McAllen International Airport

AIRPORT MASTER PLAN
DRAFT FINAL

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AIRPORT MASTER PLAN

McALLEN INTERNATIONAL AIRPORT
McAllen, Texas

Prepared for:

The City of McAllen

Prepared by:

Coffman Associates
Airport Consultants

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McAllen
International Airport

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McAllen International Airport

Introduction and Summary

Introduction and Summary

A Master Plan provides an evaluation of an airport's aviation demand and an overview of the systematic development that will best meet those demands. The Master Plan establishes development objectives and provides for a 20-year planning period that details the rationale for various study elements, including airfield configuration, facility development, on-airport land use recommendations, and support facilities. It also serves as a strategic tool for establishing airport improvement priorities and justifying the need for federal and state funding assistance.

The Federal Aviation Administration (FAA) recommends that airports update their long-term planning documents every seven to 10 years, or as necessary to address local changes at the airport. The last master plan update for McAllen International Airport (MFE or Airport) was completed in 2005. The City of McAllen (City), the sponsor of the Airport, received a grant from the FAA to update the Airport Master Plan. The FAA grant covers 90 percent of the fixed fee project cost, with the City of McAllen providing a ten percent match.

Coffman Associates is an airport consulting firm that specializes in master planning and environmental studies. Coffman Associates will lead the team, with support from the following firms:

- RS&H | Engineering support primarily to offer estimates of probable costs and recycling audit and waste plan;
- DKMG | Financial services including benefit/cost evaluations and a financial feasibility of future capital/maintenance programs; and,
- MTZ Geospatial | Aerial photography, ground survey, and GIS products to meet FAA 5300-18B requirements for Airports GIS data submittal.

The Airport Master Plan Update has been prepared in accordance with FAA requirements, including Advisory Circular (AC) 150/5300-13A, *Airport Design* (as amended), and AC 150/5070-6C, *Airport Master Plans* (as amended). The Master Plan is intended to be a proactive document which identifies and then plans for future facility needs well in advance of the actual need. This is done to ensure that the City can coordinate project approvals, design, financing, and construction in a timely manner, prior to experiencing the detrimental effects of deteriorating or inadequate facilities.

An important outcome of the Master Plan process is a recommended development plan which reserves sufficient areas for future facility needs. Such planning will protect development areas and ensure they will be readily available when required to meet future needs. The intended outcome of this study is a detailed on-airport land use concept which outlines specific uses for all areas of airport property, including strategies for revenue enhancement.

The preparation of this Master Plan is evidence that the City recognizes the importance of the Airport to the surrounding region and the associated challenges inherent in providing for its unique operating and improvement needs. The cost of maintaining an airport is an investment which yields impressive benefits to the local community. With a sound and realistic Master Plan, the Airport can maintain its role as an important link to the regional, state, and national air transportation systems. Moreover, the plan aids in supporting decisions for directing limited and valuable City resources for future airport development. Ultimately, the continued investments in the Airport will allow the City to reap the economic benefits generated by historical investments.

MASTER PLAN GOALS AND OBJECTIVES

The primary objective of the McAllen International Airport Master Plan is to develop and maintain a financially feasible, long-term development program, which satisfies aviation demand of the region; be compatible with community development, other transportation modes, and the environment; and enhance employment and revenue for the local area. Accomplishing this objective requires an evaluation of the existing airport to decide what actions should be taken to maintain a safe, adequate, and reliable facility.

This Master Plan is intended to provide guidance through an updated capital improvement and financial program to demonstrate the future investments required by the City. The new planning study also provides justification for new priorities. The plan will be closely coordinated with other planning studies in the area and with aviation plans developed by the FAA and TxDOT. This study also utilizes past planning efforts, including the *Terminal Capacity Study*, 2009; and most recent update to the Airport Layout Plan in 2015. The plan has also been coordinated with the City of McAllen, as well as other local and regional agency plans as appropriate.

Specific objectives of the study include, but are not limited to, the following:

- To research factors likely to affect all air transportation demand segments in the City of McAllen, as well as the Rio Grande Valley region over the next 20 years. The analysis will include the development of forecasts of airline passengers, air cargo shipments, general aviation activity, and military demand elements;

- To determine projected needs of Airport users for the next 20 years factoring: recent revisions to FAA airfield geometrical design standards, global positioning system (GPS Next Generation [NextGen]) approaches or other new technology, the impact of commercial and general action fleet transitions on design standards, and on-going efforts to improve commercial service to the community. This analysis will also include consideration of military needs and usage;

- To recommend improvements which will satisfy future airline, air cargo, and general aviation needs, understanding the Airport space is constrained. Commercial airline passenger enhancements will also be considered with recommendations to provide terminal building spaces, auto parking, and rental car facility improvements;

- To analyze the existing airfield system to determine the existing and ultimate runway length required to satisfy the Airport's critical aircraft now and into the future;

- To re-evaluate current plans for closing Runway 18-36 and development of a future parallel runway;

- To produce accurate base maps of existing and proposed facilities and updated ALP drawings consistent with the FAA's Standard Operating Procedure (SOP) No. 2.0. While this project will not conclude an "Electronic ALP" or "eALP," the digital Geographic Information System (GIS) data will be submitted into FAA's Airport GIS, or AGIS, system as an "airspace evaluation." This task will conform to the Survey Requirements Matrix contained in FAA AC 150/5300-18B (understanding that 18c is now available but not in use at this time). The data will be submitted to the FAA AGIS system per the ALP column of Table 2-1;

- To review future use and zoning of Airport property, instrument approach areas, and nearby development to ensure flight safety and land use compatibility. This will involve the development of new noise exposure contours, application of current land use compatibility guidelines, review of local land use controls and plans, and analysis of land use management techniques;

- To establish a schedule of development priorities and a program for improvements proposed in the master plan, consistent with the FAA's capital improvement planning; and,

- Consider sustainability efforts, specifically waste and recycling improvements as part of FAA's updated standards.

MASTER PLAN ISSUES

The MFE Master Plan specifically addresses the following issues:

- Assist the City, through the Airport Advisory Board, and a series of Public Information Workshops, in determining a vision for the Airport;

- Conduct a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis identifying strengths, weaknesses, realistic markets, goals, resources, and strategy to move forward. This analysis will factor the strengths and weaknesses of MFE to include physical and operational features. The analysis will also present the same for competing airports in the region;

- Prepare a detailed evaluation of existing and future commercial passenger and general aviation demand for MFE;

- Based on the realistic evaluation of the facility in terms of configuration, condition, amenities, location, competition, and forecasted aviation demand, establish goals and priorities for the Airport to meet that vision;

- Identify airfield alternatives based on goals and opportunities, as well as FAA applicable design standards. The analysis will include an evaluation of the airfield geometry to address potential run- way incursion hot spots and non-standard conditions;

- Provide a landside development plan that identifies areas for accommodating the forecasted growth of aviation and aviation-related business and, if appropriate, areas for non-aviation revenue- producing opportunities. Consideration will be given to the potential for new or expanded aviation facilities, including but not limited to passenger terminal facilities, aircraft storage hangar capacity and ramp capacity, and airport support facilities, including aircraft rescue and firefighting (ARFF) equipment storage;

- Assess compatible land use near the Airport;

- Prioritize preservation and rehabilitation recommendations in order of greatest overall positive impact; and,

- Identify elements of an ongoing maintenance plan.

BASELINE ASSUMPTIONS

A study such as this typically requires several baseline assumptions that are used throughout this analysis. The baseline assumptions for this study are as follows:

- MFE will continue to operate as a primary commercial service airport through the 20-year planning period;
- MFE will continue to accommodate commercial passenger airline operators and general aviation tenants, as well as itinerant and/or local aircraft operations by commercial airlines, air taxi, general aviation, and military operators;
- The commercial passenger and general aviation industries will grow through the planning period as projected by the FAA. Specifics of projected growth in the national commercial airline and general aviation industries are contained in Chapter Two – Aviation Demand Forecasts;
- The socioeconomic characteristics of the region will generally grow as forecast (see Chapter Two); and,
- A federal and state airport improvement program will be in place through the planning period to assist in funding future capital development needs.

MASTER PLAN ELEMENTS AND PROCESS

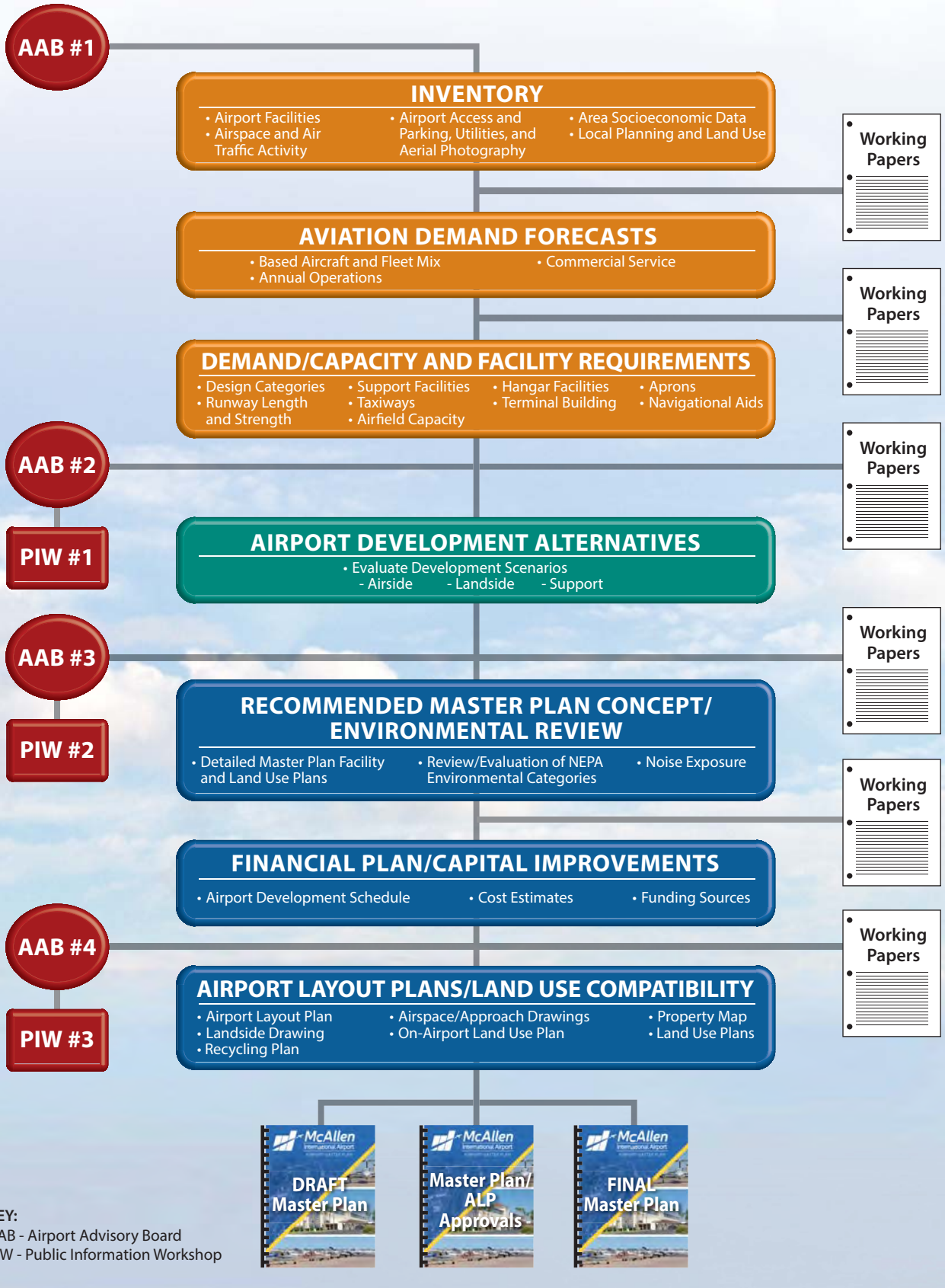
This Airport Master Plan has been prepared in a systematic fashion following FAA guidelines and industry-accepted standards and practices. The study has nine specific elements that are intended to assist in the evaluation of future facility needs and provide the supporting rationale for their implementation. **Exhibit IA** provides a graphical depiction of the elements and process involved with the study.

Element 1 – Initiation includes the development of the scope of services, schedule, and study website. Study material will be assembled in a workbook format. General background information will be established that includes outlining the goals and objectives to be accomplished during the Master Plan.

Element 2 – Inventory is focused on collecting and assembling relevant data pertaining to the Airport and the area it serves. Information is collected on existing Airport facilities and operations. Local economic and demographic data is collected to define the local growth trends, and environmental information is gathered to identify potential environmental sensitivities that might affect future improvements. Planning studies which may have relevance to the Master Plan are also collected.

Element 3 – Aviation Demand Forecasts examines the potential aviation demand at the Airport. The analysis utilizes local socioeconomic information, as well as national air transportation trends to quantify the levels of aviation activity which can reasonably be expected to occur at MFE over a 20-year period.

PROJECT WORK FLOW



An existing and ultimate critical design aircraft, based upon AC 150/5000-17, *Critical Aircraft and Regular Use Determination,* is also established to determine future planning design standards. The results of this effort are used to determine the types and sizes of facilities which will be required to meet the projected aviation demand at the Airport through the planning period.

Element 4 – Demand-Capacity and Facility Requirements determines the available capacities of various facilities at the Airport, whether they conform with FAA standards, and what facility updates or new facilities will be needed to comply with FAA requirements and/or projected 20-year demand.

Element 5 – Airport Development Alternatives considers a variety of solutions to accommodate projected airside and landside facility needs through the long-term planning period. An analysis is completed to identify the strengths and weaknesses of each proposed development alternative, with the intention of determining a single direction for development.

Element 6 – Airport Plans/Land Use Compatibility provides both a graphic and narrative description of the recommended plan for the use, development, and operation of the Airport. An environmental overview is provided to analyze potential environmental impacts of proposed Airport development projects and a waste audit and recycling plan is also conducted to identify opportunities for the Airport to be more sustainable in its approach to waste management. The official ALP drawings that are produced based on the recommended development concept and used by the FAA in determining grant eligibility will also be included.

Element 7 – Financial Management/Development Program provides a proposed capital needs program which defines the schedules, costs, and funding sources for the recommended development projects.

Element 8 – Geographic Information Systems (GIS) Services includes capturing and utilizing very detailed survey data sets. GIS services included in the process involves the collection of data to comply with Table 2-1 of Advisory Circular 150/5300-18B, column Instrument Procedure Development. The dataset is a high precision, digital model of the safety critical features of the airport as defined in 18B, Table 4-1. The process includes collection of high-resolution aerial photography, high precision surveys of safety critical airport data (runway ends, NAVAIDS, airport elevation, airspace, obstructions, and others), and compilation of collected data into a uniform GIS dataset. A GIS dataset that meets the Airport's needs and is acceptable to the FAA is the deliverable.

Element 9 – Final Reports and Approvals provide documents which depict the findings of the study effort and present the study and its recommendations to appropriate local organizations. The final document incorporates the revisions to previous working papers prepared under earlier elements into a usable Master Plan document.

COORDINATION

The McAllen International Airport Master Plan is of interest to many within the local community and region. This includes local citizens, local businesses, community organizations, City officials, Airport

users, Airport tenants, and aviation organizations. As a component of the regional, state, and national aviation systems, MFE is of importance to both state and federal agencies responsible for overseeing the air transportation system.

To assist in the development of the Master Plan, the members of the Airport Advisory Board acted in an advisory role in the development of the Master Plan. Advisory Board members met four times at designated points during the study to review study materials and provide comments to help ensure that a realistic, viable plan was developed.

Draft working paper materials were prepared at various milestones in the planning process. The working paper process allows for timely input and review during each step within the Master Plan to ensure that all issues are fully addressed as the recommended program develops.

A series of open-house Public Information Workshops were also conducted as part of the study coordination effort. These workshops are designed to allow all interested persons to become informed and provide input concerning the Master Plan process. Notices of meeting times and locations were advertised through local media outlets. All draft reports and meeting materials were made available to the public on a project website: http://mcallen.airportstudy.com .

SWOT ANALYSIS

A SWOT analysis is a strategic business planning technique used to identify **S**trengths, **W**eaknesses, **O**pportunities, and **T**hreats associated with an action or plan. The SWOT analysis involves identifying an action, objective, or element, and then identifying the internal and external forces that are positively and negatively impacting that action, objective, or element in a given environment. For this study, the SWOT analysis factors are being applied to MFE within the confines of the Master Plan. As a result, it provides a continuous vision and direction for the development of the Master Plan.

SWOT DEFINITIONS

As previously discussed, this SWOT analysis groups information into two categories:

- Internal | attributes of the Airport and market area that may be considered strengths or weaknesses to the action, objective, or element.
- External | attributes of the industry that may pose as opportunities or threats to the action, objective, or element.

The SWOT further categorizes information into one of the following:

- Strengths | internal attributes of the Airport that are helpful to achieving the action, objective, or element.

- Weaknesses | internal attributes of the Airport that are harmful to achieving the action, objective, or element.
- Opportunities | external attributes of the industry that are helpful to achieving the action, objective, or element.
- Threats | external attributes of the industry that are harmful to achieving the action, objective, or element.

SWOT ANALYSIS EXERCISE

The SWOT analysis for MFE is based upon information gathered during the project kickoff meeting held on August 17, 2017. The results of the SWOT analysis are presented in **Figure IA**. These results were utilized to frame the subjective or judgmental processing of the data presented in the Master Plan.

STRENGTHS	
Location	Market share within the Valley – strong local support
Good staff/ recently remodeled terminal	Support from Council Commission
Good relationship with air carriers	Access to Mexican markets
Customs/port of entry	Roadway access / infrastructure /utilities
Drainage improvements in ACIP	Weather – good flying weather
Airport aesthetics	Availability of customs / co-located on site
Adding roadway capacity for access to airport	Military exercises / training – 14% of activity
GA presence	Healthy based aircraft count
WEAKNESSES	
Land locked / expansion capability	Master Plan not integrated with City plans
Aging ARFF infrastructure	Single commercial runway
Limited runway length	Limited cargo/GA space
Need new auto parking capacity	Airport signage / wayfinding
Need new rental car facility capacity	Need wayfinding outside and inside
Cannot accommodate federal agency requests	
OPPORTUNITIES	
Market share within the Valley – strong local support	Incorporate Master Plan with City plans and incorporate height and hazard zoning (land use controls)
Identify neighboring properties for acquisition to allow for future airport expansion	Vacant border patrol facility
Master Plan will generate noise contours – identify potential noise impacts	Fine arts center / mall / business development within the community
THREATS	
No land use controls / height and hazard zoning	Development near airport
Wildlife attractants	Competing airports (Harlingen / Edinburg / Weslaco)

FIGURE IA
SWOT Analysis Results

SUMMARY

Planned development at MFE is focused on accommodating projected growth in activity and meeting FAA airfield design standards. The capital improvement program (CIP) that has been developed identifies both airside (runways, taxiways, navigational aids, etc.) and landside (aprons, access roads, vehicle parking, etc.) facility needs.

To properly plan for future demand that may occur, aviation demand forecasts were prepared. Because of the cyclical nature of the economy, it is virtually impossible to predict with certainty year-to-year fluctuations in activity when looking 5, 10, and 20 years into the future. Recognizing this reality, the Master Plan is keyed toward potential demand "horizon" levels rather than future dates in time. These "planning horizons" were established as levels of activity that will call for consideration of the implementation of the next step in the Airport Master Plan program. By developing the Airport to meet the aviation demand levels instead of specific points in time, the Airport will serve as a safe and efficient aviation facility which will meet the operational demands of its users while being developed in a cost-efficient manner. This program allows the City to change specific development in response to unanticipated needs or demand.

The forecast approach utilized historical and forecasted commercial service, general aviation, and economic trends resulting in modest growth projections for MFE through the planning period of the Master Plan. The forecast planning horizons are summarized in **Table IA**. These forecasts were reviewed and approved by the FAA on May 16, 2018. A copy of the approval letter is included in **Appendix B**.

TABLE IA
Planning Horizon Activity Summary
McAllen International Airport

	Base Year (2016)	Short Term (1-5 years)	Intermediate Term (6-10 years)	Long Term (11-20 years)
BASED AIRCRAFT				
Single Engine Piston	54	55	57	60
Multi-Engine Piston/Turbine	32	34	36	41
Jet	22	24	26	31
Helicopter	14	15	16	18
Total Based Aircraft	122	128	135	150
ANNUAL AIRCRAFT OPERATIONS				
Itinerant	46,817	49,030	52,560	59,640
Local	10,419	10,600	10,700	11,100
Total Operations	57,236	59,630	63,260	70,740
ENPLANEMENTS & CARGO				
Enplanements	365,928	435,000	487,000	600,000
Air Cargo (tons)	8,722	10,000	11,500	15,800
PEAKING CHARACTERISTICS				
Enplanements				
Peak Month	36,230	45,000	50,300	62,000
Design Day	1,170	1,450	1,620	2,000
Design Hour	240	290	320	380
Operations				
Peak Month	5,249	5,660	6,005	6,715
Design Day	173	186	197	221
Busy Day	249	268	284	318
Design Hour	25	27	29	32

Source: Coffman Associates analysis

MASTER PLAN CONCEPT

The Master Plan concept includes improvements to the airfield and landside area to satisfy FAA design and safety standards and to meet current and forecast needs. Airfield design standards are based upon the characteristics of the Airport's critical design aircraft, which is currently a combination of the Boeing 737-800/900 and Boeing 757-200, and adding the Boeing 767-300 in the future condition for Runway 14-32 and a future parallel runway. Based upon these aircraft, the primary and future parallel runways are planned to RDC D-IV-2400 airfield design standards. Runway 18-36, as the secondary or crosswind runway, serves small aircraft exclusively and is ultimately planned to be closed.

The following summarizes the Recommended Master Plan Concept, which is depicted on **Exhibit IB**. A more detailed discussion of the Recommended Master Plan Concept can be found in Chapter Five of the Master Plan.

- **Runway 14-32** | At 7,120 feet long and 150 feet wide, the primary runway adequately accommodates most of the commercial, military, and general aviation fleet mix of aircraft currently operating at MFE; however, as the fleet mix transitions to include larger and faster commercial aircraft, additional runway length is necessary to support safe operations. The plan includes extending the runway by 3,211 feet to the southeast for a full length of 10,331 feet. In addition to providing for safer operations, a longer runway opens the potential for new commercial markets and business ventures. Ultimately, with the development of a parallel runway, the existing primary runway designation is changed to Runway 14L-32R. Impacts of the extension of the primary runway on the vicinity roadway network and Mission Inlet channel are discussed in detail in Chapter Five.

- **Future Parallel Runway** | As a commercial service airport, it is important to have redundancy in the airfield system to ensure operations can continue uninterrupted in instances that the primary runway is undergoing significant rehabilitation or is closed for any reason. Most commercial service airports, especially small through large hub level airports, are served with at least two runways capable of serving commercial operations. The crosswind runway at MFE is too short to accommodate commercial service activities, and it cannot be reasonably upgraded to meet RDC D-IV-2400 design standards. As a result, when Runway 14-32 undergoes rehabilitation work, which will be needed at some point in the future, MFE would effectively have to close for a lengthy period lasting anywhere between weeks or months depending on the scope of work. Commercial operators, including the passenger and cargo airlines, may choose to stop serving MFE altogether and relocate their activities to other regional airports rather than cease activity for the duration. At a minimum, the loss of commercial airline operations would significantly disrupt local economic conditions. To guard against this threat, a new parallel runway has been planned to provide redundancy and support the long-term viability of commercial airline operations. The planned parallel runway (Runway 14R-32L) is planned to meet RDC D-IV-2400 design standards.

