SPACE 5 FT QUEUE 10 FT CIRCULATION
63	RENTAL CAR AREA	2,960	3,700	3,700	3,700	3,700	
64							
65	**HOLDROOMS**						
66	PEAK HOUR ORIGINATING PASSENGER	65	75	81	87	93	
67	DWELLING TIME	30 MIN	30 MIN	30 MIN	30 MIN	30 MIN	
68	SURGE FACTOR = 75% OF PASSENGERS IN 30 MINUTES	49	56	61	65	70	0.75 X TOTAL ORIGINATING PASSENGERS
69	AREA FOR HOLDROOM SEATING	731	844	911	979	1,046	15 SQ. FT. PER PASSENGER
70	DEPLANING CORRIDOR	720	720	1,080	1,080	1,080	360 SQFT + 5FT X 30FT DEPARTING PASS. CORRIDOR
71	CIRCULATION CORRIDOR AREA	366	422	456	489	523	TOTAL HOLDROOM AREA DIVIDED BY 30 FT DEPTH EQUALS HOLDROOM LENGTH X 15 FT WIDE CORRIDOR
72	SUBTOTAL HOLDROOM AREA	1,817	1,986	2,447	2,548	2,649	
73							
74	**TOILET FACILITIES**						
75	DEPARTURE AREA						
76	PEAK HOUR ORIGINATING PASSENGERS AND VISITORS	72	83	89	96	102	PASSENGER X 1.1
77	PEAK REQUIREMENT FOR TOILETS	4	4	4	5	5	15% OF 20 MIN POPULATION
78	NUMBER OF TOILET MODULES	1	1	1	1	1	15 PEOPLE/EACH MODULE
79	**TOILET AREA AT DEPARTURES**	768	768	768	768	768	24 FT X 32 FT = 768 SQ FT/EACH MODULE
80							
81	ARRIVAL AREA						
82	PEAK HOUR TERMINATING PASSENGERS AND VISITIORS	72	83	89	96	102	PASSENGER X 1.1
83	PEAK REQUIREMENTS FOR TOILETS	4	4	4	5	5	15% OF 20 MIN POPULATION
84	NO. OF TOILET MODULES	1	1	1	1	1	15 PEOPLE/EACH MODULE
85	**TOILET AREA AT ARRIVALS**	768	768	768	768	768	24 FT X 32 FT = 768 SQ FT/EACH MODULE
86							
87	HOLDROOM AIRSIDE AREA						
88	PEAK HOUR TOTAL PASSENGERS	144	168	178	192	204	TOTAL PASSENGERS ONLY
89	PEAK REQUIREMENTS FOR TOILETS	7	8	9	10	10	15% OF 20 MINUTE POPULATION
90	NO OF TOILET MODULES	1	1	1	1	1	15 PEOPLE/EACH MODULE
91	**TOILET AREA AT HOLDROOMS**	418	418	418	418	418	19 FT X 22 FT = 418 SQ FT/EACH MODULE
92							
93	TOTAL TOILET AREA	1,954	1,954	1,954	1,954	1,954	
94							
95	AIRPORT MANAGEMENT OFFICE AREA	2,000	2,000	2,000	2,000	2,000	
96	TSA OFFICE SPACE	1,500	1,500	1,500	1,500	1,500	
97							
98	TOTAL USEABLE SPACE	20,062	21,082	21,638	21,799	21,960	
99	**CONCESSION SPACE**	3,009	3,162	3,246	3,270	3,294	15% OF USEABLE SPACE
100	SUBTOTAL BUILDING AREA	23,071	24,244	24,884	25,069	25,254	
101	MAINTENANCE AND JANITORIAL	692	727	747	752	758	3% OF BUILDING AREA
102	SUBTOTAL	23,763	24,972	25,630	25,821	26,012	
103							
104	**GENERAL CIRCULATION**	1,188	1,249	1,282	1,291	1,301	5% OF GROSS FLOOR AREA
105							
106	**MECHANICAL/ELECTRICAL SPACE**	2,376	2,497	2,563	2,582	2,601	10% OF GROSS FLOOR AREA
107							
108	**STRUCTURAL SPACE**	1,188	1,249	1,282	1,291	1,301	5% OF GROSS FLOOR AREA
109							
110	TOTAL DOMESTIC TERMINAL	28,515	29,967	30,757	30,985	31,215	

APPENDIX E

Chapter 241 of Texas Local Government Code

LOCAL GOVERNMENT CODE

SUBTITLE C. REGULATORY AUTHORITY APPLYING TO MORE THAN ONE TYPE OF LOCAL GOVERNMENT

CHAPTER 241. MUNICIPAL AND COUNTY ZONING AUTHORITY AROUND AIRPORTS

SUBCHAPTER A. GENERAL PROVISIONS

Sec. 241.001. SHORT TITLE. This chapter may be cited as the Airport Zoning Act.

Acts 1987, 70th Leg., ch. 149, Sec. 1, eff. Sept. 1, 1987.

Sec. 241.002. LEGISLATIVE FINDINGS. The legislature finds that:

(1) an airport hazard endangers the lives and property of users of the airport and of occupants of land in the vicinity of the airport;

(2) an airport hazard that is an obstruction reduces the size of the area available for the landing, taking off, and maneuvering of aircraft, tending to destroy or impair the utility of the airport and the public investment in the airport;

(3) the creation of an airport hazard is a public nuisance and an injury to the community served by the airport affected by the hazard;

(4) it is necessary in the interest of the public health, public safety, and general welfare to prevent the creation of an airport hazard;

(5) the creation of an airport hazard should be prevented, to the extent legally possible, by the exercise of the police power without compensation; and

(6) the prevention of the creation of an airport hazard and the elimination, the removal, the alteration, the mitigation, or the marking and lighting of an airport hazard are public purposes for which a political subdivision may raise and spend public funds and acquire land or interests in land.

Acts 1987, 70th Leg., ch. 149, Sec. 1, eff. Sept. 1, 1987.

Sec. 241.003. DEFINITIONS. In this chapter:

(1) "Airport" means an area of land or water, publicly or privately owned, designed and set aside for the landing and taking off of aircraft and used or to be used in the interest of the public for that purpose. The term includes an area with

installations relating to flights, including installations, facilities, and bases of operations for tracking flights or acquiring data concerning flights.

(2) "Airport hazard" means a structure or object of natural growth that obstructs the air space required for the taking off, landing, and flight of aircraft or that interferes with visual, radar, radio, or other systems for tracking, acquiring data relating to, monitoring, or controlling aircraft.

(3) "Airport hazard area" means an area of land or water on which an airport hazard could exist.

(4) "Airport zoning regulation" means an airport hazard area zoning regulation and an airport compatible land use zoning regulation adopted under this chapter.

(5) "Centerline" means a line extending through the midpoint of each end of a runway.

(6) "Compatible land use" means a use of land adjacent to an airport that does not endanger the health, safety, or welfare of the owners, occupants, or users of the land because of levels of noise or vibrations or the risk of personal injury or property damage created by the operations of the airport, including the taking off and landing of aircraft.

(7) "Controlled compatible land use area" means an area of land located outside airport boundaries and within a rectangle bounded by lines located no farther than 1-1/2 statute miles from the centerline of an instrument or primary runway and lines located no farther than five statute miles from each end of the paved surface of an instrument or primary runway.

(8) "Instrument runway" means an existing or planned runway of at least 3,200 feet for which an instrument landing procedure published by a defense agency of the federal government or the Federal Aviation Administration exists or is planned.

(9) "Obstruction" means a structure, growth, or other object, including a mobile object, that exceeds a limiting height established by federal regulations or by an airport hazard area zoning regulation.

(10) "Political subdivision" means a municipality or county.

(11) "Primary runway" means an existing or planned paved runway, as shown in the official airport layout plan (ALP) of the airport, of at least 3,200 feet on which a majority of the approaches to and departures from the airport occur.

(12) "Runway" means a defined area of an airport prepared for the landing and taking off of aircraft along its length.

(13) "Structure" means an object constructed or installed by one or more persons and includes a building, tower, smokestack, and overhead transmission line.

Acts 1987, 70th Leg., ch. 149, Sec. 1, eff. Sept. 1, 1987.

Sec. 241.004. AIRPORT USED IN INTEREST OF PUBLIC. For the purposes of this chapter, an airport is used in the interest of the public if:

(1) the owner of the airport, by contract, license, or otherwise, permits the airport to be used by the public to an extent that the airport fulfills an essential community purpose; or

(2) the airport is used by the state or an agency of the state or by the United States for national defense purposes or for any federal program relating to flight.

Acts 1987, 70th Leg., ch. 149, Sec. 1, eff. Sept. 1, 1987.

Sec. 241.005. ADOPTION OF REGULATION INCLUDES AMENDMENT OR OTHER CHANGE. A reference in this chapter to the adoption of an airport zoning regulation includes the amendment, repeal, or other change of a regulation. A reference to the adoption of an airport zoning regulation also includes the amendment of an airport zoning regulation existing on the date the law codified by this chapter took effect, which was September 5, 1947.

Acts 1987, 70th Leg., ch. 149, Sec. 1, eff. Sept. 1, 1987.

SUBCHAPTER B. ADOPTION OF AIRPORT ZONING REGULATIONS

Sec. 241.011. AIRPORT HAZARD AREA ZONING REGULATIONS. (a) To prevent the creation of an airport hazard, a political subdivision in which an airport hazard area is located may adopt, administer, and enforce, under its police power, airport hazard area zoning regulations for the airport hazard area.

(b) The airport hazard area zoning regulations may divide an airport hazard area into zones and for each zone:

(1) specify the land uses permitted;

(2) regulate the type of structures; and

(3) restrict the height of structures and objects of natural growth to prevent the creation of an obstruction to flight operations or air navigation.

Acts 1987, 70th Leg., ch. 149, Sec. 1, eff. Sept. 1, 1987.

Sec. 241.012. AIRPORT COMPATIBLE LAND USE ZONING REGULATIONS. (a) A political subdivision may adopt, administer, and enforce, under its police power, airport compatible land use zoning regulations for the part of a controlled compatible land use area located within the political subdivision if the airport is:

(1) used in the interest of the public to the benefit of the political subdivision; or

(2) located within the political subdivision and owned or operated by a federal defense agency or by the state.

(b) The political subdivision by ordinance or resolution may implement, in connection with airport compatible land use zoning regulations, any federal law or rules controlling the use of land located adjacent to or in the immediate vicinity of the airport.

(c) The airport compatible land use zoning regulations must include a statement that the airport fulfills an essential community purpose.

Acts 1987, 70th Leg., ch. 149, Sec. 1, eff. Sept. 1, 1987.

Sec. 241.013. EXTRATERRITORIAL ZONING IN POLITICAL SUBDIVISIONS WITH POPULATION OF MORE THAN 45,000. (a) A political subdivision with a population of more than 45,000 in which an airport used in the interest of the public to the benefit of the political subdivision is located may adopt, administer, and enforce:

(1) airport hazard area zoning regulations applicable to an airport hazard area relating to the airport and located outside the political subdivision; and

(2) airport compatible land use zoning regulations applicable to a controlled compatible land use area relating to the airport and located outside the political subdivision.

(b) The political subdivision has the same power to adopt, administer, and enforce airport hazard area zoning regulations or airport compatible land use zoning regulations under this section as that given a political subdivision by Sections 241.011 and 241.012.

(c) The airport hazard area zoning regulations or airport compatible land use zoning regulations must include a statement that the airport fulfills an essential community purpose.

Acts 1987, 70th Leg., ch. 149, Sec. 1, eff. Sept. 1, 1987. Amended by Acts 1991, 72nd Leg., ch. 98, Sec. 1, 2, eff. Aug. 26, 1991.

Sec. 241.014. JOINT AIRPORT ZONING BOARD. (a) A political subdivision to whose benefit an airport is used in the interest of the public or in which an airport owned or operated by a defense agency of the federal government or the state is located may create a joint airport zoning board with another political subdivision in which an airport hazard area or a controlled compatible land use area relating to the airport is located. The political subdivisions must act by resolution or ordinance in creating the joint board.

(b) The joint airport zoning board has the same power to adopt, administer, and enforce airport hazard area zoning regulations or airport compatible land use zoning regulations under this section as that given a political subdivision by Sections 241.011 and 241.012.

(c) The joint airport zoning board must consist of two members appointed by each of the political subdivisions creating the board and, in addition, a chairman elected by a majority of the appointed members.

(d) If an agency of the state owns and operates an airport located within an airport hazard area or controlled compatible land use area governed by a joint airport zoning board, the agency is entitled to have two members on the board.

(e) The joint airport zoning board for an airport that is owned or operated by a defense agency of the federal government and that is closed by the federal government may provide that zoning regulations adopted by the board continue in effect until the fourth anniversary of the date the airport is closed.

Acts 1987, 70th Leg., ch. 149, Sec. 1, eff. Sept. 1, 1987. Amended by Acts 1997, 75th Leg., ch. 352, Sec. 1, eff. May 27, 1997; Acts 1999, 76th Leg., ch. 1176, Sec. 1, eff. June 18, 1999.

Sec. 241.015. INCORPORATION OF AIRPORT ZONING REGULATION INTO COMPREHENSIVE ZONING ORDINANCE. A political subdivision may incorporate an airport zoning regulation in a comprehensive zoning ordinance and administer and enforce it in connection with the administration and enforcement of the comprehensive zoning ordinance if:

(1) the two zoning regulations apply, in whole or in part, to the same area; and

(2) the comprehensive zoning ordinance includes, among other matters, a regulation on the height of buildings.

Acts 1987, 70th Leg., ch. 149, Sec. 1, eff. Sept. 1, 1987.

Sec. 241.016. AIRPORT ZONING COMMISSION. (a) Before an airport zoning regulation may be adopted, a political subdivision acting unilaterally under Section 241.013 must appoint an airport zoning commission. If the political subdivision has a planning commission or comprehensive zoning commission, that commission may be designated as the airport zoning commission.

(b) The commission shall recommend the boundaries of the zones to be established and the regulations for these zones.

(c) The commission shall make a preliminary report and hold public hearings on the report before submitting a final report.

(d) Before the 15th day before the date of a hearing under Subsection (c), notice of the hearing shall be published in an official newspaper or a newspaper of general circulation in each political subdivision in which the airport hazard area or controlled compatible land use area to be zoned is located.

(e) A joint airport zoning board created under Section 241.014 is not required to appoint a commission under this section.

Acts 1987, 70th Leg., ch. 149, Sec. 1, eff. Sept. 1, 1987. Amended by Acts 1995, 74th Leg., ch. 697, Sec. 1, eff. Sept. 1, 1995.