- **Runway 18-36** | At 2,639 feet long and 60 feet wide, Runway 18-36 is limited in its utility due to its short length. Improving the crosswind to higher standards would require significant impacts to existing on- and off-airport facilities. This master plan carries forward previous plans

to ultimately close Runway 18-36. The timeline for closure would coincide with the development of a new parallel runway.

- **Taxiway Improvements** | Parallel Taxiway A and its connectors to the primary runway currently meet or exceed taxiway design group (TDG) 5 width standards of at least 75 feet, which is sufficient for the type of aircraft operating at the airport now and in the future. The plan includes adding paved taxiway shoulders to prevent against soil erosion when taxiway pavements undergo resurfacing or rehabilitation. No-taxi islands are also planned at Taxiway A3 and at the cargo apron to eliminate direct-access points to the runway, mitigating the potential for runway incursions.

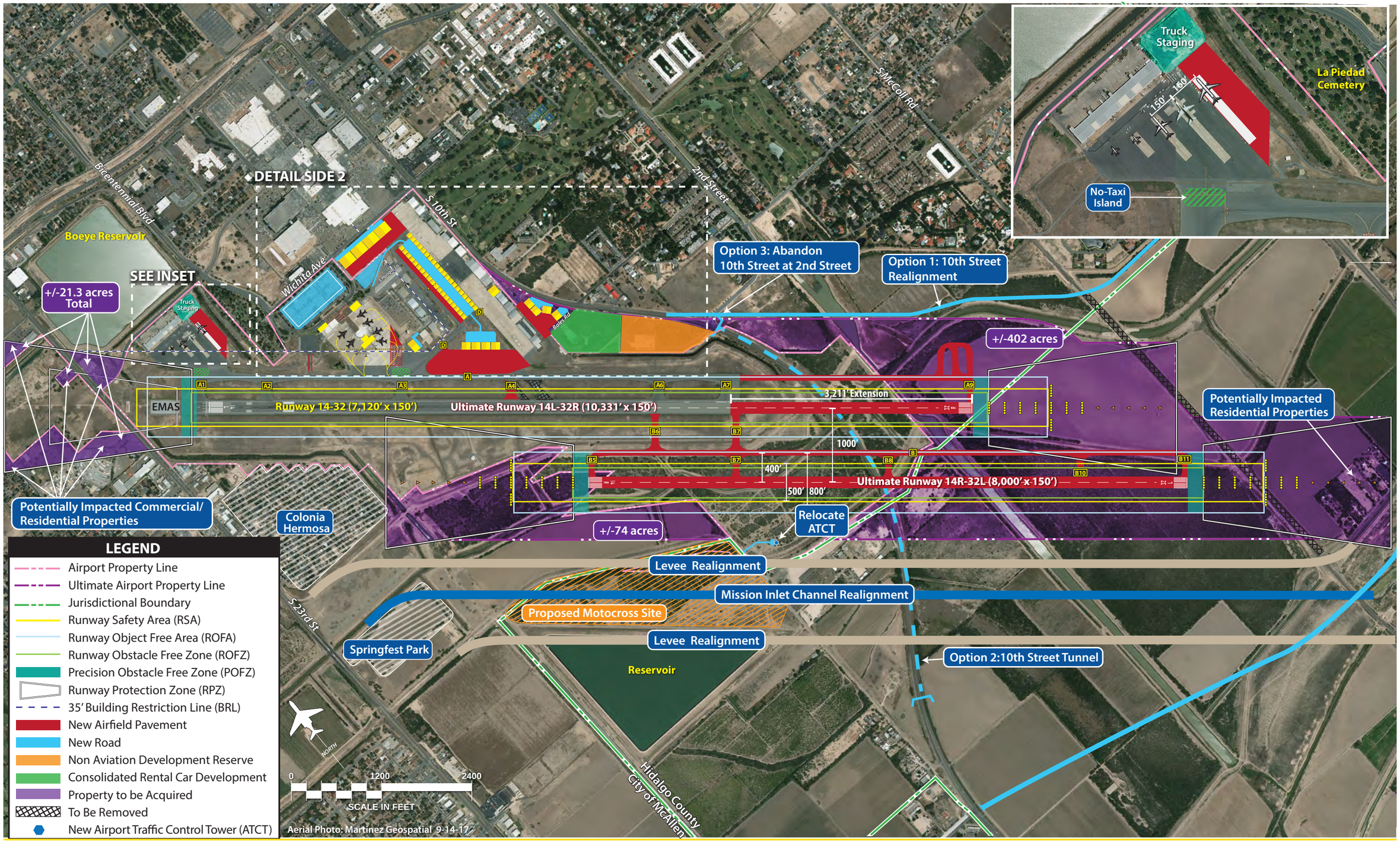
- **Property Acquisition** | The master plan concept identifies approximately 502.4 acres of property acquisition to occur through the planning period of this study (or beyond) in order to meet the demands of airside and landside development potential. This includes property for the construction of the primary runway extension, the construction of the proposed parallel runway, and the protection of associated safety areas and RPZs of both runways.

- **Airport Traffic Control Tower** | The existing tower site on the north side of the airfield results in a south view orientation for controllers and impacts from direct sun glare can impede controller vision of the airfield. The plan includes the development of a new tower on the south side of the airfield that would be more centrally located after the extension of the primary runway and development of a parallel runway and would provide for airfield views with the least potential for direct sun glare.

- **Passenger Terminal** | The existing terminal building has a gross area of approximately 148,200 square feet (sf) made up of functional areas serving airline ticketing and operations, security screening, post-security passenger holdrooms, baggage handling and claim, rental car counters, concessions, pre-security public circulation areas, and HVAC/mechanical spaces. Terminal space needs were determined based upon anticipated growth in passenger enplanements. Recommended terminal facility expansions include expanded passenger concourse areas, five new gates, and pre-security building expansions of 13,500 sf to the east and 9,500 sf to the west to provide additional baggage claim, ticketing, security screening, and public space.

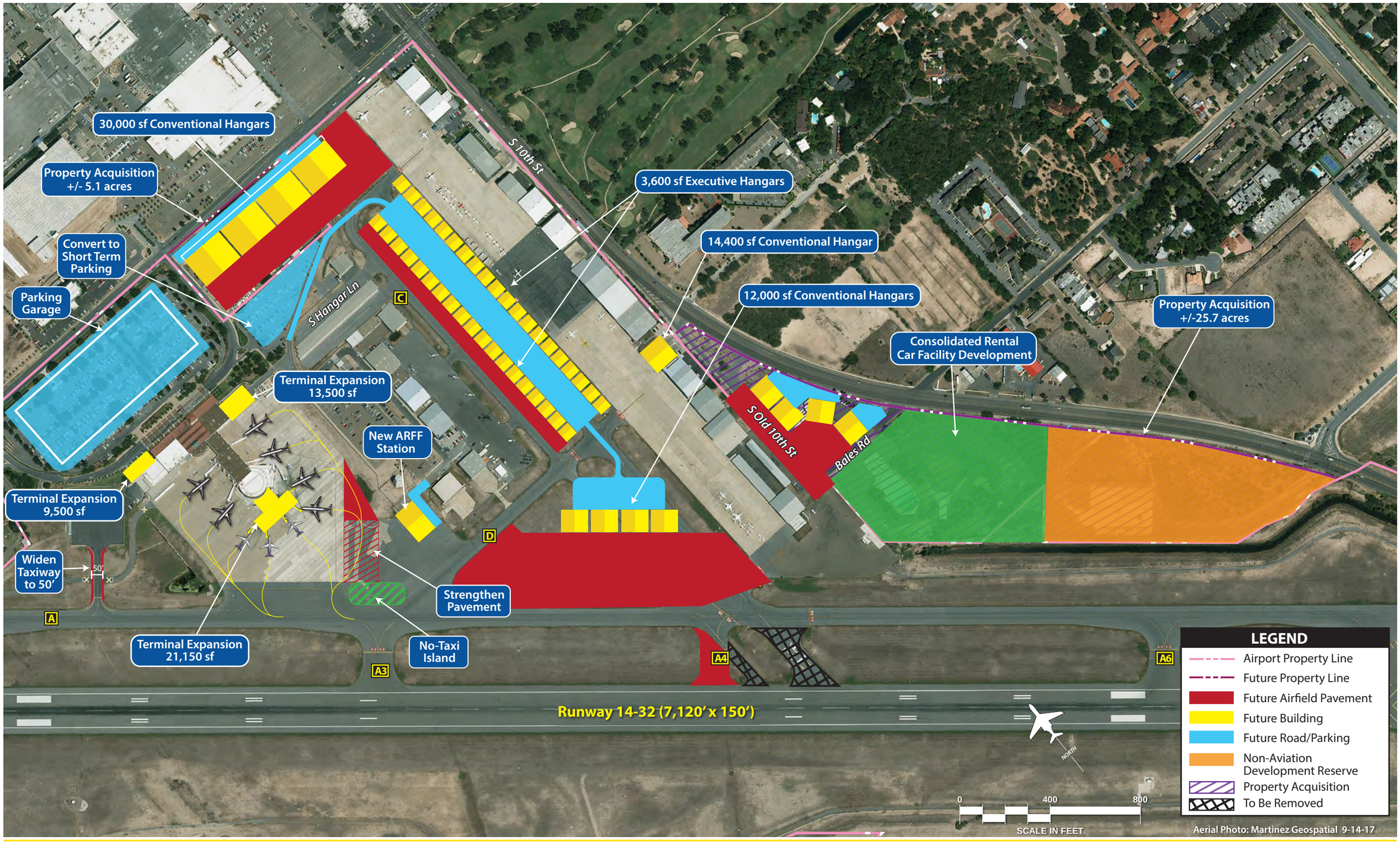
- **Terminal Parking** | There are 1,538 vehicle parking spaces available at the terminal building including the short-term lot, long-term lot, employee/overflow lot, and rental car ready/return lot. It was determined that additional vehicle parking capacity is needed over the course of the planning period. The plan includes the development of a vehicle parking garage on the site of the entirety of the existing short- and long-term parking lots. The planned garage could provide up to 1,200 spaces and would consolidate the short- and long-term lots and include employee parking.

- **Consolidated Rental Car Facility (CONRAC)** | A CONRAC is planned to relocate the rental car operators from the terminal to a dedicated facility along S. 10th Street at the intersection with Bales Road on what is currently Cascade Park. In addition to covered vehicle parking spaces and



LEGEND

- Airport Property Line
- Ultimate Airport Property Line
- Jurisdictional Boundary
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Runway Obstacle Free Zone (ROFZ)
- Precision Obstacle Free Zone (POFZ)
- Runway Protection Zone (RPZ)
- 35' Building Restriction Line (BRL)
- New Airfield Pavement
- New Road
- Non Aviation Development Reserve
- Consolidated Rental Car Development
- Property to be Acquired
- To Be Removed
- New Airport Traffic Control Tower (ATCT)


30,000 sf Conventional Hangars
Property Acquisition +/- 5.1 acres
Convert to Short Term Parking
Parking Garage
S 10th St
3,600 sf Executive Hangars
14,400 sf Conventional Hangar
12,000 sf Conventional Hangars
Property Acquisition +/-25.7 acres
Consolidated Rental Car Facility Development
S Hangar Ln
C
Terminal Expansion 13,500 sf
New ARFF Station
S Old 10th St
Bales Rd
Terminal Expansion 9,500 sf
Widen Taxiway to 50'
50'
D
A
Strengthen Pavement
Terminal Expansion 21,150 sf
No-Taxi Island
A3
A4
A6
Runway 14-32 (7,120' x 150')
NORTH
0
400
800
SCALE IN FEET
LEGEND
Airport Property Line
Future Property Line
Future Airfield Pavement
Future Building
Future Road/Parking
Non-Aviation Development Reserve
Property Acquisition
To Be Removed
Aerial Photo: Martinez Geospatial 9-14-17

rental car counters and office spaces, the CONRAC will include a car washing system, fuel storage and pumping systems, and a vehicle maintenance facility. A CONRAC creates additional revenue generating spaces in the terminal, eliminates rental car traffic from the terminal loop road, and offers an improved customer experience and service. Once a CONRAC is developed, the airport/rental car operators would need to begin shuttle services for customers.

- **Commercial Air Cargo** | Improvements to the air cargo handling facilities at MFE include expanding the apron to provide an additional aircraft staging position with a separation distance that would accommodate the Boeing 767-300F aircraft. A larger truck staging area is also planned on the east side of the cargo handling building.

- **General Aviation** | New general aviation facilities, including aircraft storage hangars and aprons, are planned to be focused on the site of Runway 18-36 when it is closed. New hangars include a variety of sizes and types to accommodate various types of aircraft and operators including fixed base operators (FBOs), specialty aviation service operators (SASOs), maintenance/repair/overhaul (MRO) operators, and private aircraft operators. New taxilanes and vehicle access roads and parking lots are included to accommodate these hangar developments.

- **Non-Aviation Development Reserve** | Areas of the Airport where accessibility to the airfield is limited or infeasible have been reserved for non-aviation revenue support purposes such as commercial or industrial development. The plan includes the acquisition of approximately 20 acres of property along S 10th Street, which includes Cascade Park and a natural gas compressor station. This property is separated from the airfield by a drainage way that restricts the ability to provide airfield access. As has been previously explained, a portion of this property is planned for a CONRAC while the remaining area is planned for non-aviation developments. This property, which has good visibility and frontage from S. 10th Street, could be prime real estate for retail opportunities, government facilities, and commercial and office development.

DEVELOPMENT FUNDING

The full implementation of the Airport Master Plan is likely to take two decades or more at a cost of $193.9 million in 2017 dollars. The breakdown of funding over the three planning horizons is presented in **Table IB**. Approximately 74 percent of the total is eligible for grant funding from the FAA. The source for FAA funding is the Aviation Trust Fund, which is funded through user fees and taxes on airline tickets, aviation fuel, and aircraft parts. A more detailed discussion of the Capital Improvement Program can be found in Chapter Five of the Master Plan.

With the Airport Master Plan Update completed, the most important challenge is implementation. The cost of developing and maintaining aviation facilities is an investment which yields impressive benefits for the City. This plan and associated development program provide the tools the City will require to meet the challenges of the future. By providing a safe and efficient facility, MFE will continue to be a valuable asset to the entire Rio Grande region.

TABLE IB
Development Funding Summary
McAllen International Airport

PLANNING HORIZON	Total Cost	AIP-Eligible Share	Local Share
Short Term Program	$33,446,600	$30,101,940	$3,344,660
Intermediate Term Program	$68,767,005	$48,440,525	$20,326,481
Long Term Program	$220,311,225	$162,778,140	$57,533,085
Beyond Long Term Program	$175,620,939	$158,058,845	$17,562,094
Total Program Costs	***$498,145,769***	***$399,379,450***	***$98,766,319***

Sources: Project cost estimates prepared by RS&H and project staging established by Airport staff, Coffman Associates, and RS&H.

McAllen International Airport

Chapter 1

Inventory

CHAPTER ONE

Inventory

The inventory chapter of existing conditions is the initial step in the preparation of the McAllen International Airport (MFE or Airport) Master Plan. The inventory will serve as an overview of the Airport's physical and operational features, including facilities, users, and activity levels, as well as specific information related to the airspace, air traffic activity, and role of the Airport. Finally, a summary of socioeconomic characteristics and review of existing environmental conditions on and adjacent to the Airport are detailed, which will provide further input into the study process.

Information provided in Chapter One serves as the baseline for the remainder of the Master Plan, which is compiled using a wide variety of resources, including: applicable planning documents; on-site visits; interviews with Airport staff, tenants, and users; aerial and ground photography; federal, state and local publications; and project record drawings. Specific sources include those listed below. Environmental resources are detailed at the end of this chapter.

- Economic Impacts, McAllen International Airport (2011), TxDOT Airport Certification Manual (Feb 3, 2014)
- McAllen International Airport Emergency Contingency Plan (Jun 29, 2012)
- 2005 Airport Master Plan Update (Jul 29, 2005)
- Foresight McAllen Comprehensive Plan (Adopted Dec 10, 2007)
- City of McAllen Website (www.mcallen.net)
- McAllen International Airport Website (www.mcallenairport.com)

AIRPORT SETTING

LOCALE

The Airport is centrally located in the City of McAllen, Texas, approximately two miles southeast of the heart of downtown. MFE is in Hidalgo County, which is one of the four counties that make up the Rio Grande Valley. There are several major highways surrounding the Airport, including U.S. Highway 83 (Interstate 2) to the north, State Highway 336 (South 10th Street) to the east, and State Highway 115 (South 23rd Street) to the west. These highways provide key access to the Airport from all directions, including connections across the Rio Grande River into Mexico. The Hidalgo Port of Entry is also located just south of the Airport. MFE is considered part of the McAllen-Edinburg-Mission Metropolitan Statistical Area (MSA), which contains the cities of McAllen, Edinburg, Pharr, and Mission. In 2016, the population of the McAllen-Edinburg-Mission MSA was 907,355.[1] **Exhibit 1A** depicts the regional setting.

LAND USE

The Airport sits at an elevation of 107 feet above mean sea level (MSL) on approximately 370 acres of land. Given its proximity to the urban core of McAllen, the Airport is surrounded on most sides by dense land uses. The Airport itself is zoned A-O for Agricultural and Open Space Uses. Agricultural uses, parks, and open green spaces are found from the southwest to the southeast of the Airport. Areas east of the Airport are zoned C-3L for Light Commercial uses; however, there are primarily residential uses, including single-family homes, apartment complexes, and hotels in these areas. Cascade Park is adjacent to the eastern property line of the Airport. McAllen Country Club is northeast of the Airport along South 10th Street, and further north there are more commercial uses, including the La Plaza Shopping Center, featuring shops and restaurants. North of the Airport are some single-family homes and more commercial uses. The Boeye Reservoir and Southwest Water Plant are also north of the Airport. Just below Boeye Reservoir is a medical clinic and a restaurant, with an automotive store nearby. Northwest of the Airport is Airport Park and additional light commercial uses, including a health center. Immediately west of the Airport are single-family residential homes.[2] **Exhibit 1B** shows existing land uses around the Airport.

CLIMATE

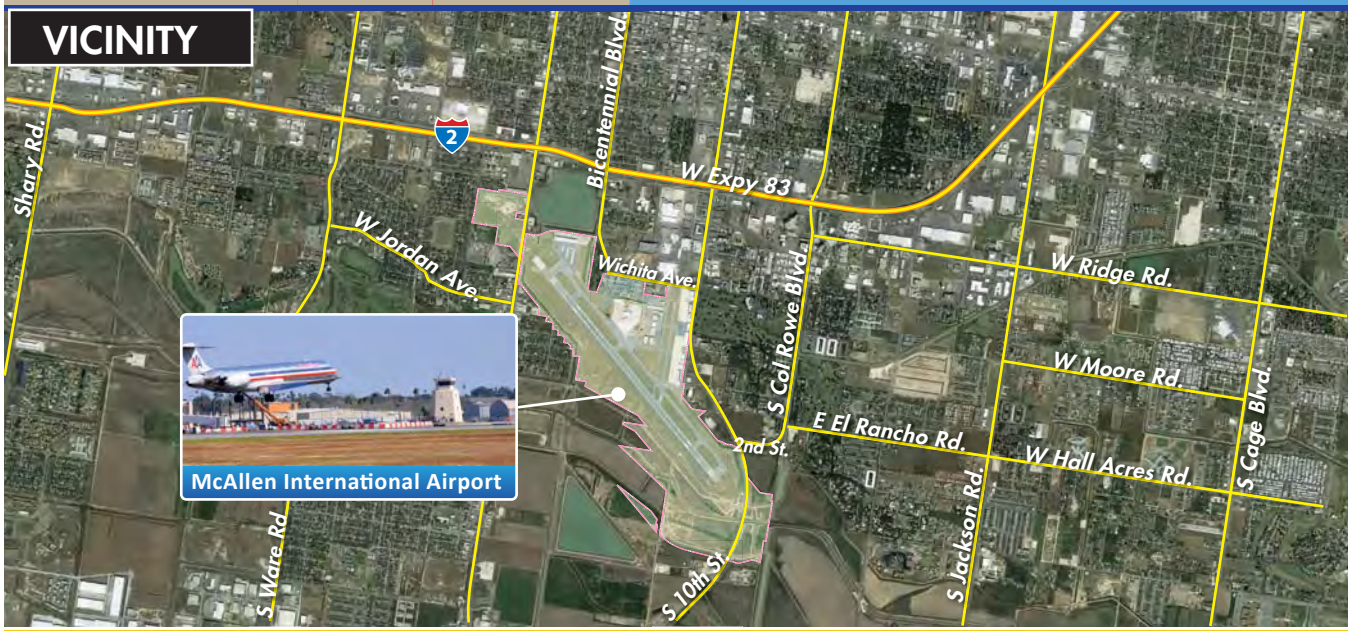
Local weather conditions can significantly impact an airport's operations. Knowledge of the local climate allows an airport to be better prepared for regional conditions and greatly enhances a pilot's flying capabilities. For example, the Airport's runway should be oriented to match predominant wind patterns for the area.

According to *Foresight McAllen Comprehensive Plan* (adopted December 10, 2007), the overall climate in McAllen is considered subtropical given its location 75 miles from the Gulf of Mexico and location along the Rio Grande River. Residents enjoy warm weather for much of the year, with average lows in

[1] Texas Department of Health and Human Services 2016 population data (https://www.dshs.texas.gov/chs/popdat/ST2016p.shtm)
[2] City of McAllen, Texas, Developing and Zoning Map (Accessible at http://gismap.mcallen.net/flexviewers/DevelopingZoning/)

LOCATION

VICINITY



the low 60s (degrees Fahrenheit) and highs in the upper 80s. There are rarely hard frosts, and there has only been one report of snow since 1941, when the City received 1.7 inches. Rain is the most common form of precipitation, with peak rainfall occurring (on average) in September. The suitable soil types and favorable climactic conditions makes McAllen a prime area for farming. Wind patterns at MFE are typically out of the southeast (130 to 150 degrees relative to true north) with wind speeds reaching their peaks from March to May. May averages the fastest wind speeds at 10.68 knots. **Exhibit 1C** displays weather and wind patterns at the Airport.

Table 1A indicates that visual meteorological conditions (VMC) occur 93.67 percent of the time. When under VMC conditions, pilots can operate using visual flight rules (VFR) and are responsible for maintaining proper separation from objects and other aircraft. Instrument meteorological conditions (IMC) account for all weather conditions less than VMC conditions that still allow for aircraft to safely operate under instrument flight rules (IFR). Under IFR, pilots rely on instruments in the aircraft to accomplish navigation. IMC conditions occur 4.48 percent of the time. Less than IMC, or poor visibility conditions (PVC), are present 1.85 percent of the time. These weather conditions are lower than instrument approach minimums, making the Airport inaccessible to most air traffic.

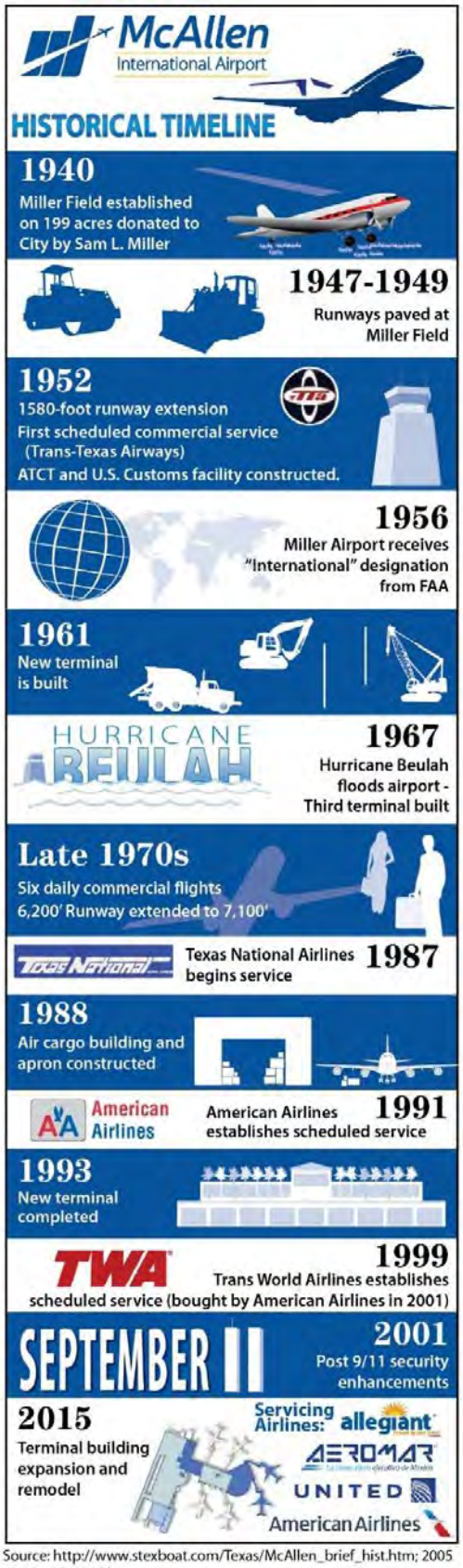
TABLE 1A
Weather Conditions
McAllen International Airport

Condition	Cloud Ceiling	Visibility	Percent of Total
VMC	≥ 1,000' AGL	≥ 3 statute miles	93.67%
IMC	≥ 500' AGL and < 1,000' AGL	≥ 1 to < 3 statute miles	4.48%
PVC	< 500' AGL	< 1 statute mile	1.85%

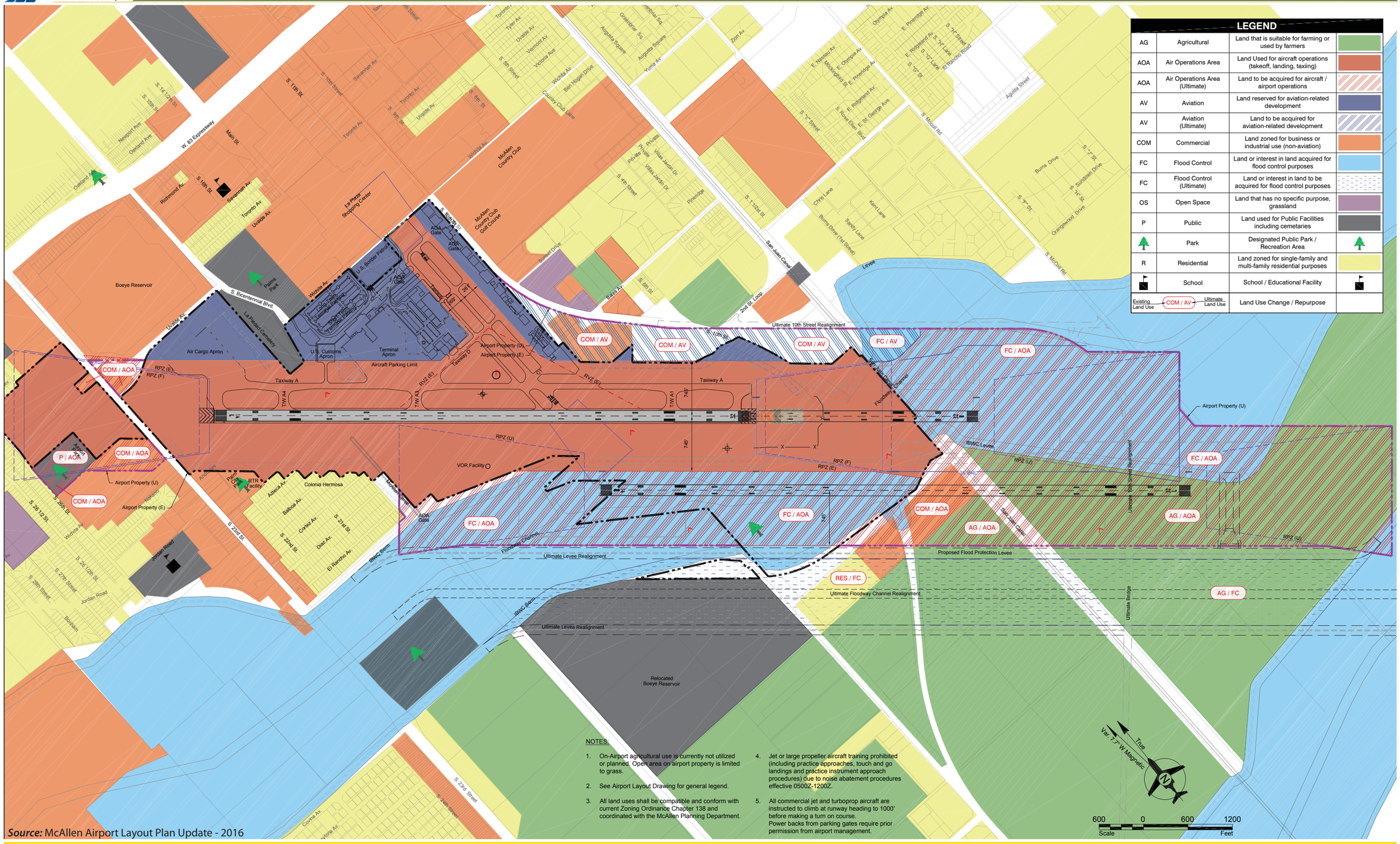
VMC: Visual Meteorological Conditions
IMC: Instrument Meteorological Conditions
PVC: Poor Visibility Conditions
AGL: Above Ground Level
Source: 111,252 All Weather Observations from Jan 1, 2007 thru Dec 31, 2016, McAllen Intl Airport Weather Station ID: 722506-12959.

AIRPORT HISTORY

The historical timeline graphic shows the Airport history from the year it was established as an Airport up to present day.



Source: http://www.stexboat.com/Texas/McAllen_brief_hist.htm; 2005 Airport Master Plan



Source: McAllen Airport Layout Plan Update - 2016

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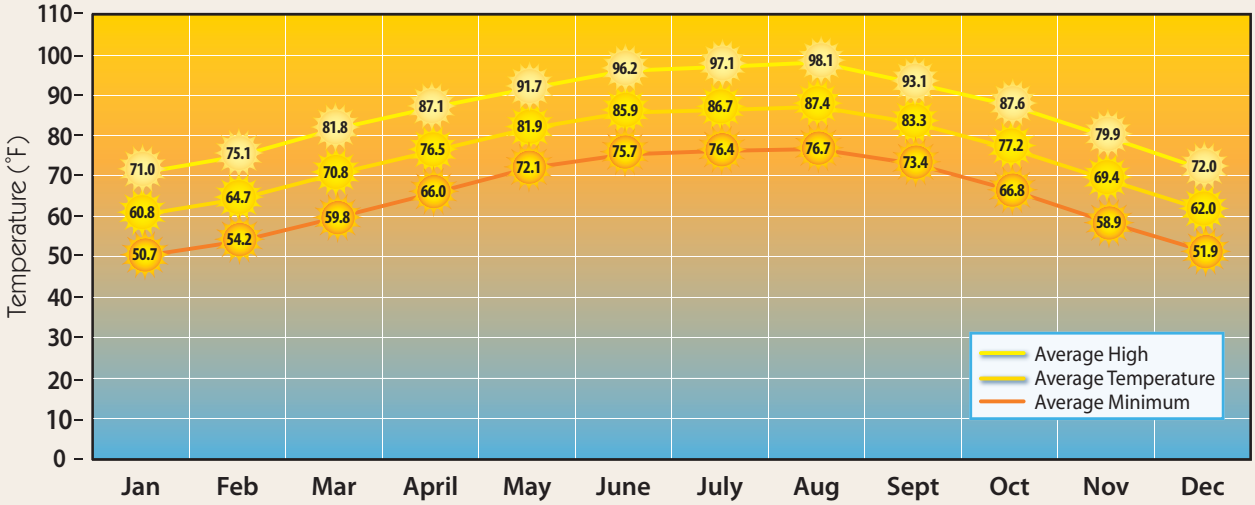
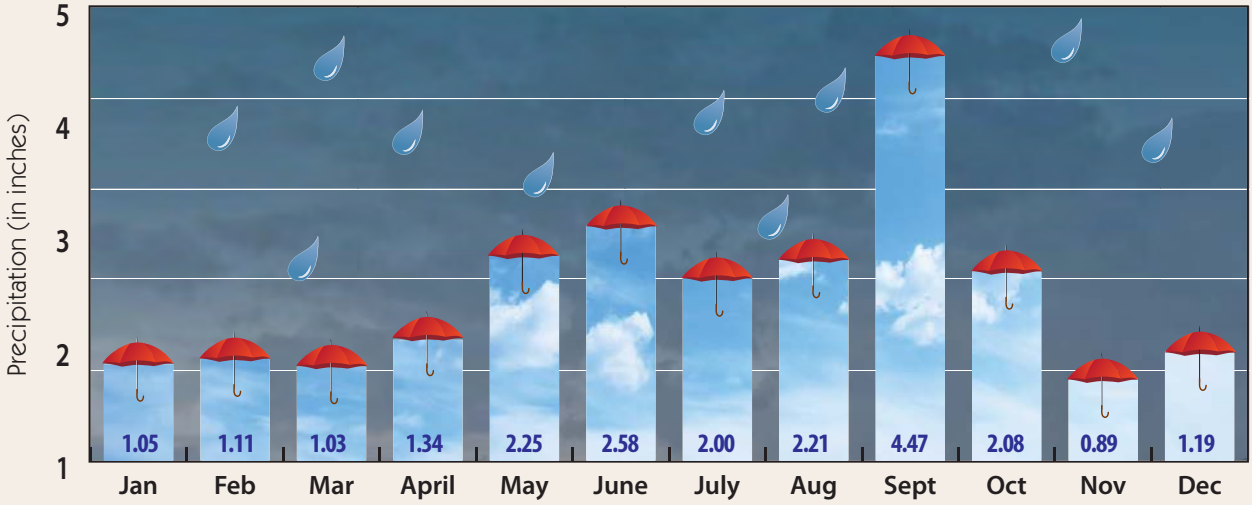
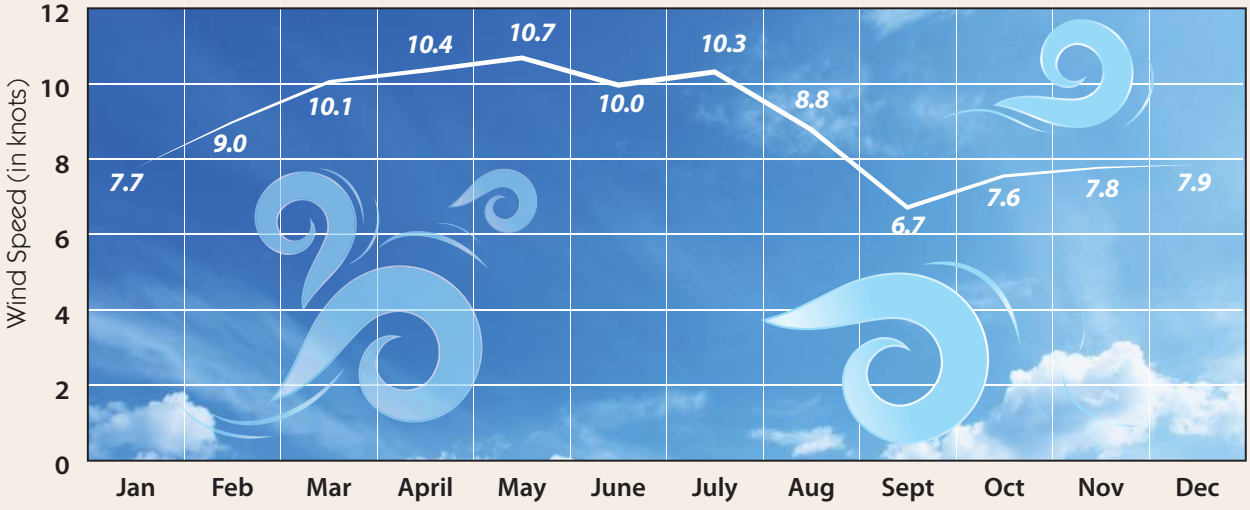
MONTHLY TEMPERATURES



MONTHLY PRECIPITATION



MONTHLY WIND DATA



Source: NOAA temperature and precipitation climate normal, Station ID: GHCND: USW00053914 (1981-2010).

CAPITAL IMPROVEMENT HISTORY

To assist in ongoing capital improvements, the FAA and the Texas Department of Transportation – Aviation Division (TxDOT) provide funding to MFE through the Airport Improvement Program (AIP). Texas is a member of the FAA's Block Grant Program, giving TxDOT the responsibility, among other things, for administering AIP Grants to reliever and general aviation airports, which includes MFE.[3] The State of Texas also offers funding opportunities that MFE is eligible for, which are listed below.[4]

- **Routine Airport Maintenance Program** | TxDOT matches local government grants up to $50,000 for basic improvements, such as parking lots, fencing, and other airside and landside needs.
- **Federal Aviation Grants** | Provides federal and state grant funding for maintenance and improvement projects to airports included in the National Plan of Integrated Airport Systems (NPIAS).

Table 1B summarizes Airport capital improvement projects and maintenance undertaken since 2005. During this ten-year period, the Airport has been awarded $36,598,787, but has budgeted, or spent, $36,514,834.70.

TABLE 1B
Airport Capital Improvement Projects
McAllen International Airport

Award Year	Award Amount	AIP[1] Number	Project Description	Budget Amount
2005	$1,062,361	34	Taxiway A Rehab - Phase 2	$1,118,275
			Grant Total	**$1,118,275**
2007	$5,890,708	35	Taxiway A (BB1)	$2,327,322
			Runway 13-31 (BB2-ALT1-ALT2)	$1,017,000
			Airfield Electrical (BB3)	$683,000
			Electrical Vault (BB5)	$1,152,507
			Security Services	$43,868
			Runway 13-31 BCA	$519,315
			Airport Administrative Expense	$56,500
			Grant Total	**$5,799,512**
2008	$75,000	36	Environmental Study - Land Acquisition	$65,000
			Updated Airport Layout	$10,000
			Perimeter Road	
			Grant Total	**$75,000**
2009	$549,738	37	Runway 13-31 Rehabilitation Design	$578,672
			Grant Total	**$578,672**
2009	$6,260,365	38	Runway 13-31 Rehabilitation	$2,742,480
			Terminal Expansion	$3,358,960
			Environmental Assessment	$33,250
			Runway Perimeter Repairs	$125,675
			Grant Total	**$6,260,365**

[3] https://www.faa.gov/airports/aip/state_block/
[4] http://txdot.gov/inside-txdot/division/aviation.html

TABLE 1B (Continued)
Airport Capital Improvement Projects
McAllen International Airport

Award Year	Award Amount	AIP[1] Number	Project Description	Budget Amount
2009	$5,400,000	39	Runway 13-31 Mill, Overlay and Shoulders	$5,131,804
			Grant Total	**$5,131,804**
2010	$973,000	40	Rehabilitation Runway 13-31	$33,250
			Runway Safety Area-Study	$71,250
			Terminal Expansion Design	$649,145
			Wildlife Hazard Assessment	$47,500
			Drainage Master Plan	$171,000
			Grant Total	**$972,145**
2011	$87,122	41	Runway Safety Area Study II	$57,950
			Wildlife Hazard Assessment II	$29,172
			Grant Total	**$87,122**
2011	$4,318,852	42	Terminal Expansion I	$4,318,852
			Grant Total	**$4,318,852**
2012	$680,373	43	Cargo Ramp Improvements	$240,985
			RSA Environmental	$275,000
			Layout Plan Update	$152,500
			Runway Safety Area Obstruction Analysis	$50,000
			Runway Safety Area Safety Area Study	$37,485
			Grant Total	**$755,970**
2013	$762,352	44	Aircraft Rescue and Firefighting Vehicle Maintenance	$185,980
			Runway Safety Area Design	$585,447
			Blast Fence	$96,000
			Security Fence	$87,288
			Grant Total	**$954,715**
2014	$9,416,163	45	Runway Safety Area Improvements	$10,445,383
			Independent Fee Analysis for Construction Management	$2,500
			Wildlife Hazard Mitigation	$14,521
			Grant Total	**$10,462,404**
2015	$1,122,750	46	Drainage Improvements Environmental	$250,000
			Cargo Ramp Environmental	$275,000
			Master Plan Update	$472,500
			PA/FIDS System	$250,000
			Grant Total	**$1,247,500**
			All Grants Total (2005 – 2015)	**$36,514,834.70**

[1] **Airport Improvement Program**
Source: Airport Management

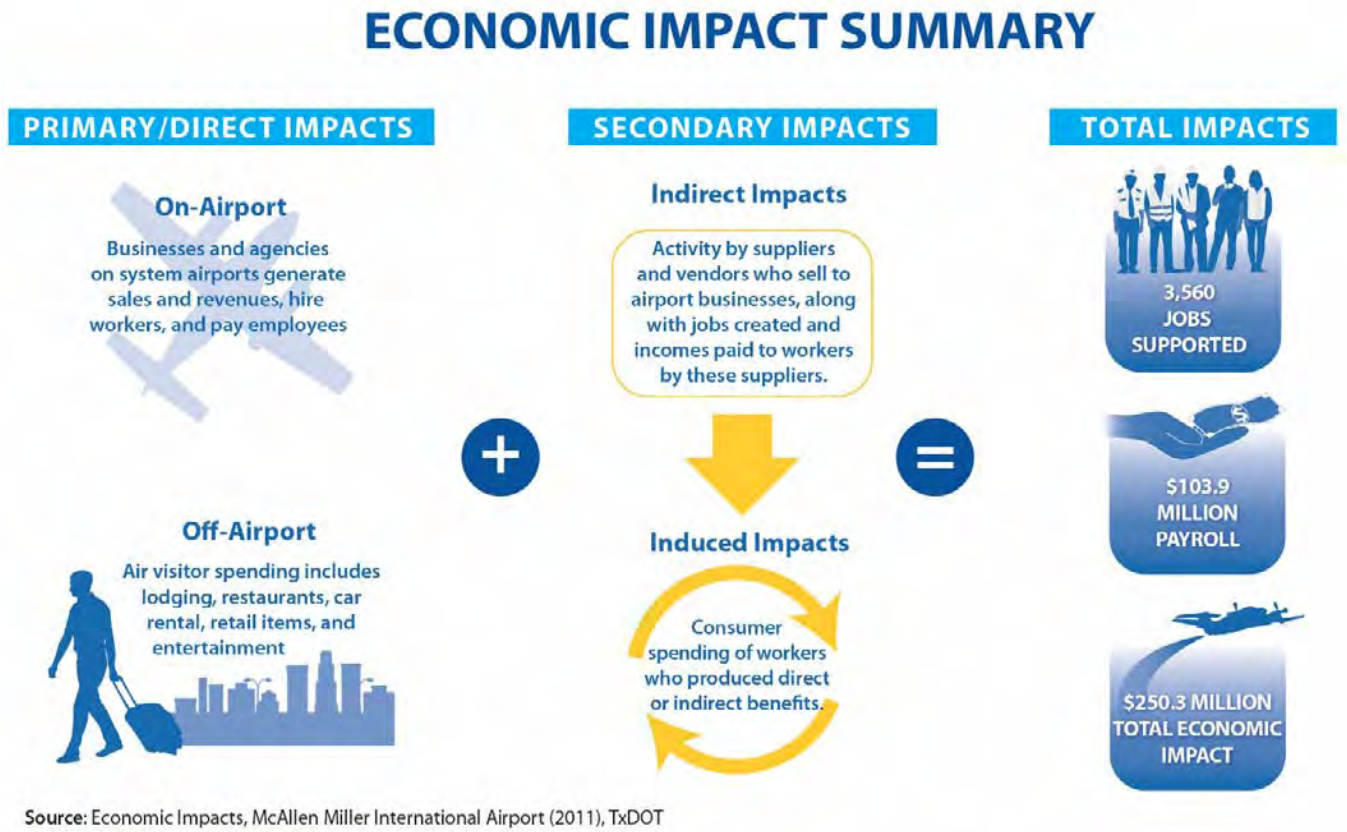
ECONOMIC IMPACT

TABLE 1C
Aviation Economic Impact

	MFE	All Texas Airports
Total Economic Activity	$250.3 million	$59.5 billion
Total Payroll	$103.9 million	$23.2 billion
Total Employment	3,560 jobs	771,700 jobs

Source: Economic Impacts, McAllen International Airport (2011), TxDOT

The Airport supports the City of McAllen's economy by transporting visitors and goods to and from the area, employing residents, and purchasing local products. MFE is a major gateway for travelers looking to access business and recreation opportunities in the Rio Grande Valley and Northern Mexico. The Airport also provides community-based services and programs that enhance the health, safety, welfare, and quality of life of area citizens. As summarized in **Table 1C**, when combined with the multiplier impact, commercial service and general aviation activity at the Airport generate over $250 million in total economic output, create over 3,500 jobs, and pay out more than $103 million to its full-time employees.



Source: Economic Impacts, McAllen Miller International Airport (2011), TxDOT

AIRPORT ADMINISTRATION

There are several key staff positions at the Airport, as listed below. Each position plays an important role in maintaining and operating the Airport. The Airport Administration office is open Monday through Friday from 8:00 a.m. to 5:00 p.m. and Airport operations staff members can be reached 24 hours per day.

- **Director of Aviation** | This role supervises the planning, development, construction, enlargement, improvement, maintenance, equipping, administration, operation, regulation, protection and policing of the Airport.
- **Deputy Director of Aviation** | This role assists the Director of Aviation in planning and development efforts, coordinates grant programs, and directs the day-to-day financial and administrative activities of the Airport.
- **Operations Manager** | Under the general direction of the Director of Aviation, this employee ensures compliance with Part 139, TSR 1542, and other regulations related to airport operations and security. This employee is also responsible for the day-to-day operations of the airport and maintaining a safe, secure, and efficient environment for airport users and tenants.
- **Maintenance Manager** |This position manages the maintenance of all facilities and buildings at the Airport.
- **Airport Operations Specialist** | This position is under general direction of the Operations Manager and assists in the control of daily operations, coordinates work in the operations center and completes other duties as assigned.
- **Airfield Maintenance Supervisor** | Under the direction of the Operations Manager, this person supervises airfield maintenance personnel, performs airfield inspections, and identifies deficiencies which require corrective action.
- **Building Maintenance Supervisor** | This position is supervised by the Operations Manager and coordinates work activities of building maintenance personnel, as well as inspects and maintains the terminal building. In the absence of the Airfield Maintenance Supervisor, this role ensures completion of all airfield maintenance work.
- **Sergeant, McAllen Police Department – Airport** | Under the direction of the Director of Aviation, this employee supervises police work involving the safety and security of the airport, protects life and property according to safety regulations, and prepares routine reports and records.
- **ARFF Coordinator** | The ARFF Coordinator is the Captain assigned to the central training division who ensures ARFF training requirements for assigned personnel are met to maintain job competency.