Sec. 241.017. PROCEDURAL LIMITATIONS APPLYING TO ADOPTION OF ZONING REGULATIONS. (a) The governing body of a political subdivision may not hold a public hearing or take other action concerning an airport zoning regulation until it receives the final report of the airport zoning commission.

(b) An airport zoning regulation may not be adopted except by action of the governing body of the political subdivision or a joint airport zoning board after the political subdivision or joint airport zoning board holds a public hearing on the matter at which parties in interest and citizens have an opportunity to be heard.

(c) Before the 15th day before the date of a hearing under Subsection (b), notice of the hearing must be published in an official newspaper or a newspaper of general circulation in each political subdivision in which the area to be zoned is located.

Acts 1987, 70th Leg., ch. 149, Sec. 1, eff. Sept. 1, 1987. Amended by Acts 1995, 74th Leg., ch. 697, Sec. 2, eff. Sept. 1, 1995.

Sec. 241.018. REASONABLENESS OF AIRPORT ZONING REGULATIONS. (a) An airport zoning regulation must be reasonable and may impose a requirement or restriction only if the requirement or restriction is reasonably necessary to achieve the purposes of this chapter.

(b) In determining which airport zoning regulations to adopt, the governing body of a political subdivision or a joint airport zoning board shall consider, among other things:

(1) the character of the flying operations expected to be conducted at the airport;

(2) the nature of the terrain within the airport hazard area;

(3) the character of the neighborhood; and

(4) the current and possible uses of the property to be zoned.

Acts 1987, 70th Leg., ch. 149, Sec. 1, eff. Sept. 1, 1987.

Sec. 241.019. NONCONFORMING USES AND STRUCTURES. Except as provided by Section 241.035, airport zoning regulations may not require:

(1) changes in nonconforming land use existing on the date of the adoption of the regulations;

(2) the removal, lowering, or other change of a structure that does not conform to the regulations on the date of their adoption, including all phases or elements of a multiphase structure, regardless of whether actual construction has commenced, that received a determination of no hazard by the

Federal Aviation Administration under 14 C.F.R., Part 77, before the regulations were adopted;

(3) the removal, lowering, or other change of an object of natural growth that does not conform to the regulations on the date of their adoption; or

(4) any other interference in the continuation of a use that does not conform to the regulations on the date of their adoption.

Acts 1987, 70th Leg., ch. 149, Sec. 1, eff. Sept. 1, 1987.

Sec. 241.020. PERMITS. (a) Airport zoning regulations may require that a permit be obtained before:

(1) a new structure is constructed;

(2) an existing structure is substantially changed or repaired;

(3) a new use is established; or

(4) an existing use is substantially changed.

(b) Airport zoning regulations must provide that a permit be obtained from the administrative agency authorized to administer and enforce the regulations before:

(1) a nonconforming structure may be replaced, rebuilt, or substantially changed or repaired; or

(2) a nonconforming object of natural growth may be replaced, substantially changed, allowed to grow higher, or replanted.

(c) A permit may not allow:

(1) the establishment of an airport hazard;

(2) a nonconforming use to be made;

(3) a nonconforming structure or object of natural growth to become higher than it was at the time of the adoption of the airport zoning regulations relating to the structure or object of natural growth or at the time of the application for the permit; or

(4) a nonconforming structure, object of natural growth, or use to become a greater hazard to air navigation than it was at the time of the adoption of the airport zoning regulations relating to the structure, object of natural growth, or use or at the time of the application for the permit.

(d) Except as provided by Subsection (c), an application for a permit shall be granted.

Acts 1987, 70th Leg., ch. 149, Sec. 1, eff. Sept. 1, 1987.

SUBCHAPTER C. ADMINISTRATIVE AGENCY AND BOARD OF ADJUSTMENT

Sec. 241.031. ADMINISTRATIVE AGENCY. (a) Airport zoning regulations must provide for the administration and enforcement of the regulations by an administrative agency. The administrative agency may be:

(1) an agency created by the regulations;

(2) an existing official, board, or agency of the political subdivision adopting the regulations; or

(3) an existing official, board, or other agency of a political subdivision that participated in the creation of a joint airport zoning board adopting the regulations, if satisfactory to that political subdivision.

(b) The administrative agency may not be the board of adjustment or include any member of the board.

(c) The administrative agency shall hear and decide all applications for permits under Section 241.020.

(d) The agency may not exercise any of the powers delegated to the board of adjustment.

Acts 1987, 70th Leg., ch. 149, Sec. 1, eff. Sept. 1, 1987.

Sec. 241.032. BOARD OF ADJUSTMENT. (a) Airport zoning regulations must provide for a board of adjustment.

(b) If a zoning board of appeals or adjustment exists, it may be designated as the board of adjustment under this chapter.

(c) If a zoning board of appeals or adjustment does not exist or is not designated as the board of adjustment under this chapter, a board of adjustment must be appointed. The board must consist of five members to be appointed for terms of two years. The appointing authority may remove a board member for cause on a written charge after a public hearing. A vacancy on the board shall be filled for the unexpired term.

(d) The concurring vote of four members of the board is necessary to:

(1) reverse an order, requirement, decision, or determination of the administrative agency;

(2) decide in favor of an applicant on a matter on which the board is required to pass under an airport zoning regulation; or

(3) make a variation in an airport zoning regulation.

(e) The board shall adopt rules in accordance with the ordinance or resolution that created it.

(f) Meetings of the board are held at the call of the chairman and at other times as determined by the board. The chairman or acting chairman may administer oaths and compel the attendance of witnesses. All hearings of the board shall be open to the public.

(g) The board shall keep minutes of its proceedings that indicate the vote of each member on each question or the fact that a member is absent or fails to vote. The board shall keep records of its examinations and other official actions. The minutes and records shall be filed immediately in the board's office and are public records.

Acts 1987, 70th Leg., ch. 149, Sec. 1, eff. Sept. 1, 1987.

Sec. 241.033. AUTHORITY OF BOARD. The board of adjustment shall:

(1) hear and decide an appeal, as provided by Section 241.036, from an order, requirement, decision, or determination made by the administrative agency in the enforcement of an airport zoning regulation;

(2) hear and decide special exceptions to the terms of an airport zoning regulation when the regulation requires the board to do so; and

(3) hear and decide specific variances under Section 241.034.

Acts 1987, 70th Leg., ch. 149, Sec. 1, eff. Sept. 1, 1987.

Sec. 241.034. VARIANCES. (a) A person who desires to erect or increase the height of a structure, permit the growth of an object of natural growth, or otherwise use property in violation of an airport zoning regulation, may apply to the board of adjustment for a variance from the regulation.

(b) The board shall allow a variance from an airport zoning regulation if:

(1) a literal application or enforcement of the regulation would result in practical difficulty or unnecessary hardship; and

(2) the granting of the relief would:

(A) result in substantial justice being done;

(B) not be contrary to the public interest; and

(C) be in accordance with the spirit of the regulation and this chapter.

(c) The board may impose any reasonable conditions on the variance that it considers necessary to accomplish the purposes of this chapter.

Acts 1987, 70th Leg., ch. 149, Sec. 1, eff. Sept. 1, 1987.

Sec. 241.035. HAZARD MARKING AND LIGHTING. If the administrative agency or board of adjustment considers it reasonable in the circumstances and advisable to accomplish the purposes of this chapter, the agency or board may require in a permit or a variance granted under this chapter that the owner of a structure or object of natural growth allow the political subdivision, at its own expense, to install, operate, and maintain on the structure or object of natural growth any markers and lights necessary to indicate to flyers the presence of an airport hazard.

Acts 1987, 70th Leg., ch. 149, Sec. 1, eff. Sept. 1, 1987.

Sec. 241.036. APPEAL TO BOARD. (a) A decision of the administrative agency made in its administration of an airport zoning regulation may be appealed to the board of adjustment by:

(1) a person who is aggrieved by the decision;

(2) a taxpayer who is affected by the decision; or

(3) the governing body of a political subdivision or a joint airport zoning board that believes the decision is an improper application of the airport zoning regulation.

(b) The appellant must file with the board and the administrative agency a notice of appeal specifying the grounds for the appeal. The appeal must be filed within a reasonable time as determined by the rules of the board. On receiving the notice, the administrative agency shall immediately transmit to the board all the papers constituting the record of the action that is appealed.

(c) An appeal stays all proceedings in furtherance of the action that is appealed unless the administrative agency certifies in writing to the board facts supporting the agency's opinion that a stay would cause imminent peril to life or property. In that case, the proceedings may be stayed only by an order of the board, after notice to the administrative agency, if due cause is shown.

(d) The board shall set a reasonable time for the appeal hearing and shall give public notice of the hearing and due notice to the parties in interest. A party may appear at the appeal hearing in person or by agent or attorney. The board shall decide the appeal within a reasonable time.

(e) The board may reverse or affirm, in whole or in part, or modify the administrative agency's order, requirement, decision, or determination from which an appeal is taken and make the correct order, requirement, decision, or determination, and for that purpose the board has the same authority as the administrative agency.

Acts 1987, 70th Leg., ch. 149, Sec. 1, eff. Sept. 1, 1987.

SUBCHAPTER D. JUDICIAL REVIEW AND OTHER REMEDIES

Sec. 241.041. JUDICIAL REVIEW OF BOARD DECISION. (a) A person who is aggrieved or a taxpayer who is affected by a decision of a board of adjustment, or the governing body of a political subdivision or a joint airport zoning board that believes a decision of a board of adjustment is illegal, may present to a court of record a verified petition stating that the decision of the board of adjustment is illegal in whole or in part and specifying the grounds of the illegality. The petition must be presented within 10 days after the date the decision is filed in the board's office.

(b) On the presentation of the petition, the court may grant a writ of certiorari directed to the board of adjustment to review the board's decision. Granting of the writ does not stay the proceedings on the decision under appeal, but on application and after notice to the board the court may grant a restraining order if due cause is shown.

(c) The board's return must be verified and must concisely state any pertinent and material facts that show the grounds of the decision that is appealed. The board is not required to return the original documents on which the board acted but may return certified or sworn copies of the documents or parts of the documents as provided by the writ.

Acts 1987, 70th Leg., ch. 149, Sec. 1, eff. Sept. 1, 1987.

Sec. 241.042. TRIAL BY COURT. (a) The court, in an appeal from a decision of a board of adjustment as provided by Section 241.041, shall try and determine the case de novo on the basis of the facts adduced in the trial of the case in the court. The court shall independently rule on the facts and the law as in an ordinary civil suit.

(b) The court has exclusive jurisdiction to reverse or affirm, in whole or in part, or modify the decision that is appealed and, if necessary, may order further proceedings by the board.

(c) Costs may not be assessed against the board unless the court determines that the board acted with gross negligence, in bad faith, or with malice in making its decision.

Acts 1987, 70th Leg., ch. 149, Sec. 1, eff. Sept. 1, 1987.

Sec. 241.043. EFFECT OF HOLDING OF THE COURT. If the court holds that an airport zoning regulation, although generally reasonable, interferes with the use or enjoyment of a particular structure or parcel of land to such an extent that, or is so onerous in its application to a particular structure or parcel of land that, the application of the regulation constitutes a taking or deprivation of property in violation of the state or federal constitution, the holding does not affect the application of the regulation to any other structure or parcel of land.

Acts 1987, 70th Leg., ch. 149, Sec. 1, eff. Sept. 1, 1987.

Sec. 241.044. ADDITIONAL REMEDIES. (a) A political subdivision or joint airport zoning board adopting airport zoning regulations may bring an action in a court of competent jurisdiction to prevent, restrain, correct, or abate a violation of:

(1) this chapter;

(2) an airport zoning regulation adopted by the political subdivision or board; or

(3) an order or ruling made in connection with the administration or enforcement of an airport zoning regulation adopted by the political subdivision or board.

(b) The court shall grant any relief, including an injunction which may be mandatory, as may be proper under all the facts and circumstances of the case to accomplish the purposes of this chapter and the regulations adopted and orders and rulings made under it.

Acts 1987, 70th Leg., ch. 149, Sec. 1, eff. Sept. 1, 1987.

SUBCHAPTER Z. MISCELLANEOUS PROVISIONS

Sec. 241.901. CONFLICT OF AN AIRPORT HAZARD AREA ZONING REGULATION WITH ANOTHER REGULATION. (a) If an airport hazard area zoning regulation conflicts with any other regulation applicable to the same area, the more stringent limitation or requirement controls.

(b) Subsection (a) applies to any conflict with respect to the height of a structure or object of natural growth or any other matter.

(c) Subsection (a) applies to any regulation that conflicts with an airport hazard area zoning regulation whether the regulation was adopted by the political subdivision that adopted the airport zoning regulation or by another political subdivision.

Acts 1987, 70th Leg., ch. 149, Sec. 1, eff. Sept. 1, 1987.

Sec. 241.902. CONFLICT OF AN AIRPORT COMPATIBLE LAND USE ZONING REGULATION WITH ANOTHER REGULATION. (a) If an airport compatible land use zoning regulation conflicts with any other regulation applicable to the same area, the airport compatible land use zoning regulation controls.

(b) Subsection (a) applies to any conflict with respect to the use of land or any other matter.

(c) Subsection (a) applies to any regulation that conflicts with an airport compatible land use zoning regulation, whether the regulation was adopted by the political subdivision that adopted the airport compatible land use zoning regulation or by another political subdivision.

Acts 1987, 70th Leg., ch. 149, Sec. 1, eff. Sept. 1, 1987.

Sec. 241.903. ACQUISITION OF AIR RIGHTS OR OTHER PROPERTY. (a) A political subdivision may acquire from a person or other political subdivision an air right, aviation easement, or other estate or interest in property or in a nonconforming structure or use if:

(1) the acquisition is necessary to accomplish the purposes of this chapter;

(2) the property or nonconforming structure or use is located within the political subdivision, the political subdivision owns the airport, or the political subdivision is served by the airport; and

(3)(A) the political subdivision desires to remove, lower, or terminate the nonconforming structure or use;

(B) airport zoning regulations are not sufficient to provide necessary approach protection because of constitutional limitations; or

(C) the acquisition of a property right is more advisable than an airport zoning regulation in providing necessary approach protection.

(b) An acquisition under this section may be by purchase, grant, or condemnation in the manner provided by Subchapter B, Chapter 21, Property Code.

Acts 1987, 70th Leg., ch. 149, Sec. 1, eff. Sept. 1, 1987.