In addition to Airport staff, there is a 14-member Airport Advisory Board that provides its support to MFE. The Airport Advisory Board makes recommendations to the City Commission on matters including planning and improvements to be made at the Airport. They also take part in and recommend rules, conditions and regulations for private airplanes under which such private owners shall use and operate their private facilities.[5]

[5] http://www.mcallen.net/advisory-boards/airport-advisory

THE AIRPORT'S SYSTEM ROLE

Airport planning takes place at the local, state, and national levels, each of which has a different emphasis and purpose.

- **Local** | MFE has an Airport Master Plan, which was last updated in 2005.
- **State** | TxDOT created the *Texas Airport System Plan* (TASP) based on input from local planning documents (i.e., master plans and airport layout plans).
- **National** | The Airport is included in the *National Plan of Integrated Airport Systems* (NPIAS), which categorizes overall airport roles and responsibilities based on input from local and state planning efforts (i.e., master plans and state system plans).

LOCAL AIRPORT PLANNING

Airport Master Plan (2005) | The Airport Master Plan is the primary local planning document that provides a 20-year airport development vision based on aviation demand forecasts. The 2005 *Airport Master Plan Update* used 2003 data for aviation forecasts. Given the inevitable uncertainties as the master plan ages, the FAA recommends airports update their master plans every five to ten years, or as necessary to address any significant changes. The primary recommendations from the 2005 Airport Master Plan included acquisition of the necessary land to accommodate future facility requirements and expansion needs; extending Runway 13|31[6], enabling the future construction of a parallel runway which required no relocation of the residents of Colonia Hermosa or any land acquisition in that neighborhood; and considering construction phasing and costs through the development process.

Foresight McAllen Comprehensive Plan (2007) | The Comprehensive Plan is the guiding document for the City of McAllen. The Airport is mentioned in this Plan as a critical component of the region's transportation network. *Foresight McAllen Comprehensive Plan* seeks to improve the connectivity between the Airport and neighboring destinations, such as downtown. A goal of regulating noise-sensitive development around the Airport is also mentioned.

McAllen International Airport Emergency Contingency Plan (2012) | The Airport created an Emergency Contingency Plan pursuant to §42301 of the Federal Aviation Administration (FAA) Modernization and reform Act of 2012. The plan describes how the Airport would handle times of excessive tarmac delays, including: providing for the deplanement of passengers; providing for the sharing of facilities and making gates available at the Airport; and processing international arriving passengers by U.S. Customs and Border Protection (CBP).

[6] Runway 13|31 is now Runway 14|32

STATE AIRPORT PLANNING

The primary planning document for the State of Texas is the TASP, which was last updated in 2010. This document identifies the public-use aviation facilities in the State that perform a critical role in the economic and social development of Texas by providing adequate air access. At the time of this writing, the TASP included 292 airports and two heliports classified by the role provided. MFE is classified as a primary commercial airport in the TASP. **Exhibit 1D** shows TASP facilities in the south Texas region, which are broken down by service levels, as follows:

- **Primary Commercial Service** | These airports support scheduled passenger service by large and medium transport aircraft and enplane at least 10,000 passengers on an annual basis.
- **Non-Primary Commercial Service** | Airports capable of accommodating scheduled passenger service by smaller transport aircraft and enplane fewer than 10,000, but more than 2,500 passengers annually.
- **Reliever** | Airports designed primarily to relieve congestion at Commercial Service airports by providing alternative general aviation facilities.
- **General Aviation (Business/Corporate)** | These airports provide community access as they are capable of accommodating business jets.
- **General Aviation (Community Service)** | Airports that provide community access by single and light twin-engine aircraft and a limited number of business jets.
- **General Aviation (Basic Service)** | Airports capable of providing air access for communities less than 30 minutes (drive time) from Commercial Service, Reliever, Business/Corporate, and Community Service airports, and supports essential but low activity levels.
- **General Aviation (Heliport)** | A facility capable of accommodating helicopters used by individuals, corporations, and helicopter air taxi services. These facilities may support scheduled passenger service if demand exists.

The primary goals of the TASP are to develop a statewide airport system that provides adequate access via air to the population and economic activity centers in Texas, as well as provide timely development and maintenance of the aviation system. The TASP also seeks to maximize the economic benefit and return on investment to the State, local communities, counties, and cities from development of the airport system, as well as integrating the airport system with other transportation modes. **Table 1D** lists the minimum facility and service requirements for airports classified as primary commercial in the TASP. The current airport layout and available services at MFE meet these minimum standards.

Current breakdown of airports in the TASP:

- Commercial Service | 27
- Reliever | 24
- Business/Corporate | 67
- Community Service | 106
- Basic Service | 68
- Heliports | 2

LEGEND
(symbol indicates state role)

- Commercial Service (CMS)
- Reliever (RL) curved line leads to Relieved Commercial Service City/Airport
- Business Corporate (BC)
- Community Service (CS)
- Basic Service (BS)
- Heliport (HE)
- Facilities outlined in yellow are in the National Plan of Integrated Airport Systems (NPIAS)

Source: Texas Airport System Plan 2010

TABLE 1D
Facility and Service Criteria for TASP Primary Commercial Airports

Airport Criteria	Minimum Objective
Airport Reference Code	ARC C-II thru C-IV, DII thru D-VI
Design Aircraft	Heavy Transport
Runways	
Length	As required by critical aircraft
Width	
Strength	
Lighting	High Intensity Runway Lighting
Approach	Precision
Visibility Minimums	200' – 1/2-mile
Taxiways	
Type	Full Parallel
Services	
Services Available	Full Range

Source: Texas Airport System Plan (2010)

FEDERAL AIRPORT PLANNING

Many of the nation's existing airports were either initially constructed by the federal government or their development and maintenance was partially funded through various federal grant-in-aid programs to local communities. The system of airports existing today is therefore due, in large part, to federal policy that promotes the development of civil aviation. As part of a continuing effort to develop a national airport system, the U.S. Congress has maintained a national plan for the development and maintenance of airports.

The FAA maintains a database of airports that are eligible for AIP funding and are for public use called the *National Plan of Integrated Airport Systems* (NPIAS). The NPIAS is published and used by the FAA in administering the AIP, which is the source of federal funds for airport improvement projects across the country. The AIP is funded exclusively by user fees and user taxes, such as those on fuel and airline tickets. An airport must be included in the NPIAS to be eligible for federal funding assistance through the AIP.

The most current plan is the NPIAS 2017-2021, which identified 3,340 public-use airports (3,332 existing and 8 proposed) that are important to national air transportation. The plan estimates that approximately $32.5 billion in AIP-eligible airport projects will require financial assistance between 2017 and 2021. **Table 1E** identifies the types of airports included in the NPIAS.

The AIP is funded exclusively by user fees and user taxes, such as those on fuel and airline tickets.

The NPIAS categorizes airports by the type of activities that take place, including commercial service, cargo service, reliever operations, and general aviation. MFE is currently classified as a small hub, primary commercial airport in the FAA's NPIAS. Primary commercial service airports are grouped into four categories:

- **Large Hub** | Account for at least one percent of total U.S. passenger enplanements
- **Medium Hub** | Account for 0.25 percent to one percent of total U.S. passenger enplanements
- **Small Hub** | Account for between 0.05 percent and 0.25 percent of total U.S. passenger enplanements
- **Nonhub** | Account for less than 0.05 percent of all U.S. passenger enplanements, but more than 10,000 annual enplanements

TABLE 1E
Activity and Development at NPIAS Airports

Number of Airports	Airport Category	Percentage of NPIAS Airports	Percentage of 2014 Total Enplanements[1]	Percentage of All Based Aircraft[2]	Percentage of NPIAS Cost[3]
30	Large Hub	1%	72	0.7%	20.9%
31	Medium Hub	1%	15	1.7%	9.6%
72	Small Hub	2%	8	4.7%	12.8%
249	Nonhub	7%	4	11.6%	16.2%
382	**Primary Subtotal**	**11%**	**99%**	**18.6%**	**59.4%**
89	National	3%	n/a	11.5%	5.4%
531	Regional	16%	n/a	25.6%	12.2%
1,261	Local	38%	n/a	21.2%	15.3%
813	Basic	24%	n/a	3.2%	6.6%
256	Unclassified	8%	n/a	1.0%	0.03%
2,950	**Nonprimary Subtotal**	**89%**	**n/a**	**62.6%**	**39.5%**
3,332	**Total NPIAS Airports**	**100%**	**99%**	**81.2%**	**99.0%**

[1] The remaining one percent of enplanements occurred at non-NPIAS airports
[2] Based on an active general aviation fleet of 203,880 aircraft in 2015
[3] These costs are rounded and do not include the cost for new airports (one percent)
Source: 2017 – 2021 *National Plan of Integrated Airport Systems* (NPIAS)

Primary commercial airports are commercial service airports that have greater than 10,000 passenger boardings within the U.S. in the most current calendar year ending before the start of the current fiscal year. **Table 1F** explains the varying airport classifications and their associated requirements.[7]

TABLE 1F
Categories of Airport Activities

Airport Classifications		Hub Type: Percentage of Annual Passenger Boardings (enplanement)	Common Name
Commercial Service: Publicly owned airports that have at least 2,500 passenger boardings each calendar year and receive scheduled passenger service	**Primary:** Have more than 10,000 passenger boardings each year	**Large:** 1% or more	**Large Hub**
		Medium: At least 0.25%, but less than 1%	**Medium Hub**
		Small: At least 0.05%, but less than 0.25%	**Small Hub**
		Nonhub: More than 10,000, but less than 0.05%	**Nonhub Primary**
	Nonprimary	**Nonhub:** At least 2,500 and no more than 10,000	**Nonprimary Commercial Service**
Nonprimary (Except Commercial Service)		Not Applicable	**Reliever General Aviation**

Source: https://www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/categories/

[7] https://www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/categories/

Airports that apply for and accept AIP grants must adhere to various grant assurances. These assurances include maintaining the airport facility safely and efficiently in accordance with specific conditions. The duration of the assurances depends on the type of airport, the useful life of the facility being developed, and other factors. Typically, the useful life for an airport development project is a minimum of 20 years. Thus, when an airport accepts AIP grants, they are obligated to maintain that facility in accordance with FAA standards for at least that long.

14 CFR Part 139 Certification

An airport must have an Airport Operating Certificate (AOC) if it is serving air carrier aircraft with more than nine seats or serving unscheduled air carrier aircraft with greater than 30 passenger seats. 14 Code of Federal Regulations (CFR) Part 139 (Part 139) describes the requirements for obtaining and maintaining an AOC. This includes meeting various FAA regulations.

Airports are classified in the following categories based on the type of air carrier operations served:

- **Class I Airport** | an airport certificated to serve scheduled operations of large air carrier aircraft (31 passenger seats or more) that can also serve unscheduled passenger operations of large air carrier aircraft and/or scheduled operations of small air carrier aircraft. **MFE is a Class I airport.**
- **Class II Airport** | an airport certificated to serve scheduled operations of small air carrier aircraft (10 to 30 passenger seats) and unscheduled passenger operations of large air carrier aircraft. A Class II airport cannot serve scheduled large air carrier aircraft.
- **Class III Airport** | an airport certificated to serve scheduled operations of small air carrier aircraft. A Class III airport cannot serve scheduled or unscheduled large air carrier aircraft.
- **Class IV Airport** | an airport certificated to serve unscheduled passenger operations of large air carrier aircraft. A Class IV airport cannot serve scheduled large or small air carrier aircraft.

The regulation (which implemented provisions of the *Airport and Airway Development Act of 1970*, as amended Nov. 27, 1971) set standards for: the marking and lighting of areas used for operations; firefighting and rescue equipment and services; the handling and storage of hazardous materials; the identification of obstructions; and safety inspection and reporting procedures. It also required airport operators to have an FAA-approved Airport Certification Manual (ACM). A Class I airport must comply with all sections of Part 139.

The ACM is a required document that defines the procedures to be followed in the routine operation of the airport and for response to emergency situations. The ACM is a working document that is updated annually. It reflects the current condition and operation of the airport and establishes the responsibility, authority, and procedures as required. There are required sections for the ACM covering administrative detail and procedural detail. Each section independently addresses: who (primary/secondary), what, how, and when as it relates to each element.

The administrative sections of the ACM cover such elements as the organizational chart, operational responsibilities, maps, descriptions, weather sensors, access, and cargo. The procedural elements cover

such items as paved and unpaved areas, safety areas, lighting and marking, communications and navigational aids, airport rescue and firefighting (ARFF), handling of hazardous material, utility protection, public protection, self-inspection program, ground vehicle control, obstruction removal, wildlife management, and construction supervision. MFE has a current, approved ACM, which was most recently revised on February 3, 2014.

AVIATION ACTIVITY

At commercial service airports, the number of passenger boardings (enplanements) is a key indicator of operational strength as they are typically the basis for federal grants-in-aid. Enplanement activity is also a good barometer of operational conditions as they can be used to measure the strength of commercial passenger airline services. Another commercial airline indicator is the measure of air cargo shipped, typically recorded in annual enplaned tonnage. The airport's based aircraft and annual operations (take-offs and landings) in aggregate and type are also important aeronautical activity measures to factor. These indicators will be used in subsequent analyses in this master plan to project future aeronautical activity and determine future facility needs. Each of the activity segments is briefly described below.

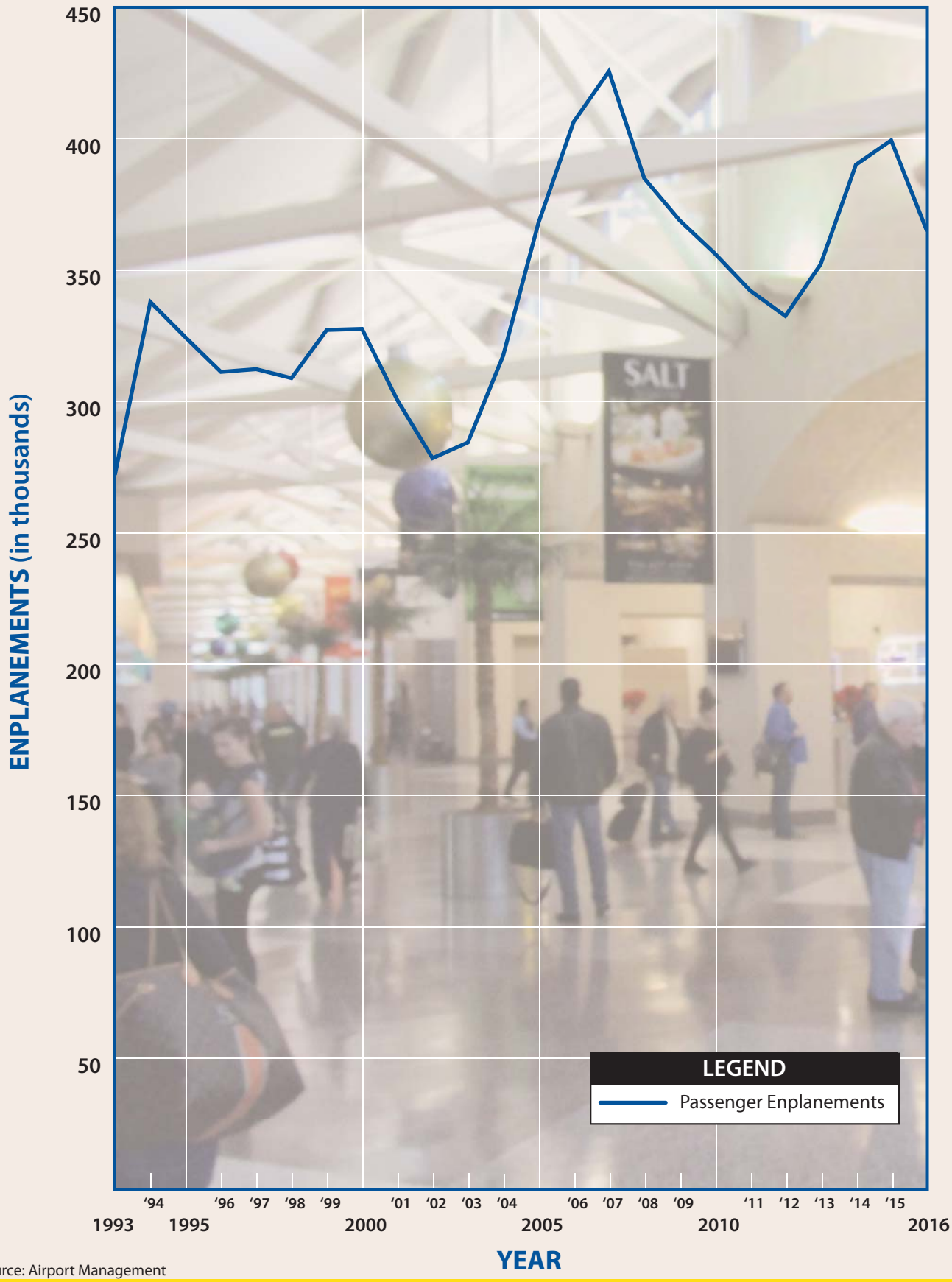
PASSENGER ENPLANEMENTS

Commercial service airports provide local and regional access to the national and international aviation systems. As such, these airports are vital to interstate commerce and a key component to local and regional economic infrastructure. These facilities support and can even drive growth in all socioeconomic categories.

AMERICAN EAGLE COMMERCIAL PASSENGER PLANE

An enplanement includes any revenue passengers that board an aircraft for a fare at the airport. This statistic is important because the FAA uses it to determine the annual level of entitlement funding dedicated to an airport under the AIP. An airport must reach 10,000 annual enplanements to be eligible for a minimum one million dollars in annual entitlement funds. Airline passenger enplanements will typically be influenced by many factors, including number of airlines serving the airport, frequency of daily departures, types of aircraft used, and diversity of number of non-stop destinations. Historic passenger enplanement data is provided on **Exhibit 1E**, which shows a mostly increasing trend with a dip during the recession of the early 2000s caused by the dot-com bubble and the Great Recession, which began in late 2007, as well as from 2015 to 2016.

MFE is currently served by four regularly scheduled airlines, including Aeromar, Allegiant Air, American Airlines, and United Airlines. Between these four airlines, the Airport offers non-stop services to Houston, Dallas-Fort Worth, Mexico City, Los Angeles, and Las Vegas with a seasonal offering to Orlando.



Source: Airport Management

AIR CARGO

The Airport has several cargo delivery providers, who provide a variety of shipping needs – from freight to packages to pets, including: United Parcel Service (UPS), Gulf and Caribbean Cargo, Kalitta Charters, Northern Air Cargo Inc., USA Jet Airlines, Inc., Ameristar Air Cargo, and Everts Air Cargo. The following list outlines the types of aircraft used by each cargo provider:

- **UPS**
  - Boeing 757-200
  - Airbus A300-600
- **Gulf and Caribbean Cargo**
  - Boeing 727-200
  - Convair CV-580
- **Kalitta Charters**
  - McDonnel Douglas DC-9-15F
  - McDonnell Douglas DC-9-30
  - Boeing 727-200
- **Northern Air Cargo, Inc.**
  - Boeing 737-300
  - Boeing 737-100/200
- **USA Jet Airlines, Inc.**
  - McDonnell Douglas DC-9-15F
  - McDonnell Douglas DC-9-30
  - McDonnell Douglas MD-80
  - Falcon 20
- **Ameristar Air Cargo**
  - McDonnell Douglas DC-9-15F
  - McDonnell Douglas MD-8
- **Everts Air Cargo**
  - McDonnell Douglas MD-80

As seen in **Table 1G**, the Airport handles over one million pounds of cargo every month. Although the monthly cargo weight varies by month, the overall trend through the last several years has remained steady.

TABLE 1G
Historical Air Cargo Activity (Reported in Pounds)
McAllen International Airport

Date (month-year)	Enplaned	Deplaned	Total
May-14	669,718	888,292	1,558,010
Jun-14	496,822	889,563	1,386,385
Jul-14	484,628	980,137	1,464,765
Aug-14	441,952	942,598	1,384,550
Sep-14	442,037	773,848	1,215,885
Oct-14	487,904	1,017,343	1,505,247
Nov-14	442,040	801,554	1,243,594
Dec-14	492,230	1,046,248	1,538,478
Jan-15	374,103	723,079	1,097,182
Feb-15	388,702	653,127	1,041,829
Mar-15	431,346	654,319	1,085,665
Apr-15	449,149	695,997	1,145,146
May-15	505,039	725,330	1,230,369
Jun-15	418,315	689,331	1,107,646
Jul-15	441,350	748,050	1,189,400
Aug-15	415,113	789,072	1,204,185
Sep-15	480,753	1,100,275	1,581,028
Oct-15	465,697	1,087,280	1,552,977
Nov-15	388,516	987,546	1,376,062
Dec-15	382,131	775,419	1,157,550
Jan-16	421,868	696,565	1,118,433
Feb-16	487,270	656,908	1,144,178
Mar-16	1,368,139	607,008	1,975,147
Apr-16	567,760	779,059	1,346,819
May-16	604,057	1,139,270	1,743,327
Jun-16	585,580	859,315	1,444,895
Jul-16	481,082	869,667	1,350,749
Aug-16	509,745	1,079,689	1,589,434
Sep-16	497,338	1,055,542	1,552,880
Oct-16	539,879	923,901	1,463,780
Nov-16	427,421	778,751	1,206,172
Dec-16	510,901	997,207	1,508,108
Jan-17	382,749	596,950	979,699
Feb-17	581,976	627,786	1,209,762
Mar-17	718,223	894,015	1,612,238
Apr-17	683,786	926,108	1,609,894

Source: Airport Records

AIRCRAFT OPERATIONS

Aircraft operational statistics at the Airport are recorded by the Airport Traffic Control Tower (ATCT), which classifies operations as either a takeoff or a landing. The ATCT is open from 6:00 a.m. to 12:00 a.m. daily. Aircraft operations are classified as either local or itinerant. Local operations consist mostly of aircraft training operations conducted within the airport traffic pattern and touch-and-go and stop-and-go operations. Itinerant operations are arriving or departing aircraft which have an origin or destination away from the airport. Aircraft operations are further segregated into four general categories: air carrier, air taxi, military, and general aviation.

- **Air Carrier** | operations performed by commercial airline aircraft with greater than 60 seats and/or a maximum payload capacity of 18,000 pounds.
- **Air Taxi** | operations associated with commuter aircraft, but also include for-hire general aviation aircraft.
- **Military** | operations conducted by airplanes and helicopters with a military identification.
- **General Aviation** | includes all other aviation activity from small ultralights to large business jets.

Exhibit 1F presents the annual and monthly (2016) aircraft operations data at MFE since 2000 broken out by type of operation (local or itinerant), as well as the category of operations (air carrier, air taxi, military, or general aviation). Note that Runway 18-36 is not available for air carrier operations. The Airport is considered an international airport of entry.

BASED AIRCRAFT

Identifying the current number of based aircraft is an important part of the master plan process; however, it can be challenging to be accurate given the transient nature of aircraft storage. The Airport maintains a record of aircraft based at the Airport, but data from the FAA's Terminal Area Forecast (TAF) was also consulted. In 2016, there were 122 based aircraft at MFE. Historic based aircraft data is shown on **Exhibit 1F**.

AIRPORT FACILITIES & SERVICES

There are four broad categories of facilities and services at the Airport: airfield, landside, aviation, and support.