APPENDIX F

Cost Estimates

COST ESTIMATE
for
EASTERWOOD AIRPORT
TEXAS A & M UNIVERSITY

CAPITAL IMPROVEMENT PROGRAM

Estimate Submittal Date
December-2003

Prepared by
URS Corporation
Cost Estimating Department
7650 West Courtney Campbell Causeway
Tampa, FL 33607-1462
(813) 286-1711
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EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan
Summary

Description	
1 Conduct EA on Master Plan Improvements	$300,000
2 Reconstruction of McKenzie Terminal Access Road	$727,647
3 Reconstruction of McKenzie Terminal Upper Level Driveways	$911,299
4 Construct Westside Apron	$1,273,755
5 Extend Taxiway Hotel	$1,976,762
6 Construct New Access to Fire School	$1,210,763
7 Construct Runway 28 Runway Safety Area	$1,775,920
8 Construct New Control Tower	$4,075,500
9 Demolish Old Control Tower	$57,946
10 Realign Taxiway Alpha (North of Runway 22)	$982,876
11 Realign Taxiway Bravo	$1,077,920
12 Realign Taxiway Charlie	$1,021,106
13a GA Ramp Expansion and Realign Taxiway Alpha (phase 1)	$1,490,699
13b GA Ramp Expansion and Realign Taxiway Alpha (phase 2)	$2,075,280
14 Construct Taxiway Juliet	$871,643
15 Install PAPI's on Runway 16/34	$123,420
16 Install MALS on Runway 16	$468,683
17 Install REILS on Runway 10	$74,989
18 Install McKenzie and GA High Mast Lights	
19 Expand McKenzie Ramp - Phase 1	$1,968,553
20 Expand McKenzie Ramp - Phase 2	$1,413,758
21 Construct Rental Car Service Facility	$329,668
22 McKenzie Terminal Roadway Signage	$72,041
23 McKenzie Terminal Roadway Landscaping	$675,005

24 Demolish Airport Maintenance Building	**$18,234**
25 Construct New Airport Maintenance Building	**$291,785**
26 West Terminal Area Access Road - Phase 1	**$66,651**
27 West Terminal Area Access Road - Phase 2	**$310,757**
28 Control Tower Access Road	**$590,098**
29a Phase I - Airfield Perimeter Fencing	**$625,008**
29b Phase II - Airfield Perimeter Fencing	**$623,567**
29c Phase III - Airfield Perimeter Fencing	**$203,780**
30 Rotocraft Hangar	**$833,878**
31 Baggage Make-up Area Reconfiguraton	**$185,446**
32 Long-Term Baggage Claim and Vertical Circulation Improvements	**$701,201**
33 Remote Apron Near Taxiway Bravo	**$3,002,421**
34 Loading Bridges	**$1,255,749**
35 Reconstruction of GA Parking Lot	**$641,216**
36 Hangar on North Ramp	**$797,519**
37 Hangar on South Ramp	**$451,664**
38 Hangar on West Ramp	**$1,836,033**
39a Drainage Area (RWY 16 RSA)	**$343,191**
39b Drainage Area (near RTF)	**$149,121**
39c Drainage Area (Lake)	**$224,397**
40c Overlay RW 16 / 34	**$2,756,535**
Total	**$40,863,485**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan

1 Conduct EA on Master Plan Improvements

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$300,000	$300,000
				$300,000
CONSTRUCTION SUBTOTAL				$300,000
MANAGEMENT COSTS				
				$300,000
				$300,000
PROJECT TOTAL				**$300,000**

1 Conduct EA on Master Plan Improvements

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
						$300,000
Environmental Assessment	Allowance	1	ls	$300,000.00	$300,000	

ESTIMATED CONSTRUCTION VALUE **$300,000**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan

2 Reconstruction of McKenzie Terminal Access Road

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$535,625	**$535,625**
CONTINGENCIES				
Change Order Contingency	10%	$53,563		
			$53,563	**$589,188**
CONSTRUCTION SUBTOTAL				**$589,188**
MANAGEMENT COSTS				
Geotech	1.5%	$8,838		
Surveying	1.5%	$8,838		
Construction Management	6%	$35,351		
Design Svcs. During Construction	4.5%	$26,513		
Design Fees	10%	$58,919		
			$138,459	**$727,647**
				$727,647
PROJECT TOTAL				**$727,647**

2 Reconstruction of McKenzie Terminal Access Road

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
						$428,500
1	Preparing rights-of-way	5,000	SY	$ 1.50	$ 7,500.00	
2	Clearing and Grubbing	1	LS	$ 1,000.00	$ 1,000.00	
3	Demolition	5,000	SY	$ 5.00	$ 25,000.00	
4	Unclassified Street Excavation	3,500	CY	$ 5.00	$ 17,500.00	
5	Temporary Erosion, Sedimentation and Water Pollution Control	1	LS	$ 2,500.00	$ 2,500.00	
6	PCC Pavement	5,000	SY	$ 40.00	$ 200,000.00	
7	Marking and signage	1	LS	$ 3,000.00	$ 3,000.00	
8	Concrete Curb	10,000	LF	$ 7.00	$ 70,000.00	
9	Lime Treated Subgrade	5,000	SY	$ 3.00	$ 15,000.00	
10	Curb Inlets	4	EA	$ 3,000.00	$ 12,000.00	
11	24-Inch RCP	1,200	LF	$ 60.00	$ 72,000.00	
12	24-Inch Headwalls	4	EA	$ 750.00	$ 3,000.00	
		Subtotal			$ 428,500.00	
	MOBILIZATION & ESTIMATE CONTINGENCY					$107,125
	Mobilization	10%			$ 42,850	
	Estimate Contingency	15%			$ 64,275	
	ESTIMATED CONSTRUCTION VALUE					**$535,625**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan

3 Reconstruction of McKenzie Terminal Upper Level Driveways

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$670,813	**$670,813**
CONTINGENCIES				
Change Order Contingency	10%	$67,081		
			$67,081	**$737,894**
CONSTRUCTION SUBTOTAL				**$737,894**
MANAGEMENT COSTS				
Geotech	1.5%	$11,068		
Surveying	1.5%	$11,068		
Construction Management	6%	$44,274		
Design Svcs. During Construction	4.5%	$33,205		
Design Fees	10%	$73,789		
			$173,405	**$911,299**
				$911,299
PROJECT TOTAL				**$911,299**

URS CORPORATION

EASTERWOOD AIRPORT

3 Reconstruction of McKenzie Terminal Upper Level Driveways

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
						$536,650
1	Erosion Control	1	LS	$ 10,000.00	$ 10,000	
2	Traffic Control	1	LS	$ 10,000.00	$ 10,000	
3	Demolition	1	LS	$ 45,000.00	$ 45,000	
4	Remove and Replace Subgrade	5,000	CY	$ 15.00	$ 75,000	
5	Lime Treated Subgrade	1,250	SY	$ 3.00	$ 3,750	
6	PCC Pavement	1,250	SY	$ 40.00	$ 50,000	
7	Marking	1	LS	$ 1,500.00	$ 1,500	
8	Curb	700	LF	$ 7.00	$ 4,900	
9	Tieback Retaining Wall	4,000	SF	$ 60.00	$ 240,000	
10	Cast-In-Place Concrete with Exposed Agg. Finish (Above Wall)	700	SF	$ 70.00	$ 49,000	
11	Aluminum Guardrail	350	LF	$ 50.00	$ 17,500	
12	Electrical	1	LS	$ 25,000.00	$ 25,000	
13	Landscaping	1	LS	$ 5,000.00	$ 5,000	
		Subtotal			$536,650	
	MOBILIZATION & ESTIMATE CONTINGENCY					$ 134,163
	Mobilization	10%			$ 53,665	
	Estimate Contingency	15%			$ 80,498	
	ESTIMATED CONSTRUCTION VALUE					**$670,813**

EASTERWOOD AIRPORT
Master Plan Update - Capital Improvement Plan
4 Construct Westside Apron

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$937,619	**$937,619**
CONTINGENCIES				
Change Order Contingency	10%	$93,762		
			$93,762	**$1,031,381**
CONSTRUCTION SUBTOTAL				**$1,031,381**
MANAGEMENT COSTS				
Geotech	1.5%	$15,471		
Surveying	1.5%	$15,471		
Construction Management	6%	$61,883		
Design Svcs. During Construction	4.5%	$46,412		
Design Fees	10%	$103,138		
			$242,375	**$1,273,755**
				$1,273,755
PROJECT TOTAL				**$1,273,755**

4 Construct Westside Apron

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
BID PACKAGE 2						**$937,619**
Code C Estimate dated 20-Jun-03	Base bid estimate (phase 2)	6,722	sy	$75.83	$509,723	
West Side Development (FFA #20)	Alternates bid estimate (phase 3)	5,597	sy	$76.45	$427,896	
AIP Project No 3-48-0047-2000						
A & M Project No 2-2922						
ESTIMATED CONSTRUCTION VALUE						**$937,619**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan

5 Extend Taxiway Hotel

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$1,609,086	**$1,609,086**
CONTINGENCIES				
Change Order Contingency	5%	$80,454		
			$80,454	**$1,689,541**
CONSTRUCTION SUBTOTAL				**$1,689,541**
MANAGEMENT COSTS				
Geotech	0.75%	$12,672		
Surveying	0.75%	$12,672		
Construction Management	5%	$84,477		
Design Svcs. During Construction	4.5%	$76,029		
Design Fees	6%	$101,372		
			$287,222	**$1,976,762**
				$1,976,762
PROJECT TOTAL				**$1,976,762**

5 Extend Taxiway Hotel

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
TAXIWAY						**$1,298,311**
Cut to subgrade to Fill onsite		7,418	cy	$3.00	$22,255	
		7,418	cy	$3.00	$22,255	
Stabilize		16,733	sy	$2.00	$33,467	
Lime		3,700	tn	$115.00	$425,500	
Paving		16,733	sy	$47.50	$794,833	
STORM						**$69,250**
RCP	18"	300	lf	$31.50	$9,450	
	24"	400	lf	$38.00	$15,200	
	30"	700	lf	$53.00	$37,100	
Structures		3	ea	$2,500.00	$7,500	
LIGHTING - MARKINGS - SIGNAGE						**$95,245**
Lighting, signs		64	ea	$680.00	$43,520	
Cable, duct, counterpoise		4,500	lf	$8.25	$37,125	
Markings		2,100	lf rw	$1.00	$2,100	
Signage & temporary MOT		1	ls	$12,500.00	$12,500	
		Subtotal			$1,462,806	
MOBILIZATION AND CONTINGENCY						**$146,281**
Mobilization		5%			$73,140	
Estimate Contingency		5%			$73,140	
ESTIMATED CONSTRUCTION VALUE						**$1,609,086**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan
6 Construct New Access to Fire School

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$891,250	**$891,250**
CONTINGENCIES				
Change Order Contingency	10%	$89,125		
			$89,125	**$980,375**
CONSTRUCTION SUBTOTAL				**$980,375**
MANAGEMENT COSTS				
Geotech	1.5%	$14,706		
Surveying	1.5%	$14,706		
Construction Management	6%	$58,823		
Design Svcs. During Construction	4.5%	$44,117		
Design Fees	10%	$98,038		
			$230,388	**$1,210,763**
				$1,210,763
PROJECT TOTAL				**$1,210,763**

6 Construct New Access to Fire School

CONCEPTUAL BUDGET
WWS

	Quantity	Unit	Unit Cost	Value	Division Value
2 LANE ACCESS ROADWAY - 3100 LF					$650,000
2-12' LANE PAVED W/ 5' PAVED SHOULDERS, NORMAL GRADE, CLEARING	3,100	LF	$125.00	$387,500	
HEAVY CLEARING NEAR CREEK	2.5	AC	$5,000.00	$12,500	
ADDITIONAL FILL NEAR CREEK, BUY, HAUL & PLACE,	25,000	CY	$10.00	$250,000	
CREEK CULVERTS - 3 PIPE - 64X43 METAL ARCH - 1 CROSSING					$63,000
CREEK CROSSING - USE 3-64X43 METAL ARCH PIPES x 100' EACH	300	LF	$200.00	$60,000	
GUARDRAIL	200	LF	$15.00	$3,000	
	Subtotal			$713,000	
MOBILIZATION AND CONTINGENCY					$178,250
Mobilization	10%			$71,300	
Estimate Contingency	15%			$106,950	
ESTIMATED CONSTRUCTION VALUE					**$891,250**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan

7 Construct Runway 28 Runway Safety Area

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$1,307,266	**$1,307,266**
CONTINGENCIES				
Change Order Contingency	10%	$130,727		
			$130,727	**$1,437,992**
CONSTRUCTION SUBTOTAL				**$1,437,992**
MANAGEMENT COSTS				
Geotech	1.5%	$21,570		
Surveying	1.5%	$21,570		
Construction Management	6%	$86,280		
Design Svcs. During Construction	4.5%	$64,710		
Design Fees	10%	$143,799		
			$337,928	**$1,775,920**
				$1,775,920
PROJECT TOTAL				**$1,775,920**

7 Construct Runway 28 Runway Safety Area

CONCEPTUAL BUDGET
WWS

	Quantity	Unit	Unit Cost	Value	Division Value
1000' RSA FILL TO REQUIRED ELEVATIONS					$1,045,812
CLEAR & GRUB	8.5	AC	$5,000.00	$42,428	
REMOVE TOPSOIL 6"	10,066	CY	$2.50	$25,165	
CUT TO FILL	6,300	CY	$3.50	$22,050	
OFFSITE FILL , BUY, HAUL, PLACE, COMPACT	90,000	CY	$10.00	$900,000	
GRADING	60,397	SY	$0.50	$30,199	
TOPSOIL REPLACE	6,644	CY	$3.00	$19,931	
GRASSING	60,397	SY	$0.10	$6,040	
	Subtotal			$1,045,812	
MOBILIZATION AND CONTINGENCY					$261,453
Mobilization	10%			$104,581	
Estimate Contingency	15%			$156,872	
ESTIMATED CONSTRUCTION VALUE					**$1,307,266**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan

8 Construct New Control Tower

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$3,000,000	**$3,000,000**
CONTINGENCIES				
Change Order Contingency	10%	$300,000		
			$300,000	**$3,300,000**
CONSTRUCTION SUBTOTAL				**$3,300,000**
MANAGEMENT COSTS				
Geotech	1.5%	$49,500		
Surveying	1.5%	$49,500		
Construction Management	6%	$198,000		
Design Svcs. During Construction	4.5%	$148,500		
Design Fees	10%	$330,000		
			$775,500	**$4,075,500**
				$4,075,500
PROJECT TOTAL				**$4,075,500**

8 Construct New Control Tower

CONCEPTUAL BUDGET
WWS

	Quantity	Unit	Unit Cost	Value	Division Value
					$3,000,000
Construct New Control Tower	1	ls	$3,000,000	$3,000,000	
ESTIMATED CONSTRUCTION VALUE					**$3,000,000**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan

9 Demolish Old Control Tower

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$43,716	**$43,716**
CONTINGENCIES				
Change Order Contingency	10%	$4,372		
			$4,372	**$48,088**
CONSTRUCTION SUBTOTAL				**$48,088**
MANAGEMENT COSTS				
Construction Management	6%	$2,885		
Design Svcs. During Construction	4.5%	$2,164		
Design Fees	10%	$4,809		
			$9,858	**$57,946**
				$57,946
PROJECT TOTAL				**$57,946**

9 Demolish Old Control Tower

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
						$34,973
Demolish Old Control Tower	65' steel tower	26,000	cf	0.625	$16,250	
	foundation	2,304	cf	3.125	$7,200	
	adjacent building	13,824	cf	0.4375	$6,048	
	adjacent building slab / fndn	1,152	cf	3.125	$3,600	
	regrade and fill	100	cy	18.75	$1,875	
		Subtotal			$34,973	
CONTRACTOR FEE AND ESTIMATE CONTINGENCY						$8,743
Contractor Fee		10%			$3,497	
Estimate Contingency		15%			$5,246	
ESTIMATED CONSTRUCTION VALUE						**$43,716**

EASTERWOOD AIRPORT
Master Plan Update - Capital Improvement Plan
10 Realign Taxiway Alpha (North of Runway 22)

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$723,501	**$723,501**
CONTINGENCIES				
Change Order Contingency	10%	$72,350		
			$72,350	**$795,851**
CONSTRUCTION SUBTOTAL				**$795,851**
MANAGEMENT COSTS				
Geotech	1.5%	$11,938		
Surveying	1.5%	$11,938		
Construction Management	6%	$47,751		
Design Svcs. During Construction	4.5%	$35,813		
Design Fees	10%	$79,585		
			$187,025	**$982,876**
				$982,876
PROJECT TOTAL				**$982,876**

URS CORPORATION

EASTERWOOD AIRPORT

10 Realign Taxiway Alpha (North of Runway 22)

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
DEMOLITION						**$25,308**
Remove TW Paving		5,000	sy	$5.00	$25,000	
Saw Paving		205	lf	$1.50	$308	
TAXIWAY						**$446,418**
Strip Topsoil		10,167	sy	$1.00	$10,167	
Cut to subgrade to		4,507	cy	$3.00	$13,522	
Fill onsite		4,507	cy	$3.00	$13,522	
Stabilize		10,167	sy	$2.75	$27,958	
Paving		10,167	sy	$37.50	$381,250	
SHOULDERS						**$62,292**
Strip Topsoil		6,389	sy	$1.00	$6,389	
Grading		6,389	sy	$6.00	$38,333	
Stabilize		6,389	sy	$2.75	$17,569	
Topsoil & Grassing			sy	$1.50		
LIGHTING - MARKINGS - SIGNAGE						**$35,200**
Lighting		30	ea	$350.00	$10,500	
Regulator & Vault work		1	ls	$16,000.00	$16,000	
Markings		1,200	lf rw	$1.00	$1,200	
Signage	3 signs at $2,500 ea	1	ls	$7,500.00	$7,500	
		Subtotal			$569,218	
MOBILIZATION AND CONTINGENCY						**$142,304**
Mobilization		10%			$56,922	
Estimate Contingency		15%			$85,383	
ESTIMATED CONSTRUCTION VALUE						**$711,522**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan
11 Realign Taxiway Bravo

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$793,464	**$793,464**
CONTINGENCIES				
Change Order Contingency	10%	$79,346		
			$79,346	**$872,810**
CONSTRUCTION SUBTOTAL				**$872,810**
MANAGEMENT COSTS				
Geotech	1.5%	$13,092		
Surveying	1.5%	$13,092		
Construction Management	6%	$52,369		
Design Svcs. During Construction	4.5%	$39,276		
Design Fees	10%	$87,281		
			$205,110	**$1,077,920**
				$1,077,920
PROJECT TOTAL				**$1,077,920**

11 Realign Taxiway Bravo

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
DEMOLITION						**$45,983**
Remove TW Paving		9,167	sy	$5.00	$45,833	
Saw Paving		100	lf	$1.50	$150	
TAXIWAY						**$436,050**
Strip Topsoil		9,167	sy	$1.00	$9,167	
Cut to subgrade		4,064	cy	$3.00	$12,192	
to						
Fill onsite		4,064	cy	$3.00	$12,192	
Stabilize		10,000	sy	$2.75	$27,500	
Paving		10,000	sy	$37.50	$375,000	
SHOULDERS						**$96,146**
Strip Topsoil		9,861	sy	$1.00	$9,861	
Grading		9,861	sy	$6.00	$59,167	
Stabilize		9,861	sy	$2.75	$27,118	
Topsoil & Grassing			sy	$1.50		
LIGHTING - MARKINGS - SIGNAGE						**$41,800**
Lighting		40	ea	$350.00	$14,000	
Regulator & Vault work		1	ls	$16,000.00	$16,000	
Markings		1,800	lf rw	$1.00	$1,800	
Signage	4 signs at $2,500 ea	1	ls	$10,000.00	$10,000	
		Subtotal			$619,979	
MOBILIZATION AND CONTINGENCY						**$154,995**
Mobilization		10%			$61,998	
Estimate Contingency		15%			$92,997	
ESTIMATED CONSTRUCTION VALUE						**$774,974**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan
12 Realign Taxiway Charlie

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$751,642	**$751,642**
CONTINGENCIES				
Change Order Contingency	10%	$75,164		
			$75,164	**$826,807**
CONSTRUCTION SUBTOTAL				**$826,807**
MANAGEMENT COSTS				
Geotech	1.5%	$12,402		
Surveying	1.5%	$12,402		
Construction Management	6%	$49,608		
Design Svcs. During Construction	4.5%	$37,206		
Design Fees	10%	$82,681		
			$194,300	**$1,021,106**
				$1,021,106
PROJECT TOTAL				**$1,021,106**

12 Realign Taxiway Charlie

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
DEMOLITION						**$47,447**
Remove TW Paving		9,444	sy	$5.00	$47,222	
Saw Paving		150	lf	$1.50	$225	
TAXIWAY						**$410,639**
Strip Topsoil		8,333	sy	$1.00	$8,333	
Cut to subgrade to		3,694	cy	$3.00	$11,083	
Fill onsite		3,694	cy	$3.00	$11,083	
Stabilize		9,444	sy	$2.75	$25,972	
Paving		9,444	sy	$37.50	$354,167	
SHOULDERS						**$87,361**
Strip Topsoil		4,722	sy	$1.00	$4,722	
Grading		9,444	sy	$6.00	$56,667	
Stabilize		9,444	sy	$2.75	$25,972	
Topsoil & Grassing			sy	$1.50		
LIGHTING - MARKINGS - SIGNAGE						**$41,700**
Lighting		40	ea	$350.00	$14,000	
Regulator & Vault work		1	ls	$16,000.00	$16,000	
Markings		1,700	lf rw	$1.00	$1,700	
Signage	4 signs at $2,500 ea	1	ls	$10,000.00	$10,000	
		Subtotal			$587,147	
MOBILIZATION AND CONTINGENCY						**$146,787**
Mobilization		10%			$58,715	
Estimate Contingency		15%			$88,072	
ESTIMATED CONSTRUCTION VALUE						**$733,934**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan

13a GA Ramp Expansion and Realign Taxiway Alpha (phase 1)

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$1,097,313	**$1,097,313**
CONTINGENCIES				
Change Order Contingency	10%	$109,731		
			$109,731	**$1,207,044**
CONSTRUCTION SUBTOTAL				**$1,207,044**
MANAGEMENT COSTS				
Geotech	1.5%	$18,106		
Surveying	1.5%	$18,106		
Construction Management	6%	$72,423		
Design Svcs. During Construction	4.5%	$54,317		
Design Fees	10%	$120,704		
			$283,655	**$1,490,699**
				$1,490,699
PROJECT TOTAL				**$1,490,699**

13a GA Ramp Expansion and Realign Taxiway Alpha (phase 1)

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
DEMOLITION						$4,950
Saw Paving		3,300	lf	$1.50	$4,950	
TAXIWAY / APRON ADDITION						$648,700
Strip Topsoil		13,578	sy	$1.00	$13,578	
Cut to subgrade		6,019	cy	$3.00	$18,058	
to						
Fill onsite		6,019	cy	$3.00	$18,058	
Stabilize		13,578	sy	$2.75	$37,339	
Paving	new work	13,578	sy	$37.50	$509,167	
	overlay existing TW	7,000	sy	$7.50	$52,500	
SHOULDERS						$55,000
Strip Topsoil		4,889	sy	$1.00	$4,889	
Grading		4,889	sy	$6.00	$29,333	
Stabilize		4,889	sy	$2.75	$13,444	
Topsoil & Grassing		4,889	sy	$1.50	$7,333	
LIGHTING - MARKINGS - SIGNAGE						$34,200
Lighting		36	ea	$350.00	$12,600	
Regulator & Vault work		1	ls	$10,000.00	$10,000	
Tiedowns	none					
Markings	c/l	1,600	lf	$1.00	$1,600	
Signage	4 signs at $2,500 ea	4	ea	$2,500.00	$10,000	
DRAINAGE						$135,000
Drainage	Structures	5	ea	$3,000.00	$15,000	
	Piping	800	lf	$150.00	$120,000	
		Subtotal			$877,850	
MOBILIZATION AND CONTINGENCY						$219,463
Mobilization		10%			$87,785	
Estimate Contingency		15%			$131,678	
ESTIMATED CONSTRUCTION VALUE						**$1,097,313**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan
13b GA Ramp Expansion and Realign Taxiway Alpha (phase 2)

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$1,527,626	**$1,527,626**
CONTINGENCIES				
Change Order Contingency	10%	$152,763		
			$152,763	**$1,680,389**
CONSTRUCTION SUBTOTAL				**$1,680,389**
MANAGEMENT COSTS				
Geotech	1.5%	$25,206		
Surveying	1.5%	$25,206		
Construction Management	6%	$100,823		
Design Svcs. During Construction	4.5%	$75,617		
Design Fees	10%	$168,039		
			$394,891	**$2,075,280**
				$2,075,280
PROJECT TOTAL				**$2,075,280**

URS CORPORATION

EASTERWOOD AIRPORT

13b GA Ramp Expansion and Realign Taxiway Alpha (phase 2)

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
DEMOLITION						**$33,361**
Remove old TW's		6,222	sy	$5.00	$31,111	
Saw Paving		1,500	lf	$1.50	$2,250	
TAXIWAY / APRON ADDITION						**$984,684**
Strip Topsoil		17,111	sy	$1.00	$17,111	
Cut to subgrade		7,586	cy	$3.00	$22,758	
to						
Fill onsite		7,586	cy	$3.00	$22,758	
Stabilize		17,111	sy	$2.75	$47,056	
Paving		23,333	sy	$37.50	$875,000	
SHOULDERS						**$32,656**
Strip Topsoil		2,903	sy	$1.00	$2,903	
Grading		2,903	sy	$6.00	$17,417	
Stabilize		2,903	sy	$2.75	$7,983	
Topsoil & Grassing		2,903	sy	$1.50	$4,354	
LIGHTING - MARKINGS - SIGNAGE						**$36,400**
Lighting		44	ea	$350.00	$15,400	
Regulator & Vault work		1	ls	$10,000.00	$10,000	
Tiedowns	none					
Markings	c/l	1,000	lf	$1.00	$1,000	
Signage	4 signs at $2,500 ea	4	ea	$2,500.00	$10,000	
DRAINAGE						**$135,000**
Drainage	Structures	5	ea	$3,000.00	$15,000	
	Piping	800	lf	$150.00	$120,000	
		Subtotal			$1,222,101	
MOBILIZATION AND CONTINGENCY						**$305,525**
Mobilization		10%			$122,210	
Estimate Contingency		15%			$183,315	
ESTIMATED CONSTRUCTION VALUE						**$1,527,626**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan
14 Construct Taxiway Juliet

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$641,622	**$641,622**
CONTINGENCIES				
Change Order Contingency	10%	$64,162		
			$64,162	**$705,784**
CONSTRUCTION SUBTOTAL				**$705,784**
MANAGEMENT COSTS				
Geotech	1.5%	$10,587		
Surveying	1.5%	$10,587		
Construction Management	6%	$42,347		
Design Svcs. During Construction	4.5%	$31,760		
Design Fees	10%	$70,578		
			$165,859	**$871,643**
				$871,643
PROJECT TOTAL				**$871,643**

URS CORPORATION

EASTERWOOD AIRPORT

14 Construct Taxiway Juliet

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
DEMOLITION						**$10,631**
Grub area		10.3	ac	$1,000.00	$10,331	
Saw Paving		200	lf	$1.50	$300	
TAXIWAY						**$365,917**
Strip Topsoil		8,333	sy	$1.00	$8,333	
Cut to subgrade to		3,694	cy	$3.00	$11,083	
Fill onsite		3,694	cy	$3.00	$11,083	
Stabilize		8,333	sy	$2.75	$22,917	
Paving		8,333	sy	$37.50	$312,500	
SHOULDERS						**$81,250**
Strip Topsoil		8,333	sy	$1.00	$8,333	
Grading		8,333	sy	$6.00	$50,000	
Stabilize		8,333	sy	$2.75	$22,917	
Topsoil & Grassing			sy	$1.50		
LIGHTING - MARKINGS - SIGNAGE						**$43,000**
Lighting		30	ea	$350.00	$10,500	
Regulator & Vault work		1	ls	$16,000.00	$16,000	
Markings		1,500	lf rw	$1.00	$1,500	
Signage	6 signs at $2,500 ea	1	ls	$15,000.00	$15,000	
		Subtotal			$500,797	
MOBILIZATION AND CONTINGENCY						**$125,199**
Mobilization		10%			$50,080	
Estimate Contingency		15%			$75,120	
ESTIMATED CONSTRUCTION VALUE						**$625,997**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan
15 Install PAPI's on Runway 16/34

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$90,850	**$90,850**
CONTINGENCIES				
Change Order Contingency	10%	$9,085		
			$9,085	**$99,935**
CONSTRUCTION SUBTOTAL				**$99,935**
MANAGEMENT COSTS				
Geotech	1.5%	$1,499		
Surveying	1.5%	$1,499		
Construction Management	6%	$5,996		
Design Svcs. During Construction	4.5%	$4,497		
Design Fees	10%	$9,994		
			$23,485	**$123,420**
				$123,420
PROJECT TOTAL				**$123,420**

15 Install PAPI's on Runway 16/34

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
PAPI ON RW 16/34						**$90,850**
PAPI	4 lights systems	2	set	$15,000.00	$30,000	
	2" pvc w/ 2#8 5kw & #6 g	7,000	lf	$7.00	$49,000	
Mobilization - assumed as part of a larger project						
Contingency		15%		$79,000	$11,850	
ESTIMATED CONSTRUCTION VALUE						**$90,850**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan
16 Install MALS on Runway 16

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$345,000	**$345,000**
CONTINGENCIES				
Change Order Contingency	10%	$34,500		
			$34,500	**$379,500**
CONSTRUCTION SUBTOTAL				**$379,500**
MANAGEMENT COSTS				
Geotech	1.5%	$5,693		
Surveying	1.5%	$5,693		
Construction Management	6%	$22,770		
Design Svcs. During Construction	4.5%	$17,078		
Design Fees	10%	$37,950		
			$89,183	**$468,683**
				$468,683
PROJECT TOTAL				**$468,683**

URS CORPORATION

EASTERWOOD AIRPORT

16 Install MALS on Runway 16

CONCEPTUAL BUDGET
WWS

	Quantity	Unit	Unit Cost	Value	Division Value
MALS ON RW 16					**$345,000**
Install MALS on F 16 approach	1	set	$300,000.00	$300,000	
Mobilization - assumed as part of a larger project					
Contingency	15%		$300,000	$45,000	
ESTIMATED CONSTRUCTION VALUE					**$345,000**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan
17 Install REILS on Runway 10

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$55,200	**$55,200**
CONTINGENCIES				
Change Order Contingency	10%	$5,520		
			$5,520	**$60,720**
CONSTRUCTION SUBTOTAL				**$60,720**
MANAGEMENT COSTS				
Geotech	1.5%	$911		
Surveying	1.5%	$911		
Construction Management	6%	$3,643		
Design Svcs. During Construction	4.5%	$2,732		
Design Fees	10%	$6,072		
			$14,269	**$74,989**
				$74,989
PROJECT TOTAL				**$74,989**

17 Install REILS on Runway 10

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
REILS ON RW 10						**$55,200**
REILS	fixture pair (2)	1	pair	$8,000.00	$8,000	
	1" pvc control conduit and cable wire	5,000	lf	$3.00	$15,000	
	2" pvc power conduit and wire	5,000	lf	$5.00	$25,000	
Mobilization - assumed as part of a larger project						
Contingency		15%		$48,000	$7,200	
ESTIMATED CONSTRUCTION VALUE						**$55,200**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan
18 Install McKenzie and GA High Mast Lights

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$220,800	**$220,800**
CONTINGENCIES				
Change Order Contingency	10%	$22,080		
			$22,080	**$242,880**
CONSTRUCTION SUBTOTAL				**$242,880**
MANAGEMENT COSTS				
Geotech	1.5%	$3,643		
Surveying	1.5%	$3,643		
Construction Management	6%	$14,573		
Design Svcs. During Construction	4.5%	$10,930		
Design Fees	10%	$24,288		
			$57,077	**$299,957**
				$299,957
PROJECT TOTAL				**$299,957**

18 Install McKenzie and GA High Mast Lights

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
High Mast Apron Lighting						**$220,800**
High mast apron lighting	poles, fixtures	8	pole	$20,000.00	$160,000	
	power conduit and wire	4,000	lf	$8.00	$32,000	
Mobilization - assumed as part of a larger project						
Contingency		15%		$192,000	$28,800	
ESTIMATED CONSTRUCTION VALUE						**$220,800**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan

19 Expand McKenzie Ramp - Phase 1

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$1,449,063	**$1,449,063**
CONTINGENCIES				
Change Order Contingency	10%	$144,906		
			$144,906	**$1,593,970**
CONSTRUCTION SUBTOTAL				**$1,593,970**
MANAGEMENT COSTS				
Geotech	1.5%	$23,910		
Surveying	1.5%	$23,910		
Construction Management	6%	$95,638		
Design Svcs. During Construction	4.5%	$71,729		
Design Fees	10%	$159,397		
			$374,583	**$1,968,553**
				$1,968,553
PROJECT TOTAL				**$1,968,553**

URS CORPORATION

EASTERWOOD AIRPORT

19 Expand McKenzie Ramp - Phase 1

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
DEMOLITION						$27,594
Remove TW Paving						
a		1,667	sy	$5.00	$8,333	
b		667	sy	$5.00	$3,333	
c		89	sy	$5.00	$444	
d		1,167	sy	$5.00	$5,833	
e		489	sy	$5.00	$2,444	
f		1,000	sy	$5.00	$5,000	
Saw Paving		1,470	lf	$1.50	$2,205	
TAXIWAY / RAMP						$839,657
Strip Topsoil		19,122	sy	$1.00	$19,122	
Cut to subgrade		8,478	cy	$3.00	$25,433	
to						
Fill onsite	On-site balance	8,478	cy	$3.00	$25,433	
Stabilize		19,122	sy	$2.75	$52,586	
Paving		19,122	sy	$37.50	$717,083	
SHOULDERS						
	L W T					
Strip Topsoil						
Grading						
Stabilize						
Topsoil & Grassing						
LIGHTING - MARKINGS - SIGNAGE						$43,000
Lighting		30	ea	$350.00	$10,500	
Regulator & Vault work		1	ls	$16,000.00	$16,000	
Markings		1,500	lf rw	$1.00	$1,500	
Signage	6 signs at $2,500 ea	1	ls	$15,000.00	$15,000	
DRAINAGE						$249,000
Drainage	Structures	8	ea	$3,000.00	$24,000	
	Piping	1,500	lf	$150.00	$225,000	
		Subtotal			$1,159,251	
MOBILIZATION AND CONTINGENCY						$289,813
Mobilization		10%			$115,925	
Estimate Contingency		15%			$173,888	
ESTIMATED CONSTRUCTION VALUE						**$1,449,063**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan

20 Expand McKenzie Ramp - Phase 2

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$1,040,676	**$1,040,676**
CONTINGENCIES				
Change Order Contingency	10%	$104,068		
			$104,068	**$1,144,743**
CONSTRUCTION SUBTOTAL				**$1,144,743**
MANAGEMENT COSTS				
Geotech	1.5%	$17,171		
Surveying	1.5%	$17,171		
Construction Management	6%	$68,685		
Design Svcs. During Construction	4.5%	$51,513		
Design Fees	10%	$114,474		
			$269,015	**$1,413,758**
				$1,413,758
PROJECT TOTAL				**$1,413,758**

EASTERWOOD AIRPORT

20 Expand McKenzie Ramp - Phase 2

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
DEMOLITION						**$6,583**
Remove TW Paving g		1,056	sy	$5.00	$5,278	
Saw Paving		870	lf	$1.50	$1,305	
TAXIWAY / RAMP						**$668,408**
Strip Topsoil		15,222	sy	$1.00	$15,222	
Cut to subgrade to		6,749	cy	$3.00	$20,246	
Fill onsite	On-site balance	6,749	cy	$3.00	$20,246	
Stabilize		15,222	sy	$2.75	$41,861	
Paving		15,222	sy	$37.50	$570,833	
SHOULDERS						
L W T						
Strip Topsoil	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
Grading						
Stabilize						
Topsoil & Grassing						
LIGHTING - MARKINGS - SIGNAGE						**$26,300**
Lighting		8	ea	$350.00	$2,800	
Regulator & Vault work		1	ls	$16,000.00	$16,000	
Markings		2,500	lf rw	$1.00	$2,500	
Signage	2 signs at $2,500 ea	1	ls	$5,000.00	$5,000	
DRAINAGE						**$131,250**
Drainage	Lump sum @ 15%	1	ls	$131,250.00	$131,250	
		Subtotal			$832,541	
MOBILIZATION AND CONTINGENCY						**$208,135**
Mobilization		10%			$83,254	
Estimate Contingency		15%			$124,881	
ESTIMATED CONSTRUCTION VALUE						**$1,040,676**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan
21 Construct Rental Car Service Facility

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$242,671	**$242,671**
CONTINGENCIES				
Change Order Contingency	10%	$24,267		
			$24,267	**$266,938**
CONSTRUCTION SUBTOTAL				**$266,938**
MANAGEMENT COSTS				
Geotech	1.5%	$4,004		
Surveying	1.5%	$4,004		
Construction Management	6%	$16,016		
Design Svcs. During Construction	4.5%	$12,012		
Design Fees	10%	$26,694		
			$62,730	**$329,668**
				$329,668
PROJECT TOTAL				**$329,668**

URS CORPORATION

EASTERWOOD AIRPORT

21 Construct Rental Car Service Facility

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
SITE						$43,144
Clear		0.5	ac	$1,000.00	$500	
Excavation & Grade	1' moved and graded	815	cy	$3.00	$2,444	
Fill sand	1' average site fill	815	cy	$10.00	$8,150	
Paving Lot		1,500	sy	$16.00	$24,000	
Storm Retainage		1,000	cy	$3.00	$3,000	
Outfall structure		1	ea	$2,800.00	$2,800	
Grassing		9,000	sf	$0.25	$2,250	
SITE IMPROVEMENTS						$23,432
Fence	property line	500	lf	$14.00	$7,000	
Electrical auto gate	auto slider 12' ea way	2	ea	$1,500.00	$3,000	
Gate control access	key button in / detector out	1	ls	$2,252.00	$2,252	
Fuel Tank dbl	500 gal, pump, power	1	ea	$5,500.00	$5,500	
Dumpster Slab and Fuel Slabs		200	sf	$5.00	$1,000	
Bollards		18	ea	$260.00	$4,680	
SITE UTILITIES						$53,050
Electrical Service		1	ls	$2,500.00	$2,500	
power to building	from street to building	150	lf	$35.00	$5,250	
Parking Lot Lighting	30' with box fixtues	6	ea	$2,200.00	$13,200	
Water Service	from street to building	150	lf	$15.00	$2,250	
Sanitary Service	from street to building	150	lf	$15.00	$2,250	
Storm Structures	4 inlets + 2 structures to retainange pond	6	ea	$2,600.00	$15,600	
Storm Piping	piping	300	lf	$40.00	$12,000	
PEMB						$74,510
Building Slab	pitch to auto drains	1,352	sf	$6.00	$8,112	
Metal Building	No entrance / exit auto doors	1,248	sf	$13.50	$16,848	
Storage, Restroom, Office Room areas		150	sf	$15.00	$2,250	
Electrical	Main Panels / meter / etc	1	ls	$3,500.00	$3,500	
	Lighting	20	ea	$150.00	$3,000	
	Outlets	20	ea	$80.00	$1,600	
	Equipment Power	6	ea	$500.00	$3,000	
	Paddle Fans	8	ea	$150.00	$1,200	
Plumbing	Water to equipment	3	ea	$400.00	$1,200	
	drain car wash water to Sump Pit	50	lf	$30.00	$1,500	
	Floor drain inlets	3	ea	$450.00	$1,350	
Wash Drain Sump Pit	1500 gal / skimmer / oil collector	1	ea	$12,000.00	$12,000	
Equipment	Vacuum unit	1	ea	$2,150.00	$2,150	
	Vacuum piping and hoses(3)	3	ea	$250.00	$750	
	Pressure Wash unit	3	ea	$3,000.00	$9,000	
	Combo washer/extractor 20 lb	1	ea	$4,250.00	$4,250	
	Air Compressor	1	ea	$2,800.00	$2,800	
		Subtotal			$194,136	
CONTRACTOR FEE AND ESTIMATE CONTINGENCY						$48,534
Contractor Fee		10%			$19,414	
Estimate Contingency		15%			$29,120	
ESTIMATED CONSTRUCTION VALUE						**$242,671**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan
22 McKenzie Terminal Roadway Signage

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$54,350	**$54,350**
CONTINGENCIES				
Change Order Contingency	10%	$5,435		
			$5,435	**$59,785**
CONSTRUCTION SUBTOTAL				**$59,785**
MANAGEMENT COSTS				
Geotech				
Surveying				
Construction Management	6%	$3,587		
Design Svcs. During Construction	4.5%	$2,690		
Design Fees	10%	$5,979		
			$12,256	**$72,041**
				$72,041
PROJECT TOTAL				**$72,041**

URS CORPORATION

EASTERWOOD AIRPORT

22 McKenzie Terminal Roadway Signage

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
Information taken from "REQUEST FOR QUOTE ON SIGNS" EASTERWOOD AIRPORT (no date)						
Yellow ID sign location indicators						
Signs currently installed that will remain		27	ea			
Red ID sign locators indicators						**$2,850**
[redacted] DOT Signs (Standard traffic signs with silver DOT poles)	2 > 9 sf sign, single post no lighting	19	ea	$150.00	$2,850	
Green ID sign locations indicators						**$45,000**
[redacted] Directional Signs (design to be selected)	50 > 100 sf sign with Multi-post support	9	ea	$5,000.00	$45,000	
Blue ID signs location indicator						**$6,000**
[redacted] Information Sign	no information	1	ea	$5,000.00	$5,000	
	assume electric lights and power	1	ls	$1,000.00	$1,000	
Purple ID sign location indicators						
[redacted] Overhead Clearance Sign	no information		ea	$500.00		
Mobilization and Contingency included						
ESTIMATED CONSTRUCTION VALUE						**$53,850**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan
23 McKenzie Terminal Roadway Landscaping

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$496,875	**$496,875**
CONTINGENCIES				
Change Order Contingency	10%	$49,688		
			$49,688	**$546,563**
CONSTRUCTION SUBTOTAL				**$546,563**
MANAGEMENT COSTS				
Geotech	1.5%	$8,198		
Surveying	1.5%	$8,198		
Construction Management	6%	$32,794		
Design Svcs. During Construction	4.5%	$24,595		
Design Fees	10%	$54,656		
			$128,442	**$675,005**
				$675,005
PROJECT TOTAL				**$675,005**