- **Airfield facilities** | facilities directly associated with aircraft operations, including runways, taxiways, lighting, markings, navigational aids, and weather reporting. **Exhibit 1G** depicts all airfield facilities at MFE and **Exhibit 1H** shows the gate layout.
- **Landside facilities** | facilities necessary to provide a safe transition from surface to air transportation and support aircraft parking, servicing, storage, maintenance, and operational safety, including non-aviation facilities that typically provide a revenue stream to the airport. **Exhibit 1J** depicts all landside facilities at MFE.

- **Aviation services** | organizations or facilities that provide aviation services, including aircraft fueling, aircraft parking, hangar space/leasing, flying clubs, flight instruction, air medical services, and aircraft maintenance.
- **Support facilities** | serve as a critical link to provide the necessary efficiency to aircraft ground operations, such as aircraft rescue, airport maintenance, firefighting (ARFF), and fuel storage.

AIRFIELD FACILITIES

RUNWAYS

Two runways serve the Airport – Runway 14-32 and Runway 18-36. Runway 14-32 is the Airport's primary runway, and Runway 18-36 is the crosswind runway. Both runways have left traffic patterns. Pilots are cautioned to be alert to runway crossing clearances. Information on both runways is available on **Exhibit 1G**.

Primary Runway 14-32

RUNWAY 14 CENTERLINE

Runway 14-32 is 7,120 feet long and 150 feet wide. The Runway 14 threshold is displaced by 137 feet. It is paved with asphalt and, at the time of this study, is in good condition. It has a single wheel strength of 90,000 pounds, a dual wheel strength of 190,000 pounds, and a double tandem wheel strength of 280,000 pounds. Runway 14-32 has precision pavement markings. Runway lighting consists of high intensity runway lighting (HIRL), a medium approach light system with runway alignment indicator light (MALSR), an unlighted touchdown point, and runway end identifier lights (REILs) on Runway 32 only. Runway 14-32 has an instrument landing system (ILS), glideslope antenna and localizer antenna, as well as global positioning system (GPS) capabilities and a very high frequency with omnidirectional range (VOR) distance measuring equipment (DME) instrument approach. There is a 2-box visual approach slope indicator (VASI) on the south side of Runway 32 at a 3.00-degree glide angle.

Crosswind Runway 18-36

PAVEMENT MARKINGS

Runway 18-36 is 2,638 feet long and 60 feet wide. It is paved with asphalt and, at the time of this study, in good condition. Runway 18-36 has a single wheel strength of 12,500 pounds. There are basic runway pavement markings. Runway lighting consists of medium intensity runway lighting (MIRL) with no approach lighting system. There are unlighted touchdown points; however, there are no REILs. There are no visual and

MONTHLY OPERATIONS (2016)

	Itinerant					Local			
Month	Air Carrier	Air Taxi	General Aviation	Military	Total	Civil	Military	Total	Total Operations
January	593	260	2,541	466	3,860	640	4	644	4,504
February	540	239	2,551	588	3,918	496	74	570	4,488
March	686	253	2,699	513	4,151	728	36	764	4,915
April	556	221	2,213	757	3,747	824	70	894	4,641
May	641	265	2,363	671	3,940	629	130	759	4,699
June	713	222	2,397	602	3,934	748	58	806	4,740
July	696	308	2,444	485	3,933	752	58	810	4,743
August	686	261	2,204	710	3,861	970	102	1,072	4,933
September	644	218	2,509	690	4,061	1,154	34	1,188	5,249
October	667	186	2,638	626	4,117	940	114	1,054	5,171
November	626	192	2,368	640	3,826	967	148	1,115	4,941
December	745	218	2,001	505	3,469	739	4	743	4,212
Total	7,793	2,843	28,928	7,253	46,817	9,587	832	10,419	57,236

ANNUAL OPERATIONS

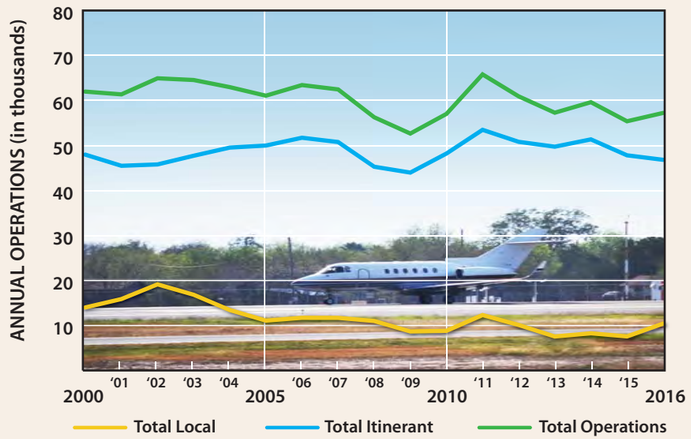
	Itinerant					Local			
Year	Air Carrier	Air Taxi	General Aviation	Military	Total	Civil	Military	Total	Total Operations
2000	7,053	1,639	33,583	5,694	47,969	13,600	407	14,007	61,976
2001	6,640	1,197	31,544	6,106	45,487	15,423	452	15,875	61,362
2002	5,832	2,249	31,475	6,233	45,789	18,638	504	19,142	64,931
2003	6,258	1,149	32,247	8,065	47,719	16,177	657	16,834	64,553
2004	5,962	3,949	33,564	6,059	49,534	13,186	248	13,434	62,968
2005	6,385	3,529	33,200	6,873	49,987	10,728	352	11,080	61,067
2006	6,589	6,455	31,539	7,138	51,721	11,320	388	11,708	63,429
2007	6,630	6,530	30,876	6,733	50,769	10,980	714	11,694	62,463
2008	6,517	3,757	29,850	5,154	45,278	10,612	382	10,994	56,272
2009	5,858	4,971	27,217	5,933	43,979	8,253	420	8,673	52,652
2010	5,661	5,094	32,750	4,704	48,209	7,637	1,174	8,811	57,020
2011	7,648	2,904	36,812	6,116	53,480	11,310	1,007	12,317	65,797
2012	6,783	3,945	34,665	5,420	50,813	9,844	263	10,107	60,920
2013	5,563	5,809	33,765	4,597	49,734	7,266	286	7,552	57,286
2014	4,831	7,029	33,751	5,746	51,357	7,816	448	8,264	59,621
2015	6,980	4,397	31,906	4,533	47,816	7,067	500	7,567	55,383
2016	7,793	2,843	28,928	7,253	46,817	9,587	832	10,419	57,236
Total	108,983	67,446	547,672	102,357	826,458	189,444	9,034	198,478	1,024,936

Sources: FAA OPSNET, FAA TAF, Airport Management

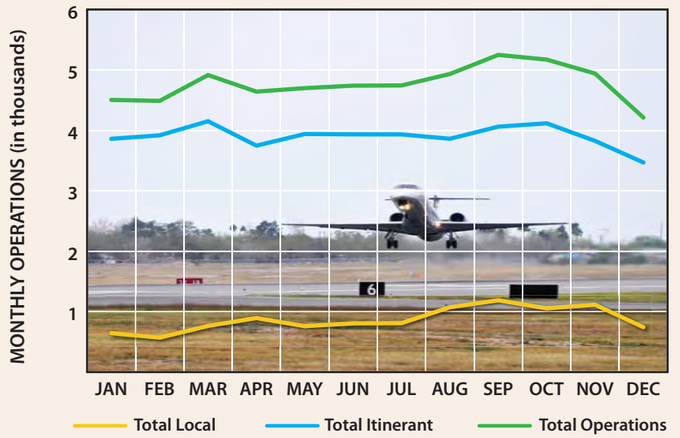
BASED AIRCRAFT

Year	Number of Aircraft
1990	148
1991	122
1992	102
1993	102
1994	94
1995	94
1996	94
1997	87
1998	87
1999	83
2000	83
2001	92
2002	114
2003	119
2004	104
2005	105
2006	107
2007	107
2008	106
2009	104
2010	104
2011	109
2012	109
2013	109
2014	109
2015	150
2016	122

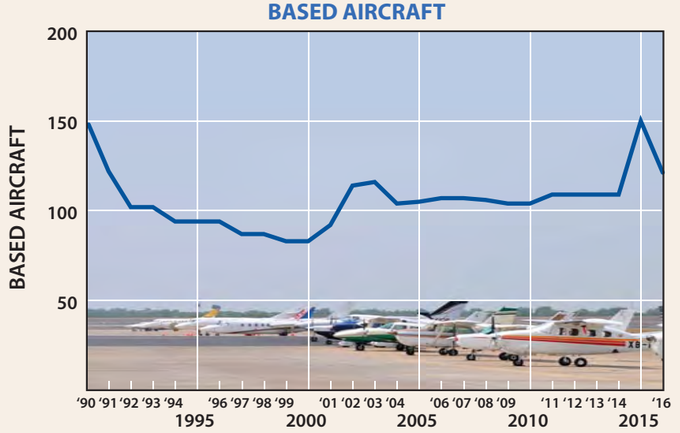
ANNUAL OPERATIONS



MONTHLY OPERATIONS



BASED AIRCRAFT



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RUNWAYS	Runway 14|32	Runway 18|36
Length (feet)	7,120	2,638
Width (feet)	150	60
Threshold Displacement (feet)	137 | 0	0
Pavement Surface Material	Asphalt	Asphalt
Pavement Surface Treatment	Grooved	None
Pavement Condition	Good	Good
Pavement Markings (Type, Condition)	Precision, Fair	Basic, Fair
Traffic Pattern	Left | Left	Left | Left
Runway Pavement Load Bearing Strength (lbs.)		
Single Wheel Gear Loading (SWL)	90,000	12,500
Dual Wheel Gear Loading (DWL)	190,000	N/A
Double Tandem Wheel Gear Loading	280,000	N/A
Runway Lighting		
Runway Edge Lighting	HIRL	MIRL
Approach Lighting System (ALS)	MALSR | None	None
Touchdown Point	Yes (no lights)	Yes (no lights)
Runway End Identifier Lights (REILs)	No | Yes	None
Visual Approach Aids		
Type	None | 2-Box VASI on left	2-Light PAPI[1] on left | None
Visual Glide Angle	3.00 degrees	4.00 degrees
Instrument Approach Aids		
Instrument Landing System (ILS)	Yes	No
Global Positioning System (GPS)	Yes	No
VOR/DME	Yes	No

[1] Out of service indefinitely

TAXIWAYS			
Designation	Width (feet)*	Type	Lighting
A	75	Parallel	MITL
A1	130	Connector	MITL
A3	130	Connector	MITL
A4	130	Connector	MITL
C	40	Parallel	MITL
C1	75	Connector	MITL
C2	30	Connector	MITL
D	50	Connector	MITL

*measured from edge of pavement

WEATHER AND NAVIGATIONAL AIDS
Airport Beacon
Lighted Wind Indicator
ATCT | 118.5 (6:00 am - 12:00 am)
CTAF | 118.5 MhZ
UNICOM | 122.95 MhZ
ATIS | 128.5 MhZ
ASOS | (956) 664-8212

KEY	
ASOS | Automated Surface Observing System	**MALSR** | MALS with Runway Alignment Indicator Lights
ATCT | Air Traffic Control Tower	**MITL** | Medium Intensity Taxiway Lighting
ATIS | Automated Terminal Information System	**MIRL** | Medium Intensity Runway Lighting
CTAF | Common Traffic Advisory Frequency	**PAPI** | Precision Approach Path Indicator
DME | Distance Measuring Equipment	**UNICOM** | Universal Communication Frequency
HIRL | High Intensity Runway Lighting	**VASI** | Visual Approach Slope Indicator
MALS | Medium Intensity Approach Lighting	**VOR** | Very High Frequency Omnidirectional Range

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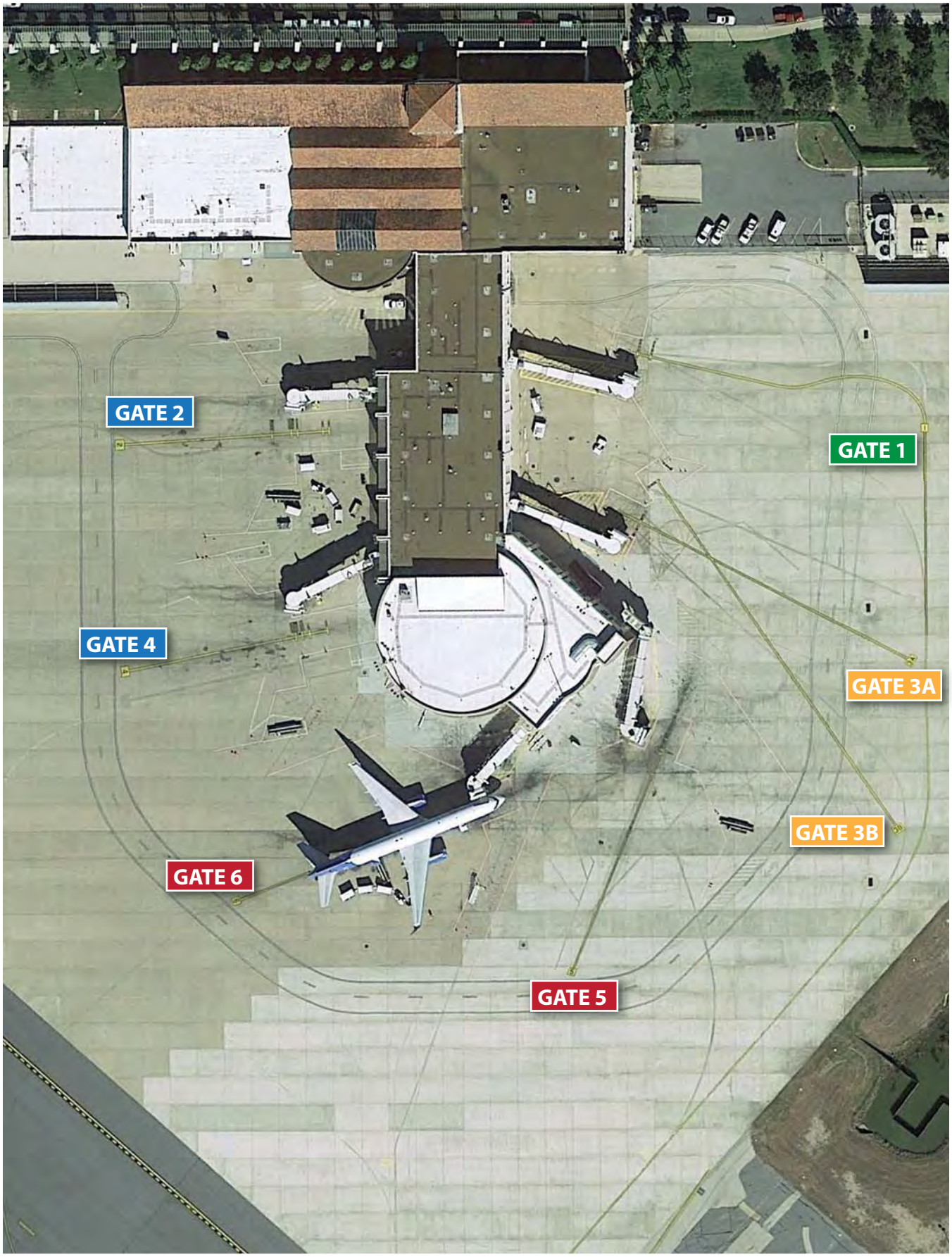

GATE 2
GATE 1
GATE 4
GATE 3A
GATE 3B
GATE 6
GATE 5

instrument approach aids on Runway 18-36. There is a 2-light precision approach path indicator (PAPI) on the east side of Runway 18 at a 4.00-degree glide angle; however, this PAPI system is out of service indefinitely.

TAXIWAYS

The taxiway system at MFE consists of parallel and connector taxiways. Taxiway widths shown on **Exhibit 1G** are measured from pavement edge to edge. All taxiways are lighted with medium intensity taxiway lighting (MITL).

TAXIWAY C1 SIGNAGE

Parallel taxiways are primarily designed to efficiently and quickly route aircraft between the runway and the originating/destination location. Taxiways A and C are the Airport's only full length and fully parallel taxiways. Taxiway A is 75 feet wide and Taxiway C is 40 feet wide, both of which are constructed of asphalt. Taxiway A runs the length of Runway 14-32, whereas Taxiway C is the primary Taxiway for Runway 18-36.

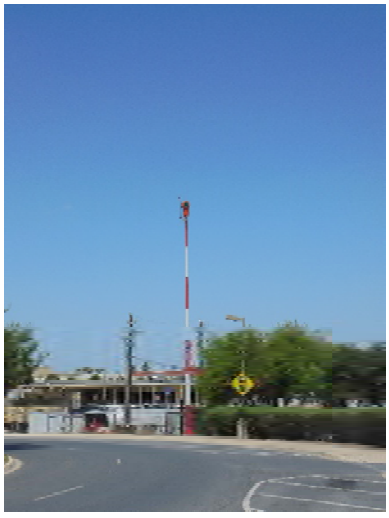
There are six connector taxiways at the Airport. Taxiways A1, A3, and A4 connect Runway 14-32 with Taxiway A. Taxiways C1 and C2 connect Runway 18-36 to Taxiway C. Taxiway D serves as a connection from the General Aviation Apron to the Terminal Apron.

AIRFIELD LIGHTING

Airfield lighting systems extend an airport's usefulness into periods of darkness and/or poor visibility. A variety of lighting systems are installed at the Airport for this purpose. These lighting systems, categorized by function, are summarized as follows.

Airport Identification Lighting

The location of the Airport at night is universally identified by a rotating beacon. The rotating beacon projects two beams of light, one white and one green, 180 degrees apart. The beacon operates from sunset to sunrise and is located west of Runway 18 near the U.S. Customs and Border Patrol facility and the rental car ready/return parking lot.


AIRPORT BEACON

Bldg #	Tenant	Square Feet*	Bldg #	Tenant	Square Feet*
1	Vacant		15	Fuel Farm	1,410
2	McCreery Aviation, Inc.	12,099	16	McCreery Aviation, Inc.	9,474
3	McCreery Aviation, Inc.	19,332	17	McCreery Aviation, Inc.	12,308
4	McCreery Aviation, Inc.	19,343	18	Rio Grande Railcar, LLC	4,885
5	McCreery Aviation, Inc.	12,555	19	Craftech Enterprises, Inc.	20,057
6	McCreery Aviation, Inc.	14,199	20	Thomas Michael Stanton Dba Western Flyers	2,651
7	Aircraft Rescue and Firefighting Station	10,604	21	U.S. DHS CBP Air and Marine Facilities	4,434
8	FNBG Financial Group, LP	15,076	22	Walter J. Passmore	8,138
9	FNBG Financial Group, LP	15,479	23	MFE Aviation, LLC	8,171
10	McCreery Aviation, Inc.	20,244	24	Thomas Michael Stanton Dba Western Flyers	12,353
11	McCreery Aviation, Inc.	12,267	25	Thomas Michael Stanton Dba Western Flyers	11,795
12	McCreery Aviation, Inc.	7,868	26	Thomas Michael Stanton Dba Western Flyers	11,458
13	McCreery Aviation, Inc.	15,011	27	Freedom Aero, LLC	8,105
14	McCreery Aviation, Inc.	1,278	28	Mayfair Properties, LLC	8,126

*Square footage of hangars are approximations from Google Earth

Aerial Photo: Martinez Geospatial 9-14-17

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Approach Lighting System (ALS)

An ALS is a configuration of lights positioned symmetrically along the extended runway centerline to supplement navigational aids, such as an instrument landing system (ILS), to provide lower visibility minimums. Runway 14 is equipped with a MALSR; however, there are no approach lighting systems available on Runway 32 or Runway 18-36. The MALSR on Runway 14 extends approximately 2,300 feet north of the Runway 14 threshold.

RUNWAY 14 MALSR AND LOCALIZER ARRAY

Runway Pavement and Edge Lighting

Pavement edge lighting defines the lateral limits of the pavement to ensure safe operations during night and/or times of low visibility, which maintains safe and efficient access to and from the runway and aircraft parking areas. Runway 14-32 is equipped with HIRL and Runway 18-36 has MIRL.

OUT OF SERVICE PAPI ON RUNWAY 18

Visual Approach Lighting

Visual approach aids are installed at the Airport to assist pilots in determining the correct descent path to the runway end during landing. A two-box VASI is available on the left side of Runway 32. The VASI is a system of lights that provides visual descent guidance during approach. The system emits either white or red light, depending on the angle at which it is viewed. Based on the combination of lighting colors, the pilot can determine if he/she is on the correct glide slope for the approach. Runway 18 is equipped with a two-box PAPI; however, it is out of service indefinitely.

Taxiway Lighting

MFE has MITL that is elevated on mounted units to each side of the taxiway.

Pilot-Controlled Lighting

During nighttime hours when the ATCT is closed (12:00 a.m. to 6:00 a.m.), pilots can use the pilot-controlled lighting (PCL) system to activate certain airfield lights from their aircraft through a series of clicks of their radio transmitter using the common traffic advisory frequency (CTAF) (118.5 MHz).

Airfield Signage

Airfield identification signs assist pilots in identifying runways, taxiway routes, holding positions, and critical areas. The airfield at MFE is equipped with lighted signs located at each taxiway intersection.

AIRPORT MARKINGS

Pavement markings aid in the movement of aircraft along surfaces at the Airport and identify closed or hazardous areas. The Airport provides and maintains marking systems in accordance with Part 139.311(a) and Advisory Circular 150/5340-1, *Standards for Airport Marking*.

As mentioned previously, Runway 14-32 has precision instrument markings, and Runway 18-36 has basic markings for a visual runway. Both runway and taxiway markings at the Airport indicate thresholds, hold lines, and centerlines. **Exhibit 1K** indicates hold position distances, which are measured from the runway centerline to the hold line (in feet).

NAVIGATIONAL AIDS

Navigational aids are electronic devices that transmit radio frequencies that pilots in properly equipped aircraft can translate into point-to-point guidance and position information. MFE has a VOR/DME to aid aircraft flying in and out of the Airport.

The VOR provides azimuth readings to pilots of properly equipped aircraft by transmitting a radio signal at every degree to provide 360 individual navigational courses. DME is combined with a VOR facility to provide distance, as well as direction information to the pilot. At MFE, the VOR/DME is located on the southwestern side of the Airport, west of Runway 14-32.

The U.S. Department of Defense initially developed the global positioning system (GPS) for military navigation around the world. Now, GPS is used extensively for a wide variety of civilian uses, including civil aircraft navigation. GPS uses satellites placed in orbit around the globe to transmit electronic signals, which pilots of properly equipped aircraft use to determine altitude, speed, and navigational information. This provides more freedom in flight planning and allows for more direct routing to the destination. GPS provides for enroute navigation and Localizer Performance (LPV) navigation with vertical guidance instrument approaches to MFE.

INSTRUMENT LANDING SYSTEM (ILS) EQUIPMENT

Airports offering full ILS approaches are equipped with both a glideslope antenna and localizer antenna array. The glideslope antenna provides vertical guidance to landing aircraft and can be located on either side of the runway; however, it is best to locate the glideslope antenna on the side of the runway with the least possibility of signal reflections from buildings, power lines, vehicles, aircraft, etc. At MFE, runway ends 14 and 32 are equipped with ILSs. Runway 14's glideslope antenna is on the west side of the airfield between Taxiways A3 and A4. The glideslope antenna for Runway 32 is also on the west side of the airfield and is located near Taxiway A1.