23 McKenzie Terminal Roadway Landscaping

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
From the Memorandum Dated August 1, 2002						
Phase I						**$156,000**
Primarily covers the parking area and the front of McKenzie Terminal. Includes removal of dead or anattractive trees, planting of new trees, shrubs, landscaped beds, and turf renovaiton		1	ls	$141,000.00	$141,000	
Concrete Seating Wall value	unit price cost adjustment $58-$14=$44add	500	lf	$44.00	$22,000	
	Less Design/Administration	(1)	ls	$4,000.00	($4,000)	
	Less Blueprinting/Advertising	(1)	ls	$3,000.00	($3,000)	
	see values added on adjacent Project Total Sheet					
Phase II						**$109,900**
Primarily covers the north, east, and west sides of the parking area. Includes planting of trees, shrubs and turf renovation		1	ls	$116,400.00	$116,400	
	Less Design/Administration	(1)	ls	$3,500.00	($3,500)	
	Less Blueprinting/Advertising	(1)	ls	$3,000.00	($3,000)	
	see values added on adjacent Project Total Sheet					
Phase III						**$230,975**
Primarily covers the grassy area north of the parking area to the entrance on Raymond Stotzer Parkway and the east and west sides of the entrance road. Includes soil berms, trees, new planter at entrance sign, irrigation modifications.		1	ls	$240,400.00	$240,400	
	Less Design/Administration	(1)	ls	$6,425.00	($6,425)	
	Less Blueprinting/Advertising	(1)	ls	$3,000.00	($3,000)	
	see values added on adjacent Project Total Sheet					
Mobilization and Contingency included						
ESTIMATED CONSTRUCTION VALUE						**$496,875**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan
24 Demolish Airport Maintenance Building

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$13,756	**$13,756**
CONTINGENCIES				
Change Order Contingency	10%	$1,376		
			$1,376	**$15,132**
CONSTRUCTION SUBTOTAL				**$15,132**
MANAGEMENT COSTS				
Construction Management	6%	$908		
Design Svcs. During Construction	4.5%	$681		
Design Fees	10%	$1,513		
			$3,102	**$18,234**
				$18,234
PROJECT TOTAL				**$18,234**

URS CORPORATION

EASTERWOOD AIRPORT

24 Demolish Airport Maintenance Building

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
Demolition of existing Airport Maintenance Building						**$11,005**
Demo PEMB	metal building system	3,550	sf	$0.35	$1,243	
	concrete slab and fndn	3,550	cf	$2.50	$8,875	
	regrade	3,550	sf	$0.25	$888	
		Subtotal			$11,005	
CONTRACTOR FEE AND ESTIMATE CONTINGENCY						**$2,751**
Contractor Fee		10%			$1,101	
Estimate Contingency		15%			$1,651	
ESTIMATED CONSTRUCTION VALUE						**$13,756**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan
25 Construct New Airport Maintenance Building

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$214,785	**$214,785**
CONTINGENCIES				
Change Order Contingency	10%	$21,479		
			$21,479	**$236,264**
CONSTRUCTION SUBTOTAL				**$236,264**
MANAGEMENT COSTS				
Geotech	1.5%	$3,544		
Surveying	1.5%	$3,544		
Construction Management	6%	$14,176		
Design Svcs. During Construction	4.5%	$10,632		
Design Fees	10%	$23,626		
			$55,522	**$291,785**
				$291,785
PROJECT TOTAL				**$291,785**

URS CORPORATION

EASTERWOOD AIRPORT

25 Construct New Airport Maintenance Building

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
3500 sf PEMB						**$171,828**
Foundations	prep pad, fndns	3,600	sfbldg	$5.78	$20,808	
Substructures	slab on grade	3,600	sfbldg	$3.27	$11,772	
Superstructure	PEMB system	3,600	sfbldg	$12.50	$45,000	
Exterior Closure	Doors & windows	3,600	sfbldg	$1.90	$6,840	
Roof	included with PEMB	3,600	sfbldg			
Interior Construction	Partitioning and finisheds-office, restrooms	3,600	sfbldg	$2.91	$10,476	
Mechanical	Plumbing	3,600	sfbldg	$5.62	$20,232	
	Fire Sprinkler	3,600	sfbldg	$2.31	$8,316	
	HVAC	3,600	sfbldg	$7.18	$25,848	
Electrical	100 amp service, panel board and feeders	3,600	sfbldg	$0.52	$1,872	
	lights, switches, receptacles, misc power	3,600	sfbldg	$4.31	$15,516	
	Alarm systems and emergency lighting	3,600	sfbldg	$0.43	$1,548	
Site Work	misc paving etc	3,600	sfbldg	$1.00	$3,600	
				$47.73		
		Subtotal			$171,828	
CONTRACTOR FEE AND ESTIMATE CONTINGENCY						**$42,957**
Contractor Fee		10%			$17,183	
Estimate Contingency		15%			$25,774	
ESTIMATED CONSTRUCTION VALUE						**$214,785**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan

26 West Terminal Area Access Road - Phase 1

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$49,063	**$49,063**
CONTINGENCIES				
Change Order Contingency	10%	$4,906		
			$4,906	**$53,969**
CONSTRUCTION SUBTOTAL				**$53,969**
MANAGEMENT COSTS				
Geotech	1.5%	$810		
Surveying	1.5%	$810		
Construction Management	6%	$3,238		
Design Svcs. During Construction	4.5%	$2,429		
Design Fees	10%	$5,397		
			$12,683	**$66,651**
				$66,651
PROJECT TOTAL				**$66,651**

26 West Terminal Area Access Road - Phase 1

CONCEPTUAL BUDGET
WWS

	Quantity	Unit	Unit Cost	Value	Division Value
2 LANE ACCESS ROADWAY - 300 LF					**$39,250**
2-12' LANE PAVED W/ 5' PAVED SHOULDERS, NORMAL GRADE, CLEARING	300	LF	$125.00	$37,500	
BASIC CLEARING	0.7	AC	$2,500.00	$1,750	
	Subtotal			$39,250	
MOBILIZATION AND CONTINGENCY					**$9,813**
Mobilization	10%			$3,925	
Estimate Contingency	15%			$5,888	
ESTIMATED CONSTRUCTION VALUE					**$49,063**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan
27 West Terminal Area Access Road - Phase 2

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$228,750	**$228,750**
CONTINGENCIES				
Change Order Contingency	10%	$22,875		
			$22,875	**$251,625**
CONSTRUCTION SUBTOTAL				**$251,625**
MANAGEMENT COSTS				
Geotech	1.5%	$3,774		
Surveying	1.5%	$3,774		
Construction Management	6%	$15,098		
Design Svcs. During Construction	4.5%	$11,323		
Design Fees	10%	$25,163		
			$59,132	**$310,757**
				$310,757
PROJECT TOTAL				**$310,757**

27 West Terminal Area Access Road - Phase 2

CONCEPTUAL BUDGET
WWS

	Quantity	Unit	Unit Cost	Value	Division Value
2 LANE ACCESS ROADWAY - 1400 LF					**$183,000**
2-12' LANE PAVED W/ 5' PAVED SHOULDERS, NORMAL GRADE, CLEARING	1,400	LF	$125.00	$175,000	
BASIC CLEARING	3.2	AC	$2,500.00	$8,000	
	Subtotal			$183,000	
MOBILIZATION AND CONTINGENCY					**$45,750**
Mobilization	10%			$18,300	
Estimate Contingency	15%			$27,450	
ESTIMATED CONSTRUCTION VALUE					**$228,750**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan
28 Control Tower Access Road

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$434,375	**$434,375**
CONTINGENCIES				
Change Order Contingency	10%	$43,438		
			$43,438	**$477,813**
CONSTRUCTION SUBTOTAL				**$477,813**
MANAGEMENT COSTS				
Geotech	1.5%	$7,167		
Surveying	1.5%	$7,167		
Construction Management	6%	$28,669		
Design Svcs. During Construction	4.5%	$21,502		
Design Fees	10%	$47,781		
			$112,286	**$590,098**
				$590,098
PROJECT TOTAL				**$590,098**

URS CORPORATION

EASTERWOOD AIRPORT

28 Control Tower Access Road

CONCEPTUAL BUDGET
WWS

	Quantity	Unit	Unit Cost	Value	Division Value
2 LANE ACCESS ROADWAY					**$337,500**
2-12' LANE PAVED W/ 5' PAVED SHOULDERS, NORMAL GRADE, CLEARING	1,700	LF	$125.00	$212,500	
HEAVY CLEARING NEAR GULLEYS	1.0	AC	$5,000.00	$5,000	
ADDITIONAL FILL GULLEY WASH, BUY, HAUL & PLACE,	12,000	CY	$10.00	$120,000	
CREEK CULVERTS - 3 PIPE - 64X43 METAL ARCH - 1 CROSSING					**$10,000**
GULLEY CROSSING - USE 2-64X43 METAL ARCH PIPES x 100' EACH	20	LF	$200.00	$4,000	
GUARDRAIL	400	LF	$15.00	$6,000	
	Subtotal			$347,500	
MOBILIZATION AND CONTINGENCY					**$86,875**
Mobilization	10%			$34,750	
Estimate Contingency	15%			$52,125	
ESTIMATED CONSTRUCTION VALUE					**$434,375**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan
29a Phase I - Airfield Perimeter Fencing

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$465,729	**$465,729**
CONTINGENCIES				
Change Order Contingency	10%	$46,573		
			$46,573	**$512,302**
CONSTRUCTION SUBTOTAL				**$512,302**
MANAGEMENT COSTS				
Surveying	1.5%	$7,685		
Construction Management	6%	$30,738		
Design Svcs. During Construction	4.5%	$23,054		
Design Fees	10%	$51,230		
			$112,706	**$625,008**
				$625,008
PROJECT TOTAL				**$625,008**

URS CORPORATION

EASTERWOOD AIRPORT

29a Phase I - Airfield Perimeter Fencing

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
FENCE REPLACEMENT						**$372,583**
remove fencing		13,500	lf	$2.00	$27,000	
clearing, grading & seeding	10' wide-each side x length of new fence	7.1	ac	$5,000.00	$35,583	
install new 10' chain link with barb wire		15,500	lf	$20.00	$310,000	
install new 3' wide concrete continuous pad below fence		15,500	lf	$3.50	$54,250	
gate		1	set	$3,000.00	$3,000	
		Subtotal			$372,583	
MOBILIZATION AND CONTINGENCY						**$93,146**
Mobilization		10%			$37,258	
Estimate Contingency		15%			$55,887	
ESTIMATED CONSTRUCTION VALUE						**$465,729**

EASTERWOOD AIRPORT
Master Plan Update - Capital Improvement Plan
29b Phase II - Airfield Perimeter Fencing

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$464,655	**$464,655**
CONTINGENCIES				
Change Order Contingency	10%	$46,465		
			$46,465	**$511,120**
CONSTRUCTION SUBTOTAL				**$511,120**
MANAGEMENT COSTS				
Surveying	1.5%	$7,667		
Construction Management	6%	$30,667		
Design Svcs. During Construction	4.5%	$23,000		
Design Fees	10%	$51,112		
			$112,447	**$623,567**
				$623,567
PROJECT TOTAL				**$623,567**

EASTERWOOD AIRPORT

29b Phase II - Airfield Perimeter Fencing

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
FENCE REPLACEMENT						**$371,724**
remove fencing		15,300	lf	$2.00	$30,600	
clearing, grading & seeding	10' wide-each side x length of new fence	7.0	ac	$5,000.00	$35,124	
install new 10' chain link with barb wire		15,300	lf	$20.00	$306,000	
install new 3' wide concrete continuous pad below fence		15,300	lf	$3.50	$53,550	
gate		1	set	$3,000.00	$3,000	
		Subtotal			$371,724	
MOBILIZATION AND CONTINGENCY						**$92,931**
Mobilization		10%			$37,172	
Estimate Contingency		15%			$55,759	
ESTIMATED CONSTRUCTION VALUE						**$464,655**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan
29c Phase III - Airfield Perimeter Fencing

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$151,848	**$151,848**
CONTINGENCIES				
Change Order Contingency	10%	$15,185		
			$15,185	**$167,033**
CONSTRUCTION SUBTOTAL				**$167,033**
MANAGEMENT COSTS				
Surveying	1.5%	$2,505		
Construction Management	6%	$10,022		
Design Svcs. During Construction	4.5%	$7,516		
Design Fees	10%	$16,703		
			$36,747	**$203,780**
				$203,780
PROJECT TOTAL				**$203,780**

URS CORPORATION

EASTERWOOD AIRPORT

29c Phase III - Airfield Perimeter Fencing

CONCEPTUAL BUDGET
WWS

	Quantity	Unit	Unit Cost	Value	Division Value
FENCE REPLACEMENT					**$121,478**
remove fencing	5,000	lf	$2.00	$10,000	
clearing, grading & seeding — 10' wide-each side x length of new fence	2.3	ac	$5,000.00	$11,478	
install new 10' chain link with barb wire	5,000	lf	$20.00	$100,000	
install new 3' wide concrete continuous pad below fence	5,000	lf	$3.50	$17,500	
gate	1	set	$3,000.00	$3,000	
	Subtotal			$121,478	
MOBILIZATION AND CONTINGENCY					**$30,370**
Mobilization	10%			$12,148	
Estimate Contingency	15%			$18,222	
ESTIMATED CONSTRUCTION VALUE					**$151,848**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan
30 Rotocraft Hangar

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$621,369	**$621,369**
CONTINGENCIES				
Change Order Contingency	10%	$62,137		
			$62,137	**$683,506**
CONSTRUCTION SUBTOTAL				**$683,506**
MANAGEMENT COSTS				
Surveying	1.5%	$10,253		
Construction Management	6%	$41,010		
Design Svcs. During Construction	4.5%	$30,758		
Design Fees	10%	$68,351		
			$150,371	**$833,878**
				$833,878
PROJECT TOTAL				**$833,878**

EASTERWOOD AIRPORT

30 Rotocraft Hangar

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
CLEARING, BLDG PAD FILL						$29,572
Clearing	Heavy	0.60	acre	$5,000.00	$3,000	
	Light	0.40	acre	$1,000.00	$400	
Embankment Fill-building, apron & parking area - fill 1', compact and grade - approx 24,700 sf		1,189	cy	$15.00	$17,839	
Lime Treated Subgrade	or stabilization	2,778	sy	$3.00	$8,333	
HANGAR - 60 x 120 = 7,200 SF (20' Eave Height)						$363,960
Foundations and 6" slab on grade		7,200	sf	$50.55	$363,960	
Steel Structure						
Steel Exterior Siding and Roof siding, with insulation						
Overhead and or Sliding Doors						
Office area within interior						
Plumbing, fixtures, service fixtures, supply and drain to 5' out						
Unit heaters and exhaust fans						
Fire Sprinklers						
Electrical, Service 5' out, distribution, light & branch wiring						
Alarm & Emergency lighting						
7.5KW generator						
Contractor fee						
SITE						$30,647
Storm Drainage	allowance	1	ls	$10,000.00	$10,000	
Parking and paving	allowed 12 spaces and drive	633	sy	$20.00	$12,667	
	saw paving	270	lf	$2.00	$540	
Grassing area		14,600	sf	$0.15	$2,190	
Aircraft Apron			sy	$37.50		
Apron Lighting	allowance	1	ls	$5,000.00	$5,000	
Sign	building ID post sign	1	ea	$250.00	$250	
		Subtotal			$424,179	
MOBILIZATION AND CONTINGENCY						$106,045
Mobilization		10%			$42,418	
Estimate Contingency		15%			$63,627	
ESTIMATED CONSTRUCTION VALUE						**$530,224**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan
31 Baggage Make-up Area Reconfiguraton

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$139,906	**$139,906**
CONTINGENCIES				
Change Order Contingency	10%	$13,991		
			$13,991	**$153,897**
CONSTRUCTION SUBTOTAL				**$153,897**
MANAGEMENT COSTS				
Construction Management	6%	$9,234		
Design Svcs. During Construction	4.5%	$6,925		
Design Fees	10%	$15,390		
			$31,549	**$185,446**
				$185,446
PROJECT TOTAL				**$185,446**

31 Baggage Make-up Area Reconfiguraton

CONCEPTUAL BUDGET
WWS

				Quantity	Unit	Unit Cost	Value	Division Value
SELECTIVE DEMO & REPLACEMENT ITEMS								$22,430
CMU wall at control cabinet		rem	5' + 1.33' x 12'-6" high	79	sf	$5.00	$396	
		new	4' x 12'-6"	50	sf	$7.00	$350	
Motor Control Cabinet			move from old wall to new wall	1	ls	$1,500.00	$1,500	
			cut out floor to relocate piping	10	sf	$10.00	$100	
Bollards in & out	4"	rem	cutoff at floor level, fill and smooth	22	ea	$25.00	$550	
	4"	new	cut concrete slab for new bollards	20	ea	$50.00	$1,000	
	6"	new	cut concrete slab for new bollards	3	ea	$60.00	$180	
	4"	new	steel pipe bollards - painted - conc filled	20	ea	$260.00	$5,200	
	6"	new	steel pipe bollards - painted - conc filled	3	ea	$325.00	$975	
Security Mesh Partitions		rem	5' panels x 9' - not reused	3	ea	$15.00	$45	
		rem	5' panels x 9' - not reused	1	ea	$15.00	$15	
		rem	2-7' panels x 9' - not reused	2	ea	$15.00	$30	
		rem	1-8'panel x 9' - not reused	1	ea	$15.00	$15	
		rem	1-17' panel x 9' - not reused	1	ea	$15.00	$15	
		rem	sliding doors - not reused	8	ea	$15.00	$120	
		new	2-7' panels x 9'	126	sf	$19.00	$2,394	
		new	1-8'panel x 9'	72	sf	$19.00	$1,368	
		new	1-17' panel x 9'	153	sf	$19.00	$2,907	
		new	3-2' x 9'	54	sf	$19.00	$1,026	
		new	1-4' x 9'	36	sf	$19.00	$684	
		new	3-6' x 9'	162	sf	$19.00	$3,078	
		paint	mesh partitions (only ones added or moved)	603	sf	$0.80	$482	
ENLARGING DOOR OPENING AT WEST CORNER								$12,445
Ovehead Door 9080		rem	not reused	1	ea	$150.00	$150	
		rem	electric control conduits / switch	1	ea	$100.00	$100	
Personel Door and Frame		rem	and reuse	1	ea	$150.00	$150	
Brick veneer		rem	running bond and soldier	126	sf	$5.00	$630	
		rem	saw straight for control joint	14	lfv	$4.00	$56	
		rem	tooth brick or saw straight for control joint	8	lfv	$10.00	$80	
CMU		rem	6" concrete block	126	sf	$5.00	$630	
		rem	poured lintel	14	lfv	$15.00	$210	
CMU		new	fill 2 cells for support column	16	lf	$25.00	$400	
		new	lintel beam 24" high x 7"	17	lf	$45.00	$765	
		new	brick support angle	15	lf	$30.00	$450	
		new	6" cmu backup	85	sf	$7.00	$595	
Brick		new	match brick	93	sf	$18.00	$1,674	
Ovehead Door 12080		new	coiling overhead door - auto	1	ea	$3,795.00	$3,795	
		new	wire in	1	ls	$250.00	$250	
		new	ovhd steel fabricated jamb	15	ea	$50.00	$750	
		new	Flexible Transparent Strip Entrances	100	sf	$13.00	$1,300	
Personel Door and Frame		reused	3080 frame & door	1	ea	$300.00	$300	
Painting		new		200	sf	$0.80	$160	

URS CORPORATION

EASTERWOOD AIRPORT

31 Baggage Make-up Area Reconfiguraton

CONCEPTUAL BUDGET
WWS

			Quantity	Unit	Unit Cost	Value	Division Value
EXTEND SOUTH WALL OUT TO COLUMN FACE FLUSH							**$76,550**
Ovehead Door 9080	rem	to be reused	4	ea	$300.00	$1,200	
	rem	electric control conduits / switch	4	ea	$100.00	$400	
Personel Door and Frame	rem	and reuse	4	ea	$150.00	$600	
	rem	brick and block	40	sf	$15.00	$600	
Brick veneer	rem	running bond and soldier	704	sf	$5.00	$3,520	
	rem	tooth brick or saw straight for control joint	20	lfv	$10.00	$200	
CMU	rem	6" concrete block	504	sf	$7.00	$3,528	
	rem	poured lintel	60	lfv	$15.00	$900	
FNDN	new	cut slab,new fndn, new slab	8	loc	$1,200.00	$9,600	
CMU	new	lintel below windows on beam face	80	lf	$30.00	$2,400	
CMU	new	fill 2 cells for support column	128	lf	$25.00		
	new	lintel beam 24" high x 7"	60	lf	$45.00	$2,700	
	new	brick support angle	48	lf	$30.00	$1,440	
	new	6" cmu backup	500	sf	$7.00	$3,500	
Brick	new	match brick	923	sf	$18.00	$16,614	
Roof System	new	Standing seam and Lt Mtl framing	720	sf	$22.50	$16,200	
	new	Gutters & downspouts	88	lf	$8.00	$704	
Ovehead Door 9080	reused	coiling overhead door - auto	4	ea	$1,600.00	$6,400	
	new	wire in	4	ls	$250.00	$1,000	
	reused	ovhd steel fabricated jamb	4	ea	$150.00	$600	
	new	Flexible Transparent Strip Entrances	288	sf	$13.00	$3,744	
Personel Door and Frame	reused	3080 frame & door	1	ea	$300.00	$300	
Painting	new		500	sf	$0.80	$400	
Light Fixture	new		10	ea	$250.00	$2,500	
			Subtotal			$113,925	
CONTRACTOR FEE AND ESTIMATE CONTINGENCY							**$28,481**
Contractor Fee			10%			$11,393	
Estimate Contingency			15%			$17,089	
ESTIMATED CONSTRUCTION VALUE							**$139,906**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan

32 Long-Term Baggage Claim and Vertical Circulation Improvements

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$529,009	**$529,009**
CONTINGENCIES				
Change Order Contingency	10%	$52,901		
			$52,901	**$581,910**
CONSTRUCTION SUBTOTAL				**$581,910**
MANAGEMENT COSTS				
Construction Management	6%	$34,915		
Design Svcs. During Construction	4.5%	$26,186		
Design Fees	10%	$58,191		
			$119,291	**$701,201**
				$701,201
PROJECT TOTAL				**$701,201**

URS CORPORATION

EASTERWOOD AIRPORT

32 Long-Term Baggage Claim and Vertical Circulation Improvements

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
EXTERIOR MASONRY WALL						**$65,667**
Brick veneer	remove below windows	360	sf	$5.00	$1,800	
Foundation	cut slab, new fndn, new slab	6	bays	$1,500.00	$9,000	
Exterior infill walls	brick veneer	1,628	sf	$18.00	$29,304	
	cmu system	1,428	sf	$14.68	$20,963	
	brick support angle	100	lf	$30.00	$3,000	
Personel Door and Frame	3080 frame & door	2	ea	$800.00	$1,600	
ROOF SYSTEM						**$29,940**
Roofing metal support framing	Standing seam and Lt Mtl Framing	1,200	sf	$22.50	$27,000	
	Center support beam	36	lf	$55.00	$1,980	
	Gutters and downspouts	120	lf	$8.00	$960	
BAGGAGE CAROUSEL						**$197,100**
Existing Carousel	remove carousel and (4) grill door units	120	lf	$50.00	$6,000	
Partition repair	rework and finish partition	360	sf	$10.00	$3,600	
New Carousel		150	lf	$1,200.00	$180,000	
Storefront System	Modify for carousel	2	loc	$2,500.00	$5,000	
Electrical power feed		1	ls	$2,500.00	$2,500	
ESCALATOR						**$108,000**
Open floor pit	existing pit per as-built plans	1	ls	$1,000.00	$1,000	
Modify 2nd level connections	support, railings and trim out	1	ls	$5,000.00	$5,000	
Escalator System	32"x15' fl to fl stainless steel	1	fl to fl	$102,000.00	$102,000	
FINISH ALLOWANCE ASSUMED						**$22,500**
Carpeting	Partial area of lobby	500	sy	$45.00	$22,500	
		Subtotal			$423,207	
CONTRACTOR FEE AND ESTIMATE CONTINGENCY						**$105,802**
Contractor Fee		10%			$42,321	
Estimate Contingency		15%			$63,481	
ESTIMATED CONSTRUCTION VALUE						**$529,009**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan
33 Remote Apron Near Taxiway Bravo

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$2,210,100	**$2,210,100**
CONTINGENCIES				
Change Order Contingency	10%	$221,010		
			$221,010	**$2,431,110**
CONSTRUCTION SUBTOTAL				**$2,431,110**
MANAGEMENT COSTS				
Geotech	1.5%	$36,467		
Surveying	1.5%	$36,467		
Construction Management	6%	$145,867		
Design Svcs. During Construction	4.5%	$109,400		
Design Fees	10%	$243,111		
			$571,311	**$3,002,421**
				$3,002,421
PROJECT TOTAL				**$3,002,421**

URS CORPORATION

EASTERWOOD AIRPORT

33 Remote Apron Near Taxiway Bravo

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
DEMOLITION						**$8,700**
Clearing		8.7	ac	$1,000.00	$8,700	
RAMP						**$1,449,030**
Strip Topsoil		33,000	sy	$1.00	$33,000	
Cut to subgrade		14,630	cy	$3.00	$43,890	
to						
Fill onsite	Onsite balance	14,630	cy	$3.00	$43,890	
Stabilize		33,000	sy	$2.75	$90,750	
Paving		33,000	sy	$37.50	$1,237,500	
SHOULDERS						
L W T						
Strip Topsoil	[redacted]					
Grading						
Stabilize						
Topsoil & Grassing						
LIGHTING - MARKINGS - SIGNAGE						**$31,350**
Lighting		21	ea	$350.00	$7,350	
Regulator & Vault work		1	ls	$16,000.00	$16,000	
Markings	parking allowed striping	3,000	lf	$1.00	$3,000	
Signage	2 signs at $2,500 ea	1	ls	$5,000.00	$5,000	
DRAINAGE						**$279,000**
Drainage	Lump sum @ 15%	1	ls	$279,000.00	$279,000	
		Subtotal			$1,768,080	
MOBILIZATION AND CONTINGENCY						**$442,020**
Mobilization		10%			$176,808	
Estimate Contingency		15%			$265,212	
ESTIMATED CONSTRUCTION VALUE						**$2,210,100**

EASTERWOOD AIRPORT
Master Plan Update - Capital Improvement Plan
34 Loading Bridges

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$935,729	**$935,729**
CONTINGENCIES				
Change Order Contingency	10%	$93,573		
			$93,573	**$1,029,302**
CONSTRUCTION SUBTOTAL				**$1,029,302**
MANAGEMENT COSTS				
Geotech	1.5%	$15,440		
Construction Management	6%	$61,758		
Design Svcs. During Construction	4.5%	$46,319		
Design Fees	10%	$102,930		
			$226,446	**$1,255,749**
				$1,255,749
PROJECT TOTAL				**$1,255,749**

URS CORPORATION

EASTERWOOD AIRPORT

34 Loading Bridges

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
DEMOLITION						**$13,333**
Apron		1,000	sf	$10.00	$10,000	
Excavation		222.2	cy	$15.00	$3,333	
FOUNDATION (2 sets)						**$54,500**
Piling Crew Mobilization		1	ls	$10,000.00	$10,000	
36" Caisson	1 per bridge - 80' deep	160	lf	$200.00	$32,000	
8' Bell		2	ea	$2,000.00	$4,000	
Cap	2 @ 10 cy ea	20	cy	$350.00	$7,000	
	anchor bolt sets	2	set	$750.00	$1,500	
LOADING BRIDGE UNITS (2 sets)						**$628,000**
Purchase Jet way bridge	45' plus boading unit	2	ea	$260,000.00	$520,000	
	Deliver including 400hz units	2	ea	$8,000.00	$16,000	
	Install	2	ea	$20,000.00	$40,000	
Purchase 400hz Unit		2	ea	$25,000.00	$50,000	
	Install	2	ea	$1,000.00	$2,000	
GATE LOBBY						**$52,750**
Provide Opening and Door at Gate Lobby		2	ea	$5,000.00	$10,000	
Provide Electrical Service to Gate Exterior	conduit and wire	400	lf	$25.00	$10,000	
	CB and panel	2	ea	$2,500.00	$5,000	
Security Glass/Alum partition	and modify railings	75	lf	$350.00	$26,250	
Floor Finish Repairs		1	ls	$1,500.00	$1,500	
		Subtotal			$748,583	
MOBILIZATION AND CONTINGENCY						**$187,146**
Mobilization		10%			$74,858	
Estimate Contingency		15%			$112,288	
ESTIMATED CONSTRUCTION VALUE						**$935,729**

EASTERWOOD AIRPORT
Master Plan Update - Capital Improvement Plan
35 Reconstruction of GA Parking Lot

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$477,806	**$477,806**
CONTINGENCIES				
Change Order Contingency	10%	$47,781		
			$47,781	**$525,587**
CONSTRUCTION SUBTOTAL				**$525,587**
MANAGEMENT COSTS				
Surveying	1.5%	$7,884		
Construction Management	6%	$31,535		
Design Svcs. During Construction	4.5%	$23,651		
Design Fees	10%	$52,559		
			$115,629	**$641,216**
				$641,216
PROJECT TOTAL				**$641,216**