The localizer antenna array provides horizontal guidance and is used to establish and maintain an approaching aircraft's position relative to the runway centerline until visual contact confirms the runway alignment and location. Typically, the localizer antenna array is sited on the extended runway centerline

485′
320′
255′
A4
A
250′
A3
125′
125′
C
128′
125′
C2
130′
125′
D
Runway 14-32 (7,120′ x 150′)
Runway 18-36 (2,638′ x 60′)
A
C
106′
125′
C1
296′
C
130′
A
250′
A1
250′
NORTH
0
800
SCALE IN FEET
LEGEND
Airport Property Line
NOTE:
Hold position distance = runway centerline to hold line
Aerial Photo: Martinez Geospatial 9-14-17

between 1,000 feet and 2,000 feet from the end of the runway. At MFE, the localizer antenna for Runway 14 is located approximately 900 feet north of the runway end. The localizer antenna for Runway 32 is located approximately 1,000 feet south of the runway end. The equipment shelters, which house electronic equipment, are located approximately 250 feet or greater from the localizer antennae, as required by the FAA.

EQUIPMENT SHELTER

WEATHER AND COMMUNICATION

As mentioned previously, MFE is served by an ASOS. The system updates weather observations every minute, continuously reporting changes by calling (956) 664-8212. The ASOS reports cloud ceiling, visibility, temperature, dew point, wind direction, wind speed, altimeter setting (barometric pressure), and density altitude (airfield elevation corrected for temperature). The ASOS is co-located with the Runway 14 ILS/glideslope antenna.

MFE also has a lighted wind cone and segmented circle located between the triangulation of Taxiways A, C, and D. The wind cone informs pilots of the wind direction and speed, while the segmented circle indicates aircraft traffic pattern information.

LANDSIDE FACILITIES

TERMINAL BUILDING

COFFEEZONE BEFORE SECURITY

The terminal building is centrally located on the east side of Taxiway A at 2500 South Bicentennial Boulevard. Originally built in 1993, the terminal building was expanded and remodeled in 2015 to accommodate the approximate 2.4 million passengers that use the terminal annually. Post-expansion, the terminal building is approximately 148,000 square feet with a wide range of amenities, including:

- Free wireless internet
- Two restaurants and a bar
- Two retail shops
- Electronic charging stations built into terminal seating
- Shoe shine service
- Seven on-Airport rental car counters
- Airline ticket counters
- Baggage claim
- Six airline gates
- Easy access to parking lots

Lagardère Travel Retail, formerly the Paradies Shops, operates a Consumer News and Business Channel (CNBC) Store and Explore McAllen in the terminal building. These shops offer books, magazines, bottled soft drinks and water, pre-packaged snacks, travel pillows, and souvenir merchandise reflective of Texas and the Rio Grande Valley. The remodel of the terminal building also changed the food and beverage venues. CoffeeZone is now a full-service restaurant offering meals all day long. In the event of a power outage, there is a back-up emergency generator for the Terminal Building, as well as the airfield.

AIRLINE COUNTERS

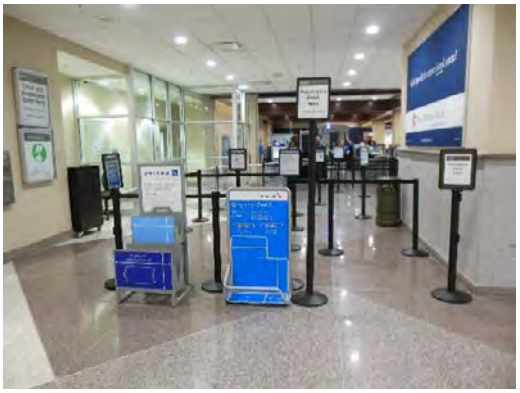
GREETING LOBBY AND CONCESSIONS AREA

Upper Level

Exhibit 1L illustrates the upper and lower levels layout of the Terminal Building.

When passengers enter the upper level of the Airport, airline check-in counters are concentrated to the right (west), with a greeting lobby and concessions area straight ahead. To the left (east) of the main entrances are rental car counters and two baggage claim carousels. Airport administration and TSA both have office space on the upper level, as well.

Once past security, there are six gates. Gates 1 through 4 are along the corridor, and Gates 5 and 6 are at the south end of the terminal. There are additional concession areas post-security, as well as holdroom seating areas at each gate. Each gate has a check-in area with a podium and space for passengers to access the aircraft loading bridges.



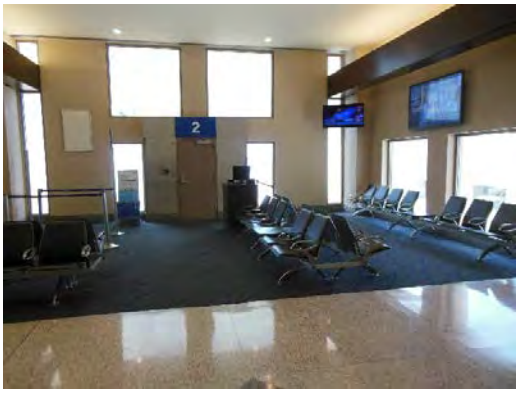
SECURITY CHECK POINT

Lower Level

The lower level of the terminal is dedicated primarily to baggage screening, in-bound baggage handling, office/storage spaces, federal inspection services (FIS), loading dock, and HVAC/mechanical space.

BAGGAGE CLAIM CAROUSEL

CONVENIENCE SHOP POST SECURITY



GATE 2 WAIT AREA

TERMINAL ACCESS ROADWAYS

The terminal building is accessible from South Bicentennial Boulevard and from South Hangar Lane, both of which are off Wichita Avenue. Cars must enter from the entrance closest to La Piedad Cemetery as South Bicentennial Boulevard is a one-way circulation drive. The entrance road has two lanes heading south, with the opportunity to enter the long-term parking area on the left. Upon beginning entrance to the Airport, cars can also veer right toward the taxi stand and La Piedad Cemetery. Shortly after the entrance to long-term parking, there is another left-handed entrance for access to short-term parking. Cars then enter the terminal curb frontage area for passenger drop-off and pick-up. Just beyond the terminal curb frontage, there is another opportunity to enter the short- or long-term parking lots via a left-handed entrance. Off to the right, there is the entrance to the rental car parking area. The entrance to the U.S. Customs and Border Patrol building is on the right-hand side of South Bicentennial Boulevard as cars exit the Airport.

TERMINAL CURB FRONTAGE

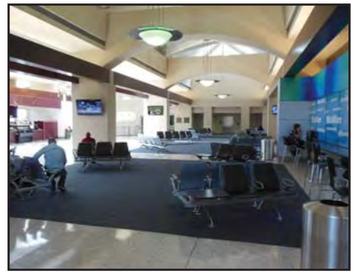
The curb frontage area is clearly denoted with a paved brick road and people crossing signs. Along the terminal curb frontage area, there are three access ways to the short- and long-term parking areas, all of which are handicap accessible. The first part of the curb frontage area is intended for passenger drop-off at the departures end. Passenger pick-up is at the end of the terminal curb frontage area at the arrivals area. The entirety of the curb frontage area is approximately 586 feet in length, half of which is for drop-off and the other half for pick-up.

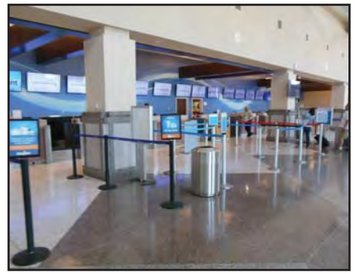
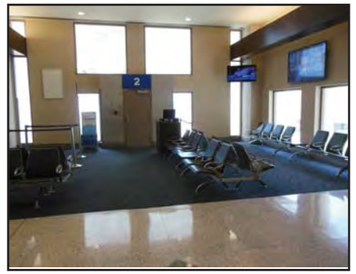
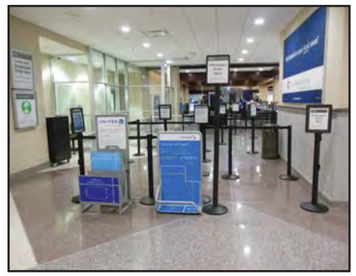
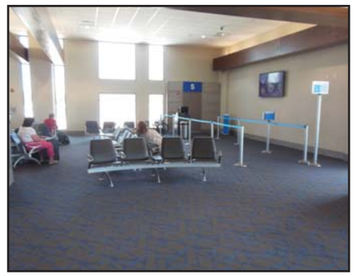
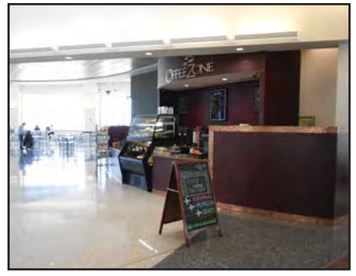
TERMINAL CURB FRONTAGE

LOWER LEVEL

LEGEND

- Greeting Lobby
- Airline Ticketing
- Airline Ticket Queue
- Circulation/Stairwell/Elevator
- Commuter Lobby
- Inbound Baggage
- Outbound Baggage - Interior
- Outbound Baggage - Exterior
- Baggage Claim
- Federal Inspection Services (FIS)
- Loading Dock
- Holdroom
- Office Space/Storage
- MFE Office Space
- Airline Office Space
- TSA Office Space
- Rental Car Offices and Counter
- Rental Car Queuing
- Restroom
- Gate Check-in
- Concessions
- Concession Seating
- Security Screening
- Security Queuing
- HVAC/Mechanical
- Server Room



LEGEND

- Greeting Lobby
- Airline Ticketing
- Airline Ticket Queue
- Circulation/Stairwell/Elevator
- Commuter Lobby
- Inbound Baggage
- Outbound Baggage - Interior
- Outbound Baggage - Exterior
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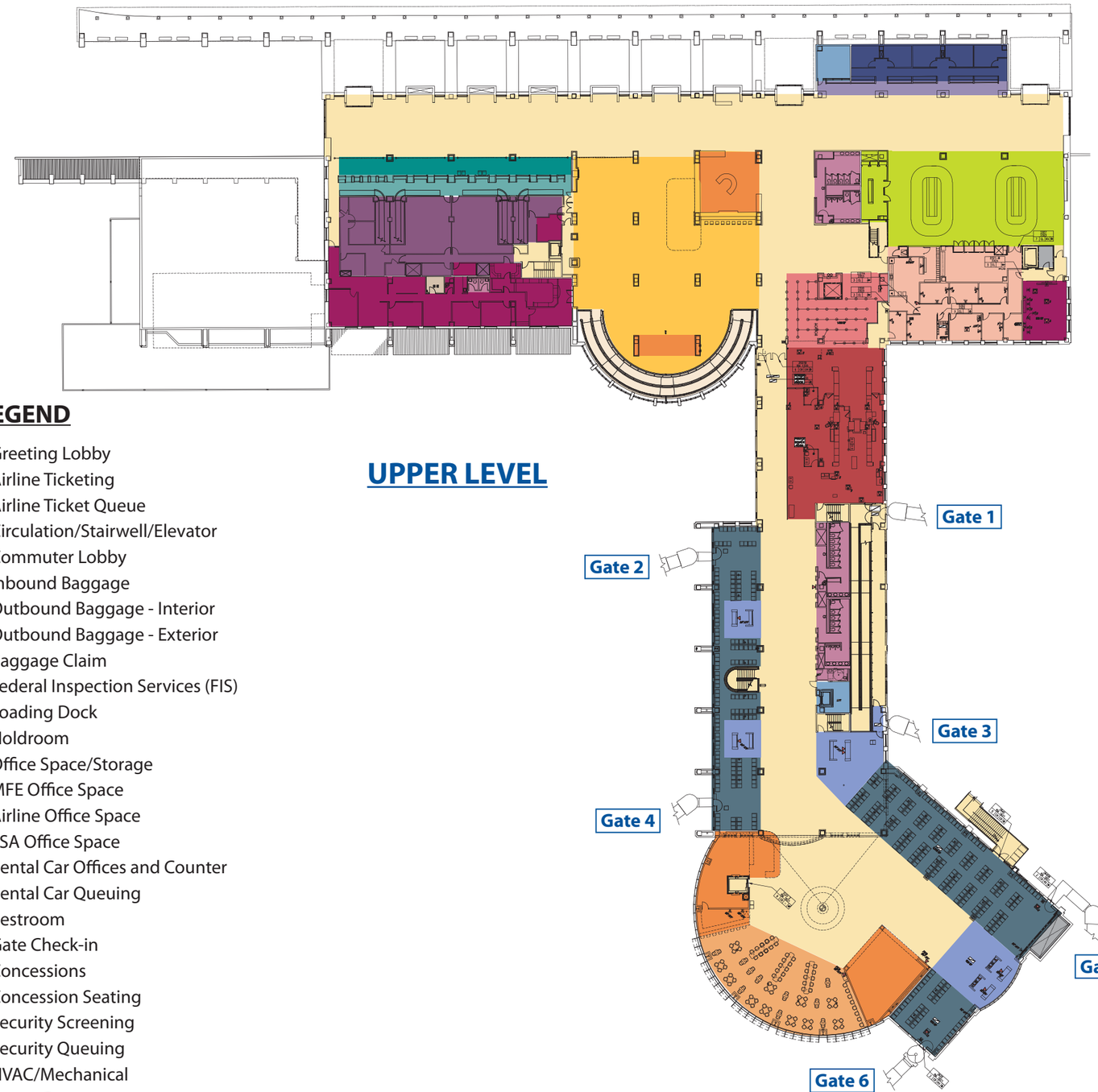
- Concessions
- Concession Seating
- Security Screening
- Security Queuing
- HVAC/Mechanical
- Server Room

UPPER LEVEL



VEHICLE PARKING

Vehicle parking is available at several locations surrounding the Airport, with a total of almost 1,700 spaces. **Table 1H** indicates the capacity of each lot, including the number of accessible parking spaces. Parking is available for City of McAllen employees, passengers, and rental cars. The rates vary depending on the lot and duration of stay.

TABLE 1H
Automobile Parking Lots
McAllen International Airport

Lot	Accessible Spaces	Regular Spaces	Capacity
Short-term	13	130	143
Long-term	18	848	866
Employee/Overflow	12	308	320
Rental car[1]	--	--	209

[1] Ten of the spaces in this lot are designated for city personnel
Source: Airport personnel

SHORT- AND LONG-TERM PARKING LOTS

Curbside access provides for three lanes and a curbside parking lane. Directly north of the terminal building is a short- and long-term passenger lot whose pay system is operated by Republic Parking System. Payless Car Rental and Thrifty Car Rental also utilize this lot. Other rental car agencies have a dedicated ready/return lot to the east of the short- and long-term parking lot, of which 10 spaces are exclusively for the use of city personnel. The employee parking lot is northeast of the terminal building.

McAllen Flight Academy has its own small lot off South Hangar Lane. There is additional parking at the end of South Hangar Lane near the ATCT and several hangars. At the intersection of Wichita Avenue and South 10th Street, McCreery Aviation has several parking spaces available. All hangars along South 10th Street (which becomes south Old 10th Street) have multiple parking spots for convenient hangar access. There are additional parking spaces near the U.S. Border Patrol building; however, note that the lot directly east of the U.S. Border Patrol building is off Airport property.

AIR CARGO FACILITY

The air cargo facility, built in 1988, and accompanying apron, are northwest of the terminal building and are accessible from Uvalde Avenue. The cargo apron is approximately 35,830 square yards and can accommodate up to four B-727 aircraft simultaneously. The air cargo facility itself has a continuous line of truck dock spaces on one side of the 48,120-square foot building. The air cargo facility is part of the City's Foreign Trade Zone (FTZ), which encompasses 775 acres of land in McAllen.[8]

AIR CARGO FACILITY

[8] http://www.mcallenftz.org/mcallen-ftz-overview.php

There are five cargo tenants at the Airport, including:

- Ace Forwarding Inc. (Bays 18 and 19)
- Davila's Delivery Service (Bays 8 and 9)
- GSI (cargo office)
- United Parcel Service (UPS) (Bay 13)
- ATS (Bay 17)

Except for UPS, tenants of the cargo facility strictly provide ground transfer services. UPS operates its own cargo aircraft at the Airport. Cargo bays one through four are currently used to store airfield maintenance equipment.

AIRCRAFT HANGAR FACILITIES

Existing hangar facilities at MFE are identified on **Exhibit 1J**, along with the existing tenant and footprint area (in square feet). Hangar facilities are concentrated west of 10th Street and the general aviation apron.

AIRCRAFT PARKING APRONS

There are four aircraft parking aprons at the Airport – the cargo apron, terminal apron, general aviation apron, and U.S. customs apron. All four serve unique purposes for the Airport.

1. The **cargo apron** is specifically for cargo aircraft and associated activity. There is space for four aircraft at one time and the area consists of approximately 35,830 square yards of apron space.
2. The **terminal apron** provides parking for commercial service aircraft at the terminal facility's six gates equipped with passenger loading bridges. The terminal apron is constructed of concrete and has an area of approximately 73,978 square yards.
3. The **general aviation aprons** are accessible from South 10th street on the east side and South Hangar Lane on the west side. The general aviation aprons accommodate aircraft and passengers of general aviation operators located on either side of Runway 18-36. The general aviation aprons combine for an area of approximately 80,119 square yards and a total of 83 tie-downs available.
4. The **customs apron** is located between La Piedad Cemetery and the terminal building. It consists of approximately 5,993 square yards and is utilized for conducting federal inspection services (FIS) by customs officials.

TERMINAL APRON AREA

GENERAL AVIATION APRON AREA

NOISE WALL

There are three blast shields for jet blast protection. One is located on the Terminal Ramp west of jet bridge number two for protection of the outbound baggage building. The second blast wall is located on the northern portion of the General Aviation Ramp to protect vehicles and pedestrians on Wichita Avenue. A third noise wall is located on the general aviation FIS ramp.

AVIATION SERVICES

FIXED BASE OPERATOR (FBO)

There is one fixed base operator (FBO) at the Airport – McCreery Aviation.

- **McCreery Aviation** | This FBO has served the Airport since 1946. The hours of operation are from 5:00 am to 10:00 pm with afterhours service upon request. At the U.S. Customs and Border Protection ramp, McCreery Aviation offers complete line service with Texaco Jet A and 100LL fuel. The FBO also offers hangar space and tie-downs, pilot lounge, conference room, catering, and crew car availability. McCreery Aviation will also offer hotel accommodation service for overnight guests. Additional departments include: aircraft charter, air ambulance, flight instruction, aircraft rental, aircraft sales and management, maintenance, parts, pilot supplies, and avionics services.[9]

MCCREERY AVIATION

CHARTER SERVICE PROVIDER

Western Flyers Air Service provides charter operations at the Airport. They are an FAA-Certified air carrier offering executive travel using either Beechcraft King Airs or a Beechcraft Baron. Flights can accommodate up to seven passengers, with service destination across the domestic U.S., Mexico, and Central America.

McCreery Aviation also offers air charter services. These services are available 24 hours per day to the U.S. and Mexico. McCreery Aviation operates Cessna 421C aircraft for charter flights that can accommodate up to six passengers.

[9] http://www.mccreeryaviation.com/

SUPPORT FACILITIES

FIRE STATION & ARFF

14 CFR Part 139 airports are required to provide aircraft rescue and firefighting (ARFF) services during air carrier operations that require a Part 139 certificate. Each certificated airport maintains equipment and personnel based on an ARFF index established according to the length of aircraft and scheduled daily flight frequency. There are five indices, A through E, with A applicable to the smallest aircraft and E the largest (based on wingspan). The Airport falls within ARFF Index C based upon the MD-80 aircraft. As such, the Airport is required to maintain a fleet of equipment and properly trained personnel consistent with this standard.

ARFF STATION

The ARFF facility at the Airport is located just east of Taxiway D on the general aviation apron. **Table 1J** details ARFF equipment available at MFE. Vehicles three and four are used as the primary units to meet the published Index C requirements. Vehicle two is considered a reserve unit.

Table 1J
ARFF Equipment
McAllen International Airport

Vehicle Number	2	3	4
Vehicle Type	T-1500	T-1500	T-1500
Vehicle Manufacturer	Oshkosh	Oshkosh	Oshkosh
Year	2005	2009	1991
Condition of Vehicle	Excellent	Excellent	Good
Water Capacity (Gallons)	1,500	1,500	1,500
Discharge Rate (Gallons per Minute)	1,950 GPM	1,950 GPM	1,200 GPM
Roof Turret	800 GPM	800 GPM	800 GPM
Bumper Turret	300 GPM	300 GPM	300 GPM
Handline	95 GPM	95 GPM	60 GPM
Dry Chemical (Pounds)	450 LBS	450 LBS	700 LBS
Dry Chemical Discharge Rate Handline (Pounds per Second)	5 LBS / SEC	5 LBS / SEC	5 LBS / SEC
Dry Chemical Discharge Rate Turret (Pounds per Second)	15 LBS / SEC	15 LBS / SEC	15 LBS / SEC

Source: Airport Management

FUEL STORAGE

Fuel providers at the Airport have varied over the years, but McCreery Aviation has always been the primary fuel provider. Rio Grande Chemical is another fuel provider at the Airport. McCreery Aviation has five underground storage tanks that offer Jet A, 100 Low Lead (LL) (Avgas), and diesel. There are four Jet A tanks with a total combined storage capacity of 72,000 gallons. There is one 12,000-gallon 100LL

tank, and one 1,000-gallon diesel tank. Rio Grande Chemical has one above ground storage tank with a 1,700-gallon capacity with Jet A. **Table 1K** summarizes fuel sales and flowage from each provider combined for 2013 through May of 2017.

Table 1K
Fuel Usage and Sales
McAllen International Airport

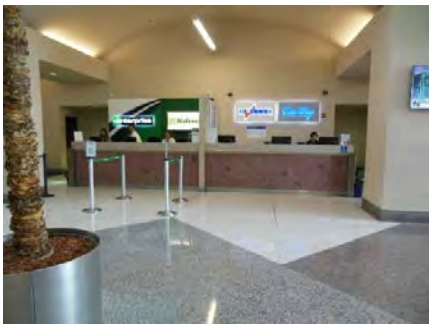
	2017[1, 4]	2016[1]	2015[2]	2014[3]	2013[2]
Total Gallons	517,225.60	1,431,759.00	1,641,959.10	1,817,838.50	1,528,703.00
Total Sales	$31,033.54	$85,905.54	$98,517.55	$109,070.31	$91,722.18

[1] Includes fuel sales from Rio Grande Chemical, McCreery Aviation
[2] Includes fuel sales from Rio Grande Chemical, McCreery Aviation, and Mayfair Properties
[3] Includes fuel sales from Mayfair Properties (no longer a tenant at the Airport) and McCreery Aviation
[4] 2017 fuel data reflects sales from January to May
Source: Airport Records

RENTAL CAR SERVICE & STORAGE

There are eight rental car companies at the Airport, including:[10]

- Enterprise
- National
- Hertz
- Dollar
- Thrifty
- Avis
- Payless
- Budget (off-site)
- Aleman (off-site)



RENTAL CAR COUNTERS

RENTAL CAR PARKING LOT

VEHICLE AIRFIELD ACCESS & PERIMETER FENCING

There is an on-Airport access road that connects to the eastern side of the terminal apron that is denoted with yellow x's. This road passes the jet and prop blast diverter before continuing past the cargo facility. The road then follows the perimeter of the Airport property line, down and around Runway 14-32 before terminating at the general aviation apron. The entire perimeter of the Airport is protected by a perimeter fence or facility buildings. There are nine electrically operated vehicle gates within the perimeter, all of which are overseen by the McAllen Department of Aviation.

[10] http://www.mcallenairport.com/terminal/transportation.aspx

AIRPORT DRAINAGE

ON-AIRPORT DRAINAGE CHANNEL

Given that there are no natural streams in McAllen, all storm-water removal must be done via man-made drainage features, as shown on **Exhibit 1M**. There are two primary drainage channels bisecting the Airport, the Mission Inlet and an Airport drainage ditch, both of which cross Runway 14-32. San Juan Canal carries water from the Rio Grande River, one of the City's raw water sources. The Mission Inlet carries water north from the Rio Grande River under the west end of Runway 14-32.

In addition to the Airport drainage ditch and Mission Inlet, the Airport's storm drainage system comprises a system of culverts, ditches, and two detention basins that collect surface runoff for diversion to the Mission Pilot Channel. These detention basins help separate oil from stormwater runoff. Approximately two miles southeast of the Airport, the Mission Pilot Channel connects with the Banker Floodway at a gated outlet structure. After Hurricane Beulah in 1967 flooded the entire Airport, the Banker Weir was constructed to divert water from the Rio Grande River to the Banker Floodway. The Mission Pilot Channel is now used to convey and store only local stormwater run-off.[11]

UTILITIES

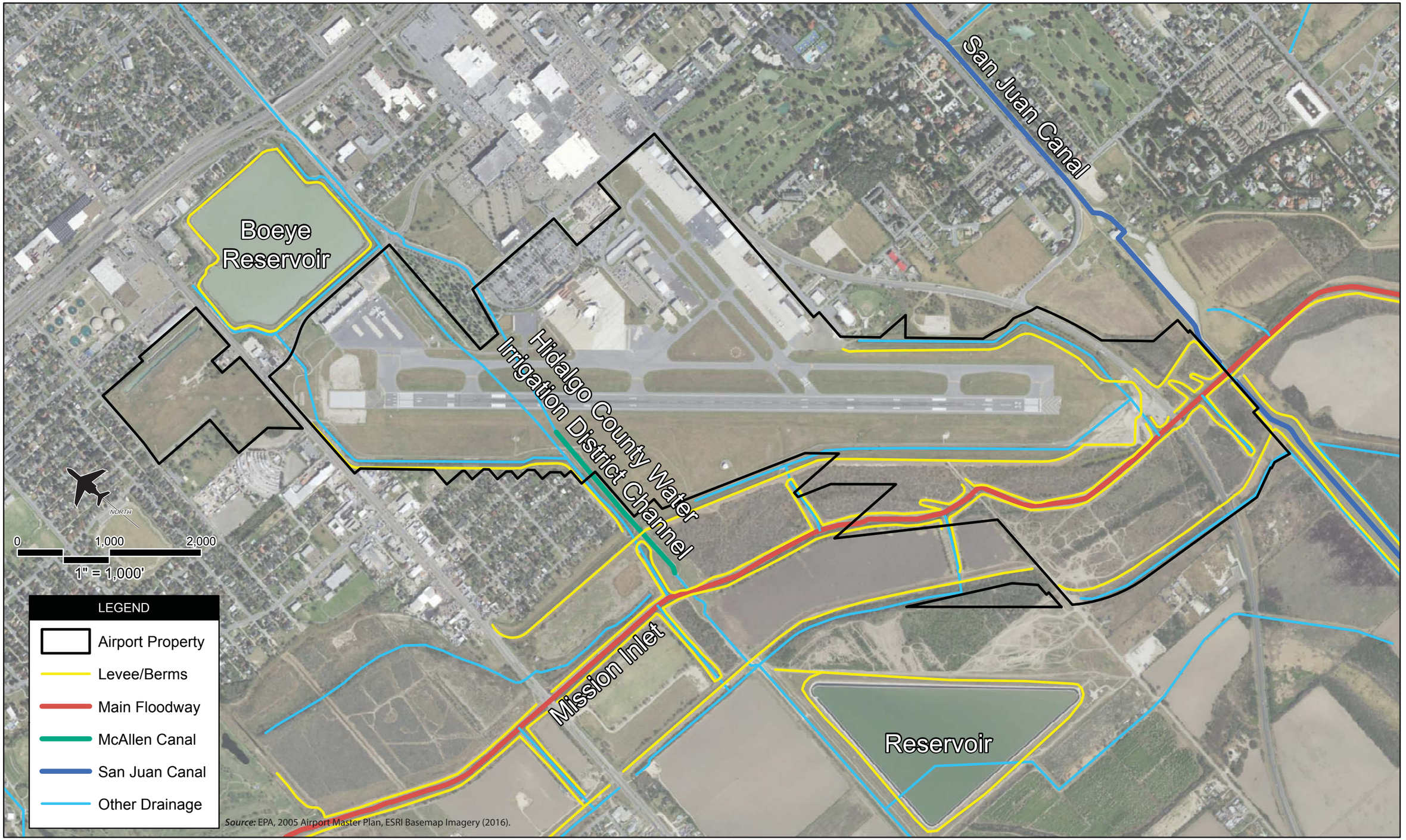
The following utilities serve the Airport:

- Water, wastewater & storm drainage | McAllen Public Utilities
- Storm Drainage: City of McAllen
- Electricity | American Electric Power
- Natural Gas | Texas Gas Service
- Trash & Recycling | City of McAllen

AREA AIRSPACE & AIR TRAFFIC CONTROL

The *FAA Act of 1958* established the FAA as the responsible agency for the control and use of navigable airspace within the U.S. The FAA has established the National Airspace System (NAS) to protect persons and property on the ground, in addition to establishing a safe and efficient airspace environment for civil, commercial, and military aviation. The NAS covers the common network of U.S. airspace, including air navigation facilities; airports and landing areas; aeronautical charts; associated rules, regulations, and procedures; technical information; and personnel and material. The system also includes components shared jointly with the military.

[11] Airport Master Plan Update, 2005



Source: EPA, 2005 Airport Master Plan, ESRI Basemap Imagery (2016).

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AIRSPACE STRUCTURE

Airspace within the U.S. is broadly classified as either "controlled" or "uncontrolled." The difference between controlled and uncontrolled airspace relates primarily to requirements for pilot qualifications, ground-to-air communications, navigation and air traffic services, and weather conditions. Six classes of airspace have been designated in the U.S., as shown on **Exhibit 1N**. Airspace designated as Class A, B, C, D, or E is considered controlled airspace. Aircraft operating within controlled airspace are subject to varying requirements for positive air traffic control. Airspace near MFE is depicted on **Exhibit 1P**.

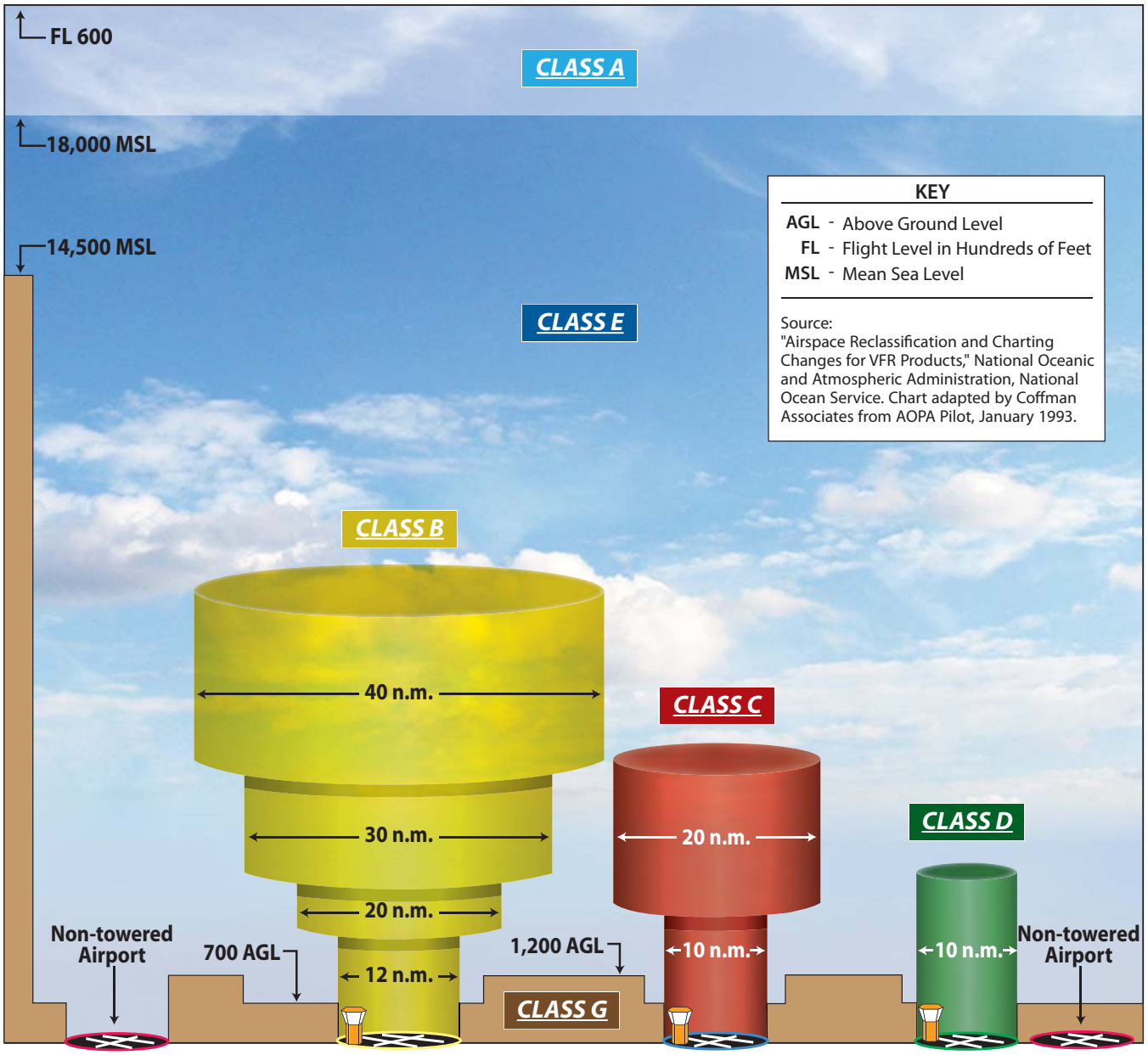
Class A Airspace | Class A airspace includes all airspace from 18,000 feet MSL to flight level (FL) 600 (approximately 60,000 feet MSL) over the contiguous 48 states and Alaska. This airspace is designated in Federal Aviation Regulation (F.A.R.) Part 71.33 for positive control of aircraft. All aircraft must be on an IFR clearance to operate within Class A airspace.

Class B Airspace | Class B airspace has been designated around some of the country's major airports, such as George Bush Intercontinental Airport (IAH) and William P. Hobby Airport (HOU), to separate all aircraft within a specified radius of the primary airport. Each Class B airspace is specifically tailored for its primary airport. All aircraft operating within Class B airspace must have air traffic control clearance. Certain minimum aircraft equipment and pilot certification requirements must also be met. This airspace is the most restrictive controlled airspace routinely encountered by pilots operating under VFR in an uncontrolled environment. The nearest Class B airspace supports IAH and HOU, to the east-northeast.

Class C Airspace | The FAA has established Class C airspace at approximately 120 airports around the country that have significant levels of IFR traffic. Class C airspace is designed to regulate the flow of uncontrolled traffic above, around, and below the arrival and departure airspace required for high-performance, passenger-carrying aircraft at major airports. To fly inside Class C airspace, an aircraft must have a two-way radio, an encoding transponder, and have established communication with the ATC facility. Aircraft may fly below the floor of the Class C airspace or above the Class C airspace ceiling without establishing communication with ATC. The nearest Class C airspace to MFE surrounds Valley International Airport (HRL), approximately 30 nautical miles to the east.

Class D Airspace | Class D airspace is controlled airspace surrounding airports with an ATCT. The Class D airspace typically constitutes a cylinder with a horizontal radius of four or five nautical miles (NM) from the airport, extending from the surface up to a designated vertical limit, typically set at approximately 2,500 feet above the airport elevation. As shown on **Exhibit 1P**, MFE operates within Class D airspace beginning at the surface and extending to 2,600 feet MSL during the operational hours of the ATCT. Aircraft operators planning to operate within Class D airspace are required to contact the MFE air traffic control prior to entering or departing MFE airspace and must maintain in contact while within the controlled airspace to land at MFE or to transverse the area. When the ATCT is inactive, MFE airspace reverts to Class E airspace.

Class E Airspace | Class E airspace consists of controlled airspace designed to contain IFR operations near an airport and while aircraft are transitioning between the airport and enroute environments. Unless otherwise specified, Class E airspace terminates at the base of the overlying airspace. Only aircraft



DEFINITION OF AIRSPACE CLASSIFICATIONS

CLASS A Generally airspace above 18,000 feet MSL up to and including FL 600.

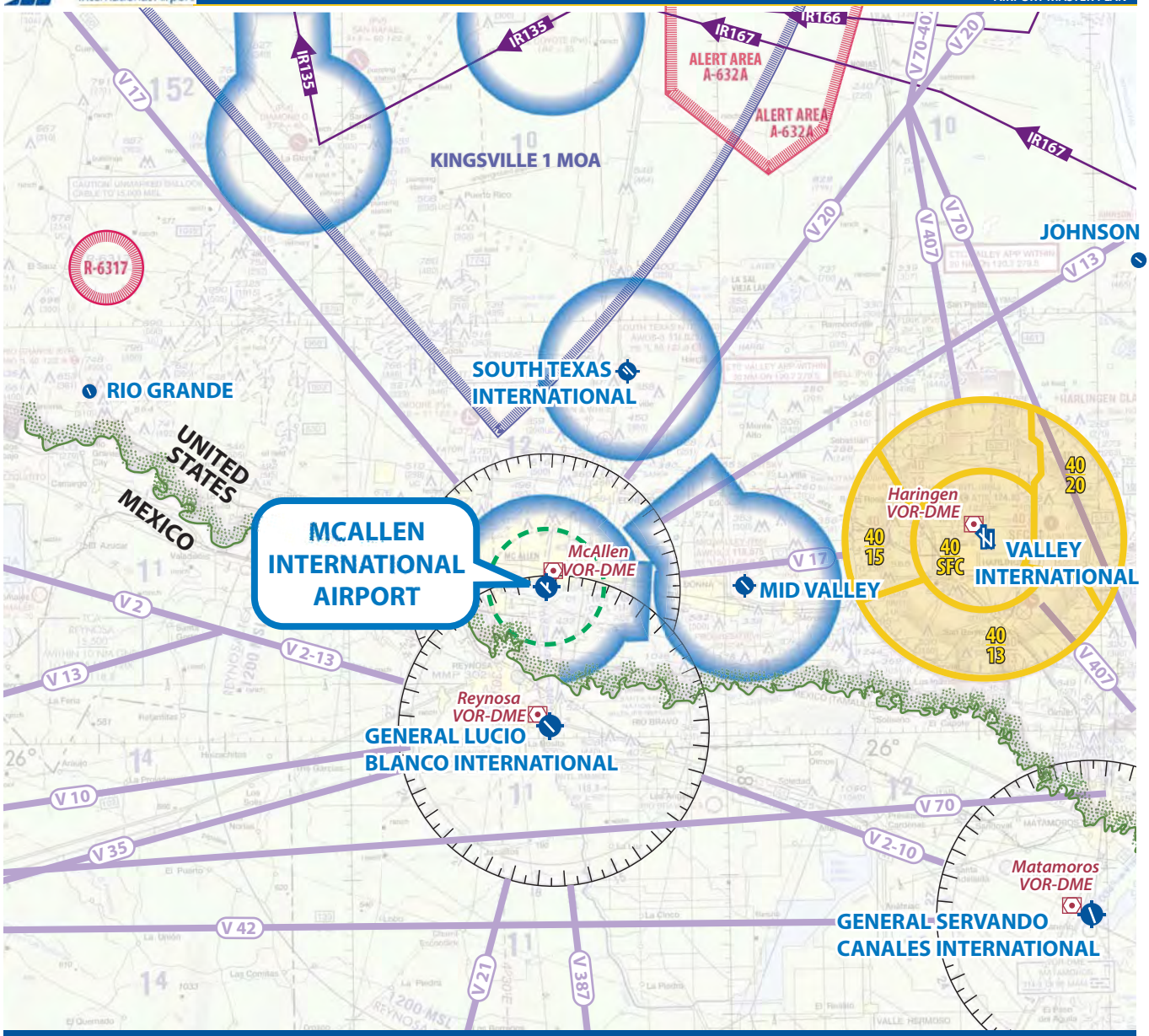
CLASS B Generally multi-layered airspace from the surface up to 10,000 feet MSL surrounding the nation's busiest airports.

CLASS C Generally airspace from the surface to 4,000 feet AGL surrounding towered airports with service by radar approach control.

CLASS D Generally airspace from the surface to 2,500 feet AGL surrounding towered airports.

CLASS E Generally controlled airspace that is not Class A, Class B, Class C, or Class D.

CLASS G Generally uncontrolled airspace that is not Class A, Class B, Class C, Class D, or Class E.



LEGEND

- Airport with hard-surfaced runways 1,500' to 8,069' in length
- Airports with hard-surfaced runways greater than 8,069' or some multiple runways less than 8,069'
- VOR-DME
- Compass Rose
- Air Defense Identification Zone
- Victor Airways
- Class C Airspace
- Class D Airspace
- Class E (sfc) Airspace with floor 700 ft. above surface that laterally abuts 1200 ft. or higher Class E airspace
- Military Training Route
- Prohibited, Restricted, and Warning Area
- Military Operations Area

N

NOT TO SCALE

Source: Brownsville Sectional Chart, US Department of Commerce, National Oceanic and Atmospheric Administration, 2/2/17

operating under IFR are required to be in contact with ATC when operating in Class E airspace. While aircraft conducting visual flights in Class E airspace are not required to be in radio communications with ATC facilities, visual flight can only be conducted if minimum visibility and cloud ceilings exist.

Class G Airspace | Airspace not designated as Class A, B, C, D, or E is considered uncontrolled, or Class G, airspace. Air traffic control does not have the authority or responsibility to exercise control over air traffic within this airspace. Class G airspace lies between the surface and the overlaying Class E airspace (700 to 1,200 feet above ground level).

While aircraft may technically operate within this Class G airspace without any contact with ATC, it is unlikely that many aircraft will operate this low to the ground. Furthermore, federal regulations specify minimum altitudes for flight. F.A.R. Part 91.119*, Minimum Safe Altitudes*, generally states that except when necessary for takeoff or landing, pilots must not operate an aircraft over any congested area of a city, town, or settlement, or over any open-air assembly of persons, at an altitude of 1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft.

Over less congested areas, pilots must maintain an altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure. Helicopters may be operated at less than the minimums prescribed above if the operation is conducted without hazard to persons or property on the surface. In addition, each person operating a helicopter shall comply with any routes or altitudes specifically prescribed for helicopters by the FAA.

Special Use Airspace | Special use airspace is defined as airspace where activities must be confined because of their nature or where limitations are imposed on aircraft not taking part in those activities. The designation of special use airspace identifies for other users the areas where military activity occurs, provides for segregation of that activity from other fliers, and allows charting to keep airspace users informed. These areas are depicted on **Exhibit 1N**.

Victor Airways | For aircraft arriving or departing the regional area using VOR facilities, a system of Federal Airways, referred to as Victor Airways, has been established. Victor Airways are corridors of airspace eight miles wide that extend upward from 1,200 feet above ground level (AGL) to 18,000 feet MSL and extend between VOR navigational facilities. Victor Airways are shown with violet lines on **Exhibit 1P**. For aircraft enroute or departing MFE, there are several Victor Airways available converging at the McAllen VOR-DME, which is on Airport property.

Alert Areas / Military Operations Area (MOA) / Restricted Areas| Alert Areas, MOAs, and Restricted Areas are depicted on aeronautical charts to inform nonparticipating pilots of areas that may contain a high volume of pilot training, military operations/activities, or an unusual type of aerial activity. Pilots should exercise caution near and within these areas. All activity within these areas, if granted by the controlling agency, should be conducted in accordance with regulations, without waiver, and pilots of participating aircraft, as well as pilots transitioning the area, are equally responsible for collision avoidance. The Kingsville 1 MOA, beginning approximately 12 nautical miles (NM) north of MFE, is controlled by the United States Navy and is utilized for general training activities at altitudes ranging from 8,000

feet to 35,000 feet MSL. Alert Area A-632A begins approximately 34 NM north/northeast of MFE and is utilized for formation flights at altitudes ranging from 6,000 to 17,999 feet MSL. Restricted Airspace R-6317 begins approximately 36 NM northwest of MFE, is five miles in diameter and is controlled by the U.S. Customs and Border Protection, Air and Marine Operations Center.

AIRSPACE CONTROL

The FAA has established 21 Air Route Traffic Control Centers (ARTCCs) throughout the continental U.S. to control aircraft operating under IFR within controlled airspace and while enroute. An ARTCC assigns specific routes and altitudes along Federal Airways to maintain separation and orderly traffic flow. The Houston Center ARTCC controls IFR airspace enroute to and from MFE.

AIRPORT TRAFFIC CONTROL TOWER

Flight service stations (FSS) are air traffic facilities which provide pilot briefings, flight plan processing, inflight radio communications, search and rescue (SAR) services, and assistance to lost aircraft and aircraft in emergency situations. FSSs also relay air traffic control clearances, process Notice to Airmen (NOTAMs), broadcast aviation meteorological and aeronautical information, and notify Customs and Border Protection of trans border flights. The San Angelo FSS is the nearest of its kind to MFE.

Airport Traffic Control Tower (ATCT) | The ATCT, which has a top elevation of 146 feet MSL, is located southeast of the terminal building. The tower operates from 6:00 a.m. to midnight seven days per week. Tower controllers provide services to aircraft operating on the Airport and generally within a five-mile radius of the Airport, as approved by the collocated approach control facility. When the tower is closed, the airspace is turned over to the Houston Center ARTCC.

FLIGHT PROCEDURES

Flight procedures are a set of predetermined maneuvers established by the FAA, using electronic or visual navigational aids that assist pilots in locating and landing or departing from an airport. For MFE, there are instrument approach procedures and departure procedures as shown on **Exhibit 1Q**.