URS CORPORATION

EASTERWOOD AIRPORT

35 Reconstruction of GA Parking Lot

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
DEMOLITION						$36,000
Clearing, asphalt etc		7,556	sy	$3.00	$22,667	
Convert Paved areas to Green areas		2,667	sy	$5.00	$13,333	
ROADWAYS AND PARKING AREAS						$163,300
Strip Topsoil		1,111	sy	$1.00	$1,111	
Cut to subgrade	25% of area	2,000	sy	$3.00	$6,000	
Fill onsite	25% of area	2,000	sy	$3.00	$6,000	
Stabilize	25% of area	2,000	sy	$2.75	$5,500	
Paving	asphalt topping and base adjustments	7,556	sy	$16.00	$120,889	
Curbing	Perimeter	2,800	lf	$7.00	$19,600	
	Islands	600	lf	$7.00	$4,200	
DRAINAGE						$180,000
Storm Piping		1,500	lf	$100.00	$150,000	
Structures		10	ea	$3,000.00	$30,000	
LIGHTING - MARKINGS - SIGNAGE						$2,945
Lighting	none					
Markings	Roadways	1,200	lf	$0.80	$960	
	Car spaces	95	ea	$8.00	$760	
Signs	Stop sign	5	ea	$125.00	$625	
	Area sign	1	ea	$600.00	$600	
		Subtotal			$382,245	
MOBILIZATION AND CONTINGENCY						$95,561
Mobilization		10%			$38,225	
Estimate Contingency		15%			$57,337	
ESTIMATED CONSTRUCTION VALUE						**$477,806**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan
36 Hangar on North Ramp

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$594,276	**$594,276**
CONTINGENCIES				
Change Order Contingency	10%	$59,428		
			$59,428	**$653,704**
CONSTRUCTION SUBTOTAL				**$653,704**
MANAGEMENT COSTS				
Surveying	1.5%	$9,806		
Construction Management	6%	$39,222		
Design Svcs. During Construction	4.5%	$29,417		
Design Fees	10%	$65,370		
			$143,815	**$797,519**
				$797,519
PROJECT TOTAL				**$797,519**

36 Hangar on North Ramp

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
CLEARING, BLDG PAD FILL						**$10,139**
Clearing		0.5	acre	$2,500.00	$1,250	
Building pad area - fill 1' , compact and grade - approx 10,000 sf		370	cy	$15.00	$5,556	
Lime Treated Subgrade		1,111	sy	$3.00	$3,333	
HANGAR - 60 x 145 = 8,700 SF (22' Eave Height)						**$435,522**
Foundations and 6" slab on grade		8,700	sf	$50.06	$435,522	
Steel Structure						
Steel Exterior Siding and Roof siding, with insulation						
Overhead and or Sliding Doors						
Office area within interior						
Plumbing, fixtures, service fixtures, supply and drain to 5' out						
Unit heaters and exhaust fans						
Fire Sprinklers						
Electrical, Service 5' out, distribution, light & branch wiring						
Alarm & Emergency lighting						
7.5KW generator						
Contractor fee						
SITE						**$29,760**
Storm Drainage	none					
Parking and paving	allowed 10 spaces and drive	1,000	sy	$20.00	$20,000	
Grassing area		5,400	sf	$0.15	$810	
Infill concrete slab - toward apron	10' x 145' aircraft door width	1,450	sf	$6.00	$8,700	
Aircraft Apron	none					
Apron Lighting	none					
Sign	building ID post sign	1	ea	$250.00	$250	
		Subtotal			$475,421	
MOBILIZATION AND CONTINGENCY						**$118,855**
Mobilization		10%			$47,542	
Estimate Contingency		15%			$71,313	
ESTIMATED CONSTRUCTION VALUE						**$594,276**

EASTERWOOD AIRPORT
Master Plan Update - Capital Improvement Plan
37 Hangar on South Ramp

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$336,560	**$336,560**
CONTINGENCIES				
Change Order Contingency	10%	$33,656		
			$33,656	**$370,216**
CONSTRUCTION SUBTOTAL				**$370,216**
MANAGEMENT COSTS				
Surveying	1.5%	$5,553		
Construction Management	6%	$22,213		
Design Svcs. During Construction	4.5%	$16,660		
Design Fees	10%	$37,022		
			$81,448	**$451,664**
				$451,664
PROJECT TOTAL				**$451,664**

37 Hangar on South Ramp

CONCEPTUAL BUDGET
WWS

Item	Description	Quantity	Unit	Unit Cost	Value	Division Value
CLEARING, BLDG PAD FILL						**$5,958**
Clearing		0.25	acre	$2,500.00	$625	
Building pad area - fill 1' , compact and grade - approx 6,000 sf		222	cy	$15.00	$3,333	
Lime Treated Subgrade		667	sy	$3.00	$2,000	
HANGAR - 60 x 80 = 4,800 SF (20' Eave Height)						**$242,640**
Foundations and 6" slab on grade		4,800	sf	$50.55	$242,640	
Steel Structure						
Steel Exterior Siding and Roof siding, with insulation						
Overhead and or Sliding Doors						
Office area within interior						
Plumbing, fixtures, service fixtures, supply and drain to 5' out						
Unit heaters and exhaust fans						
Fire Sprinklers						
Electrical, Service 5' out, distribution, light & branch wiring						
Alarm & Emergency lighting						
7.5KW generator						
Contractor fee						
SITE						**$20,650**
Storm Drainage	none					
Parking and paving	allowed 6 spaces and drive	750	sy	$20.00	$15,000	
Grassing area		4,000	sf	$0.15	$600	
Infill concrete slab - toward apron	10' x 80' aircraft door width	800	sf	$6.00	$4,800	
Aircraft Apron	none					
Apron Lighting	none					
Sign	building ID post sign	1	ea	$250.00	$250	
		Subtotal			$269,248	
MOBILIZATION AND CONTINGENCY						**$67,312**
Mobilization		10%			$26,925	
Estimate Contingency		15%			$40,387	
ESTIMATED CONSTRUCTION VALUE						**$336,560**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan
38 Hangar on West Ramp

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$1,368,132	**$1,368,132**
CONTINGENCIES				
Change Order Contingency	10%	$136,813		
			$136,813	**$1,504,945**
CONSTRUCTION SUBTOTAL				**$1,504,945**
MANAGEMENT COSTS				
Surveying	1.5%	$22,574		
Construction Management	6%	$90,297		
Design Svcs. During Construction	4.5%	$67,723		
Design Fees	10%	$150,495		
			$331,088	**$1,836,033**
				$1,836,033
PROJECT TOTAL				**$1,836,033**

38 Hangar on West Ramp

CONCEPTUAL BUDGET
WWS

Item		Quantity	Unit	Unit Cost	Value	Division Value
CLEARING, BLDG PAD FILL						$22,056
Clearing		1.00	acre	$2,500.00	$2,500	
Building pad area - fill 1' , compact and grade - approx 22,000 sf		815	cy	$15.00	$12,222	
Lime Treated Subgrade		2,444	sy	$3.00	$7,333	
HANGAR - 100 x 200 = 22,000 SF (24' Eave Height)						$1,009,000
Foundations and 6" slab on grade		20,000	sf	$50.45	$1,009,000	
Steel Structure						
Steel Exterior Siding and Roof siding, with insulation						
Overhead and or Sliding Doors						
Office area within interior						
Plumbing, fixtures, service fixtures, supply and drain to 5' out						
Unit heaters and exhaust fans						
Fire Sprinklers						
Electrical, Service 5' out, distribution, light & branch wiring						
Alarm & Emergency lighting						
7.5KW generator						
Contractor fee						
SITE						$63,450
Storm Drainage	none					
Parking and paving	allowed 20 spaces and drive	2,500	sy	$20.00	$50,000	
Grassing area		8,000	sf	$0.15	$1,200	
Infill concrete slab - toward apron	10' x 200' aircraft door width	2,000	sf	$6.00	$12,000	
Aircraft Apron	none					
Apron Lighting	none					
Sign	building ID post sign	1	ea	$250.00	$250	
		Subtotal			$1,094,506	
MOBILIZATION AND CONTINGENCY						$273,626
Mobilization		10%			$109,451	
Estimate Contingency		15%			$164,176	
ESTIMATED CONSTRUCTION VALUE						**$1,368,132**

EASTERWOOD AIRPORT
Master Plan Update - Capital Improvement Plan
39a Drainage Area (RWY 16 RSA)

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$252,625	**$252,625**
CONTINGENCIES				
Change Order Contingency	10%	$25,263		
			$25,263	**$277,888**
CONSTRUCTION SUBTOTAL				**$277,888**
MANAGEMENT COSTS				
Geotech	1.5%	$4,168		
Surveying	1.5%	$4,168		
Construction Management	6%	$16,673		
Design Svcs. During Construction	4.5%	$12,505		
Design Fees	10%	$27,789		
			$65,304	**$343,191**
				$343,191
PROJECT TOTAL				**$343,191**

39a Drainage Area (RWY 16 RSA)

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
EARTHWORK						$106,600
EMBANKMENT	600X60X5	8,500	CY	$10.00	$85,000	
EXCAVATION (SAFETY AREAS)		1,200	CY	$5.50	$6,600	
SEEDING	3 APPLICATIONS X $0.50 /SY/APPLICATION EACH	10,000	SY	$1.50	$15,000	
STORM						$95,500
RCP	36" RCP III	1,000	LF	$78.00	$78,000	
STRUCTURES		5	EA	$3,500.00	$17,500	
		Subtotal			$202,100	
MOBILIZATION AND CONTINGENCY						$50,525
Mobilization		10%			$20,210	
Estimate Contingency		15%			$30,315	
ESTIMATED CONSTRUCTION VALUE						**$252,625**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan
39b Drainage Area (near RTF)

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$109,769	**$109,769**
CONTINGENCIES				
Change Order Contingency	10%	$10,977		
			$10,977	**$120,746**
CONSTRUCTION SUBTOTAL				**$120,746**
MANAGEMENT COSTS				
Geotech	1.5%	$1,811		
Surveying	1.5%	$1,811		
Construction Management	6%	$7,245		
Design Svcs. During Construction	4.5%	$5,434		
Design Fees	10%	$12,075		
			$28,375	**$149,121**
				$149,121
PROJECT TOTAL				**$149,121**

URS CORPORATION

EASTERWOOD AIRPORT

39b Drainage Area (near RTF)

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
EARTHWORK						
CLEARING	SEE 28 CTAR					
FILL						
STORM						$87,815
RCP	48" RCP III	110	LF	$109.00	$11,990	
	42" RCP III	200	LF	$95.00	$19,000	
	36" RCP III	300	LF	$78.00	$23,400	
	30" RCP III	165	LF	$65.00	$10,725	
STRUCTURES		5	EA	$3,500.00	$17,500	
TRENCH SAFETY		1	LS	$4,000.00	$4,000	
RIP-RAP		20	CY	$60.00	$1,200	
FENCE						
		Subtotal			$87,815	
MOBILIZATION AND CONTINGENCY						$21,954
Mobilization		10%			$8,782	
Estimate Contingency		15%			$13,172	
ESTIMATED CONSTRUCTION VALUE						**$109,769**

EASTERWOOD AIRPORT
Master Plan Update - Capital Improvement Plan
39c Drainage Area (Lake)

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$165,180	**$165,180**
CONTINGENCIES				
Change Order Contingency	10%	$16,518		
			$16,518	**$181,698**
CONSTRUCTION SUBTOTAL				**$181,698**
MANAGEMENT COSTS				
Geotech	1.5%	$2,725		
Surveying	1.5%	$2,725		
Construction Management	6%	$10,902		
Design Svcs. During Construction	4.5%	$8,176		
Design Fees	10%	$18,170		
			$42,699	**$224,397**
				$224,397
PROJECT TOTAL				**$224,397**

39c Drainage Area (Lake)

CONCEPTUAL BUDGET
WWS

			Quantity	Unit	Unit Cost	Value	Division Value
EXTEND DRAINAGE NEAR CANOE POND							**$112,144**
CLEARING	150X200		0.7	AC	$1,500.00	$1,033	
FILL	150X200X10		11,111	CY	$10.00	$111,111	
STORM							**$20,000**
RCP	24"	PIPE WITHIN FILL	200	LF	$50.00	$10,000	
STRUCTURES			2	EA	$3,500.00	$7,000	
CONNECT TO EXISTING			2	EA	$1,500.00	$3,000	
			Subtotal			$132,144	
MOBILIZATION AND CONTINGENCY							**$33,036**
Mobilization			10%			$13,214	
Estimate Contingency			15%			$19,822	
ESTIMATED CONSTRUCTION VALUE							**$165,180**

EASTERWOOD AIRPORT

Master Plan Update - Capital Improvement Plan

40c Overlay RW 16 / 34

Description	Factors	Cost	Item Totals	Cumulative Totals
CONSTRUCTION COSTS				
			$2,029,102	**$2,029,102**
CONTINGENCIES				
Change Order Contingency	10%	$202,910		
			$202,910	**$2,232,012**
CONSTRUCTION SUBTOTAL				**$2,232,012**
MANAGEMENT COSTS				
Geotech	1.5%	$33,480		
Surveying	1.5%	$33,480		
Construction Management	6%	$133,921		
Design Svcs. During Construction	4.5%	$100,441		
Design Fees	10%	$223,201		
			$524,523	**$2,756,535**
				$2,756,535
PROJECT TOTAL				**$2,756,535**

40c Overlay RW 16 / 34

CONCEPTUAL BUDGET
WWS

		Quantity	Unit	Unit Cost	Value	Division Value
PREPARATION FOR OVERLAY						**$27,147**
SAW CUT AND CHANNEL AT EXISTING CROSS PAVING	(FOR FLUSH MATCH JOINT)	1,200	LF	$3.00	$3,600	
CLEAN & PREP		117,733	SY	$0.20	$23,547	
OVERLAY						**$1,563,531**
TACK COAT	0.08 GAL/SY = 12.5 SY / GAL	9,419	GAL	$1.18	$11,114	
ASPHALT PAVING 4" AVG	5 SY @ 4" = 1 TON OF MATERIAL INCLUDES TAPERED AT CROSSOVERS	25,000	TON	$52.50	$1,312,500	
GROOVING SURFACE		116,667	SY	$1.00	$116,667	
MARKINGS	1 CL, 2 EL @ 12" WIDTH + END MARKINGS	15,500	SF	$1.50	$23,250	
LIGHTING AND SIGNAGE ADJUSTMENTS		1	LS	$100,000.00	$100,000	
GRASS EDGE ADJUST						**$32,604**
4" X 8' EDGE FILL TAPER	CUT GRADE, FILL, PLACE & GRADE	640	CY	$10.00	$6,404	
GRASSING	SOD	11,644	SY	$2.25	$26,200	
		Subtotal			$1,623,282	
MOBILIZATION AND CONTINGENCY						**$405,820**
Mobilization		10%			$162,328	
Estimate Contingency		15%			$243,492	
ESTIMATED CONSTRUCTION VALUE						**$2,029,102**