Instrument Approach Procedures: Instrument approach procedures are a series of predetermined maneuvers established by the FAA, using electronic navigational aids that assist pilots in locating and landing at an airport, especially during instrument flight conditions. There are currently six published instrument approach procedures, including an ILS approach to Runways 14 and 32. Precision instrument approaches provide vertical descent information and course guidance information to the pilot. Non-precision approaches only provide course guidance to the pilot; however, the relatively new GPS localizer

	WEATHER MINIMUMS BY AIRCRAFT TYPE							
	Category A		Category B		Category C		Category D	
	CH	VIS	CH	VIS	CH	VIS	CH	VIS
Runway 14 ILS Approaches								
Straight-In ILS	200	½	200	½	200	½	200	½
Straight-In LOC	513	½	513	½	513	1	513	1
Circling	513	1	513	1	513	1 ½	693	2 ¼
Runway 32 ILS Approaches								
Straight-In ILS	200	¾	200	¾	200	¾	200	¾
Straight-In LOC	485	1	485	1	458	1 ⅜	458	1 ⅜
Circling	473	1	473	1	473	1 ½	693	2 ¼
RNAV (GPS) Runway 14								
LPV DA	200	½	200	½	200	½	200	½
LNAV/VNAV DA	311	½	311	½	311	½	311	½
LNAV MDA	413	½	413	½	413	¾	413	¾
Circling	473	1	473	1	473	1 ½	693	2 ¼
RNAV (GPS) Runway 32								
LPV DA	200	¾	200	¾	200	¾	200	¾
LNAV/VNAV DA	289	⅞	289	⅞	289	⅞	289	⅞
LNAV MDA	378	1	378	1	378	1	378	1
Circling	473	1	473	1	473	1 ½	693	2 ¼
VOR RUNWAY 14								
Straight-In 14	513	½	513	½	513	1	513	1
Circling	513	1	513	1	513	1 ½	693	2 ¼
VOR RUNWAY 32								
Straight-In 32	558	1	558	1	558	1 ⅝	558	1 ⅝
Circling	553	1	553	1	553	1 ⅝	693	2 ¼

Aircraft categories are based on the approach speed of aircraft, which is determined as 1.3 times the stall speed in landing configuration. The approach categories are as follows:

Category A | 0-90 knots (e.g., Cessna 172)
Category B | 91-120 knots (e.g. Beechcraft King Air)
Category C | 121-140 knots (e.g., B-737, Regional Jets, Canadair Challenger)
Category D | 141-166 knots (e.g., B-747, Gulfstream IV)
Category E | Greater than 166 knots (e.g., Certain military aircraft)

ABBREVIATIONS

CH | Cloud Height
DA | Decision Altitude (used for vertically guided approaches)
GPS | Global Positioning System
ILS | Instrument Landing System
MDA | Minimum Descent Altitude
LNAV/VNAV | A technical variant of GPS (Lateral, Vertical Navigation)
LOC | Localizer
LPV | Localizer Performance with Vertical Guidance
VOR | Very High Frequency Omnidirectional Range
VIS | Visibility (in miles)

Source: AirNav

performance with vertical guidance (LPV) approaches are currently categorized by the FAA as a non-precision approach even though it provides vertical guidance.

The visibility and cloud height minimums associated with the approach define the capability of an instrument approach procedure. Visibility minimums define the horizontal distance the pilot must be able to see to complete the approach. Cloud height defines the lowest level a cloud layer (defined in feet above the ground) can be situated for the pilot to complete the approach. If the observed visibility or cloud ceilings are below the minimums prescribed for the approach, the pilot cannot complete the instrument approach. **Exhibit 1Q** summarizes FAA-approved and published instrument approach procedures, including associated weather minimums for MFE.

The most sophisticated instrument approach procedures at MFE are associated with the ILS to Runways 14 and 32. The ILS or localizer (LOC) Runway 14 approaches provide visibility minimums as low as ½-mile and cloud heights of 200 feet above ground level (AGL) (referred to as Category 1 or CAT 1 approach). Instrument approaches based on GPS have become very common across the country. GPS is inexpensive, as it does not require a significant investment in ground-based systems by an airport or FAA. Both runway ends at MFE are served by GPS approaches with associated minima, as presented on **Exhibit 1P**. GPS LPV approaches provide both horizontal and vertical guidance information to pilots. Advancements in GPS technology have allowed for instrument approach procedures to provide minimums as low as ILS systems. Currently, the GPS approaches to each runway include an LPV component.

The other published approach utilizes very high frequency omnidirectional range (VOR) technology and provides for circling minimums, which allow pilots the flexibility to land on the runway most closely aligned with the prevailing wind at that time. This flexibility generally requires circling approaches to have higher visibility minimums than the straight-in approaches. This is done to provide pilots with sufficient visibility and ground clearance to navigate visually from the approach to the desired runway end for landing. This circling instrument approach procedure is non-precision in nature.

Local Operating Procedures: The traffic pattern at the Airport is maintained to provide the safest and most efficient use of the airspace. At MFE, all four runway ends use a left-hand traffic pattern. The typical traffic pattern altitude for rotorcraft is 500 feet AGL; piston aircraft is between 800 and 1,000 feet AGL; and 1,500 feet AGL for turbine aircraft. Note that Runway 18-36 is not available for air carrier operations.

MFE does not have aircraft restrictions, curfews, or a mandatory noise abatement program, as these programs would violate the Federal *Airport Noise and Capacity Act* (ANCA) of 1990. Federal law requires the Airport to remain open 24 hours a day, 7 days a week, and to accept all civilian and military aircraft that can be safely accommodated.

AREA AIRPORTS

There are five airports open to the public with instrument procedures within 60 miles of MFE, as shown on **Exhibit 1R**. The next closest commercial service airport is Valley International Airport in Harlingen,

approximately 32 miles to the east. In addition to the public-use airports, there are several private landing strips within a 20-mile radius of MFE, including:

- Mid Valley Dusters | 16 miles W
- Gross Private Airport | 6 miles N
- Moore Field | 18 miles N
- Putz Airport | 10 miles W
- Progreso Airport | 18 miles SE
- Norman & White Airport | 16 miles NE

SOCIOECONOMIC CHARACTERISTICS

Socioeconomic characteristics are collected and examined to derive an understanding of the dynamics of growth near The Airport. This information is essential in determining aviation demand level requirements, as most general aviation demand is directly related to the socioeconomic condition of the surrounding region. Statistical analysis of population, employment, and income trends provide a picture of the economic strength of the region, as well as the ability of the area to sustain a strong economic base into the future. Additional socioeconomic data will be used in the forecast chapter; however, the information provided in this chapter will introduce socioeconomic trends in the study area.

Hidalgo, Cameron, Starr, and Willacy Counties make up the Rio Grande Valley, which is in the center of the Rioplex region. The Rioplex includes the four Rio Grande Valley Counties and the Northern Mexico border cities between Matamoros and Ciudad Mier. The cities of McAllen, Brownsville, and Harlingen make up the northern half of the Rioplex.[12] **Exhibit 1S** shows population, employment, and income trends from 1990 to present day for Cameron, Starr, and Willacy Counties, and the McAllen-Edinburg-Mission MSA/Hidalgo County, as well as future projections. Note that the McAllen-Edinburg-Mission MSA encompasses the entirety of Hidalgo County, and thus the population, employment, and income figures are identical for each of these entities. The McAllen Chamber of Commerce (2013) indicated that growth is expected in the Rio Grande Valley, which includes these four counties. The data in **Exhibit 1S** echo this trend of growth, showing that all four counties are anticipated to grow in population, employment, and per capita income over the next 20 years.

The City of McAllen historically had an economy based solely on agricultural operations, primarily cotton and citrus, until the McAllen-Hidalgo-Reynosa Bridge opened in 1941. This bridge created a gateway from McAllen to Mexico that launched an exchange of people and goods. Retirees from the northern U.S. flocked to McAllen's temperate climate, and wealthy Mexican residents crossed the border to shop at La Plaza Mall. During the 1980s and 1990s, affordable labor became more readily available, igniting the development of the McAllen Foreign Trade Zone (FTZ). The passage of the North American Free Trade Agreement (NAFTA) in 1994 further propelled McAllen into a future of international trade, retail, and tourism.[13]

Today, there are two million people living within 15 miles of the Airport, many of whom are bilingual and living and working on both sides of the U.S./Mexico border. There are an approximate five million

[12] McAllen Chamber of Commerce
[13] McAllen Economic Development Corporation (http://www.mcallenedc.org/doing-business-here/about-the-area)

MCALLEN INTERNATIONAL AIRPORT (MFE)

NPIAS Classification ..... **Primary**
FAA Asset Study Classification ..... **N/A**
Location from MFE ..... **N/A**
Elevation ..... **107 ft**
Weather Reporting ..... **ASOS**
ATCT ..... **Yes**
Annual Operations **57,236**
Annual Enplanements **365,928**
Based Aircraft **122**

Runways	18-36	14-32
Length	2,638 ft.	7,120 ft.
Width	60 ft.	150 ft.
Pavement Strength		
SWL	12,500 lbs.	90,000 lbs.
DWL	**N/A**	190,000 lbs.
DWT	**N/A**	280,000 lbs.
Lighting	MIRL	HIRL
Marking	Basic	Precision
Approach Aids	PAPI-2 on left | None	None | VASI-2 on left
Instrument Approach Procedures	None	None

Services Provided: 100LL and Jet A fuel, aircraft tiedowns, major airframe, and major power plant services.

BROWNSVILLE/SOUTH PADRE ISLAND INT'L AIRPORT (BRO)

NPIAS Classification ..... **Primary**
FAA Asset Study Classification ..... **N/A**
Location from MFE ..... **47 nm E**
Elevation ..... **22.4 ft**
Weather Reporting ..... **ASOS**
ATCT ..... **Yes**
Annual Operations **27,154**
Annual Enplanements **120,151**
Based Aircraft **60**

Runways	13-31	18-36
Length	7,399 ft.	6,000 ft.
Width	150 ft.	150 ft.
Pavement Strength		
SWL	75,000 lbs.	75,000 lbs.
DWL	170,000 lbs.	144,000 lbs.
DWT	240,000 lbs.	150,000 lbs.
Lighting	HIRL	MIRL
Marking	Precision	Nonprecision
Approach Aids	MALSR | None	PAPI-4 | VASI-4
Instrument Approach Procedures	ILS/DME | None	None

Services Provided: 100LL and Jet A fuel, aircraft tiedowns and hangars, major airframe and power plant service, high bottled and bulk oxygen.

MID VALLEY AIRPORT (T65)

NPIAS Classification ..... **General Aviation**
FAA Asset Study Classification ..... **Local**
Location from MFE ..... **14 nm E**
Elevation ..... **70 ft**
Weather Reporting ..... **AWOS**
ATCT ..... **No**
Annual Operations **610**
Annual Enplanements ..... **N/A**
Based Aircraft **45**

Runways	14-32
Length	6,002 ft.
Width	75 ft.
Pavement Strength	
SWL	12,500 lbs.
DWL	N/A
DWT	N/A
Lighting	MIRL
Marking	Nonprecision
Approach Aids	PAPI-4
Instrument Approach Procedures	N/A

Services Provided: 100LL and Jet A fuel, aircraft tiedowns, major airframe, and major power plant services.

PORT ISABEL-CAMERON COUNTY AIRPORT (PIL)

NPIAS Classification ..... **General Aviation**
FAA Asset Study Classification ..... **Regional**
Location from MFE ..... **48 nm E**
Elevation ..... **18.6 ft**
Weather Reporting ..... **ASOS**
ATCT ..... **No**
Annual Operations **29,420**
Annual Enplanements ..... **N/A**
Based Aircraft **13**

Runways	13-31	8-26	3-21	17-35
Length	8,001 ft.	5,317 ft.	5,000 ft.	4,200 ft.
Width	200 ft.	150 ft.	150 ft.	75 ft.
Pavement Strength				
SWL	105,000 lbs.	50,000 lbs.	30,000 lbs.	30,000 lbs.
DWL	135,000 lbs.	60,000 lbs.	45,000 lbs.	45,000 lbs.
DWT	230,000 lbs.	110,000 lbs.	90,000 lbs.	90,000 lbs.
Lighting	MIRL	None	None	None
Marking	Nonprecision	None	None	Basic
Approach Aids	PAPI-2	N/A	N/A	N//A
Instrument Approach Procedures	N/A	N/A	N/A	N/A

Services Provided: 100 LL and Jet A fuel, aircraft tiedowns and hangars, minor airframe service, minor power plant service, and low bulk oxygen.

SOUTH TEXAS INTERNATIONAL AIRPORT AT EDINBURG (EBG)

NPIAS Classification ..... **General Aviation**
FAA Asset Study Classification ..... **Local**
Location from MFE ..... **17 nm N**
Elevation ..... **75.2 ft**
Weather Reporting ..... **AWOS**
ATCT ..... **No**
Annual Operations **4,140**
Annual Enplanements ..... **N/A**
Based Aircraft **30**

Runways	14-32
Length	5,000 ft.
Width	75 ft.
Pavement Strength	
SWL	22,000 lbs.
DWL	N/A
DWT	N/A
Lighting	MIRL
Marking	Nonprecision
Approach Aids	None
Instrument Approach Procedures	None

Services Provided: 100 LL and Jet-A fuel, aircraft tiedowns and hangars.

VALLEY INTERNATIONAL AIRPORT (HRL)

NPIAS Classification ..... **Primary**
FAA Asset Study Classification ..... **N/A**
Location from MFE ..... **32 nm E**
Elevation **36**
Weather Reporting ..... **ASOS**
ATCT ..... **Yes**
Annual Operations **36,112**
Annual Enplanements **263,614**
Based Aircraft **52**

Runways	17R-35L	13-31	17L-35R
Length	8,301 ft	7,257 ft.	5,949 ft.
Width	150 ft.	150 ft.	150 ft.
Pavement Strength			
SWL	160,000 lbs.	160,000 lbs.	160,000 lbs.
DWL	200,000 lbs.	200,000 lbs.	200,000 lbs.
DWT	350,000 lbs.	350,000 lbs.	350,000 lbs.
Lighting	HIRL	HIRL	MIRL
Marking	Precision	Precision	Precision
Approach Aids	MALSR | PAPI-4	VASI-4	None
Instrument Approach Procedures	ILS/DME | None	None	None

Services Provided: 100LL and Jet A fuel, aircraft tiedowns and hangars, major airframe service, major power plant service, and high bottled oxygen.

KEY

ASOS | Automated Surface Observation System
ATCT | Airport Traffic Control Tower
AWOS | Automated Weather Observation System
DWL | Dual Wheel Loading
DWT | Double Wheel Tandem
FAA | Federal Aviation Administration
HIRL | High Intensity Runway Lights
ILS/DME | Instrument Landing System/ Distance Measuring Equipment
LIRL | Low Intensity Runway Lights
LL | Low Lead
MALSR | Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights
MIRL | Medium Intensity Runway Lights
N/A | Not Applicable
nm | Nautical Mile
NPIAS | National Plan of Integrated Airport Systems
PAPI | Precision Approach Path Indicator
SWL | Single Wheel Loading
VASI | Visual Approach Slope Indicator

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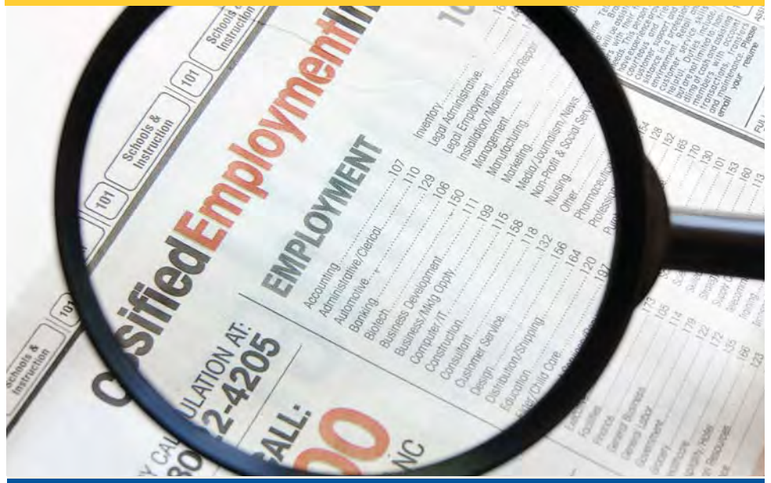
POPULATION

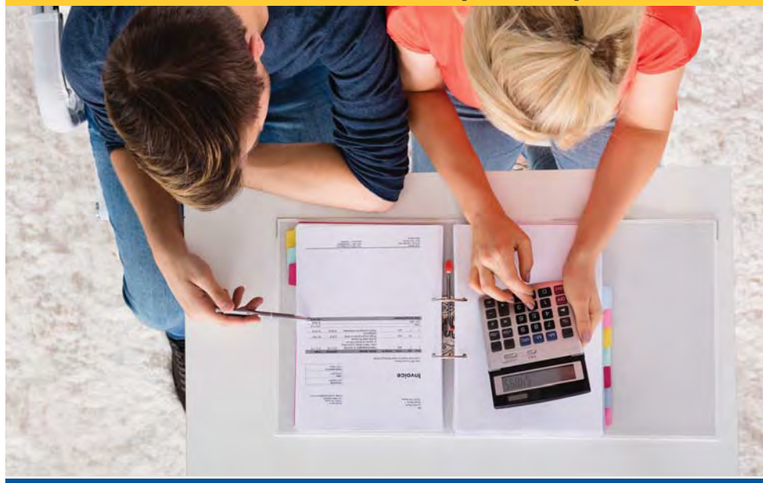
YEAR	HIDALGO COUNTY[2]	CAMERON COUNTY	STARR COUNTY	WILLACY COUNTY	RIO GRANDE VALLEY[3]
1990	387,200	261,728	40,805	17,699	176,858
2000	573,216	336,123	53,733	20,076	245,787
2005	674,982	373,429	58,284	21,229	281,981
2010	774,773	406,220	60,968	22,134	316,024
2011	798,286	414,348	61,804	22,191	324,157
2012	811,904	417,573	62,466	22,201	328,536
2013	818,553	421,288	62,060	22,023	330,981
2014	828,288	422,386	62,635	21,667	333,744
2015	841,667	424,133	63,072	21,662	337,634
2016	848,037	425,194	63,241	21,661	339,5333
2010-16 CAGR[4]	1.52%	0.76%	0.61%	-0.36%	1.20%

EMPLOYMENT



HIDALGO COUNTY[2]	CAMERON COUNTY	STARR COUNTY	WILLACY COUNTY	RIO GRANDE VALLEY
134,823	98,638	10,722	4,605	62,197
212,048	139,359	16,630	5,233	93,318
269,161	155,539	19,843	5,411	112,489
312,839	172,333	22,121	6,827	128,530
325,920	179,034	22,561	6,449	133,491
330,937	181,447	22,786	6,395	135,391
338,127	185,747	22,988	6,372	138,309
345,300	188,784	23,208	6,501	140,948
355,173	193,774	23,787	6,625	144,840
365,129	198,805	24,374	6,747	148,764
2.61%	2.41%	1.63%	-0.20%	2.47%

INCOME - PCPI[1] ($2009)



HIDALGO COUNTY[2]	CAMERON COUNTY	STARR COUNTY	WILLACY COUNTY	RIO GRANDE VALLEY
113,982	14,880	8,361	11,758	12,245
17,042	18,511	12,282	18,245	16,520
19,381	20,178	15,452	18,185	18,299
21,320	22,309	19,918	22,308	21,464
21,444	22,369	20,403	22,667	21,721
21,351	22,542	20,662	20,934	21,372
21,353	22,605	20,701	20,663	21,331
21,771	23,107	21,277	23,353	22,377
22,230	23,636	21,277	23,237	22,595
22,651	24,087	21,727	23,712	23,044
1.01%	1.29%	1.46%	1.02%	1.19%

FORECASTS

2021	1,003,379	486,483	71,681	25,568	396,778
2026	1,118,087	525,833	76,234	27,147	436,825
2031	1,241,185	567,278	80,901	28,773	479,534
2036	1,357,060	607,319	85,109	30,289	519,944
2016-36 CAGR	2.38%	1.80%	1.50%	1.69%	2.15%

416,734	224,925	27,412	7,380	169,113
473,426	253,615	30,726	8,062	191,457
535,250	284,863	34,310	8,782	215,801
602,006	318,533	38,142	9,542	242,056
2.53%	2.39%	2.26%	1.75%	2.46%

24,890	26,510	24,154	26,314	25,467
27,302	29,142	26,785	29,172	28,100
29,550	31,594	29,214	31,839	30,549
31,623	33,848	31,416	34,289	32,794
1.68%	1.72%	1.86%	1.86%	1.78%

[1]**PCPI** | Per Capita Personal Income
[2]Encompasses same area as McAllen-Edinburg-Mission Metropolitan Statistical Area (MSA)
[3]Hidalgo, Cameron, Starr, and Willacy Counties make up the Rio Grande Valley.
[4]**CAGR** | Compound Annual Growth Rate

Source: Woods & Poole Complete Economic and Demographic Data Source (2016); 1990-2009 Population Data from U.S. Census Bureau; 2010-2016 Population Data from Texas Demographic Center; 2021-2036 Projections from Texas Water Develpment Board

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vehicles that cross the McAllen-Hidalgo-Reynosa Bridge and the Anzalduas International Crossing annually, creating an economic corridor from McAllen to Mexico. Given the accessibility of the McAllen area, the abundance of young, skilled laborers, and the FTZ, many businesses have chosen to locate in this area.

The McAllen FTZ #12 was founded in 1973 as the first inland, non-seaport FTZ in the U.S. An FTZ is an isolated, policed, and enclosed area that is in or adjacent to a port of entry, but is considered outside of U.S. customs territory. FTZs have attractive benefits, including:

- Inverted tariffs
- Duty exemption on re-exports
- Weekly entry savings
- Duty deferral
- Ad valorem tax relief

The McAllen FTZ includes approximately 775 acres with over 410 companies in manufacturing, industrial, supplier, warehouse distribution, and logistics.[14] In addition to the industries that operate within the FTZ, McAllen's retail, and health care/educational service job sectors continue to dominate the market, making up 44 percent of the employable population.[15, 16] **Table 1L** illustrates the number of people employed by industry with the median earnings.

TABLE 1L
McAllen Employment by Industry and Median Earnings

Industry	Total Employment	Median Earnings[1]
Agriculture, forestry, fishing and hunting, and mining	1,061	$66,250
Construction	2,483	$21,605
Manufacturing	2,943	$35,448
Wholesale trade	2,292	$27,900
Retail trade	8,367	$19,103
Transportation and warehousing, and utilities	2,445	$40,244
Information	764	$31,739
Finance and insurance, and real estate and rental & leasing	2,843	$36,608
Professional, scientific, and management, and administrative and waste management services	5,477	$20,460
Educational services, and health care and social assistance	16,949	$40,277
Arts, entertainment, and recreation, and accommodation and food services	6,083	$12,109
Other services, except public administration	2,626	$16,915
Public administration	2,819	$44,418

[1] Median earnings in the past 12 months in 2015 inflation-adjusted dollars.
Source: American Community Survey 2015 Five-Year Estimates (Table S2405 and B24031)

[14] McAllen Economic Development Corporation (http://www.mcallenedc.org/doing-business-here/about-the-area)
[15] The employable population accounts for the total civilian population 16 years and over.
[16] American Community Survey 2015 Five-Year Estimates

ENVIRONMENTAL INVENTORY

The Environmental Inventory addresses existing conditions at the Airport and its environs. This inventory is intended to help identify relevant environmental issues that should be considered during preparation of the Airport Master Plan. The inventory is organized using the resource categories contained in Federal Aviation Administration (FAA) Order 1050.1F, *Environmental Impacts: Policies and Procedures* (2015). Available information regarding the environmental conditions at the Airport and within the surrounding area has been derived from internet resources, agency maps, and existing literature. A comprehensive list of resources is included below.

AIR QUALITY

The United States (U.S.) Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) based on health risks for six pollutants:

- Carbon monoxide (CO)
- Nitrogen dioxide (NO_2)
- Sulfur dioxide (SO_2)
- Lead (Pb)
- Ozone (O_3)
- Two sizes of particulate matter (PM): PM measuring between 10 and 2.5 micrometers in diameter (PM_{10}), and PM measuring 2.5 micrometers or less in diameter ($PM_{2.5}$)

An area with ambient air concentrations exceeding the NAAQS for a criteria pollutant is said to be a nonattainment area for the pollutant's NAAQS, while an area where ambient concentrations are below the NAAQS is considered an attainment area. The U.S. EPA requires that areas designated as nonattainment demonstrate how they will attain the NAAQS by an established deadline. To accomplish this, states are required to prepare State Implementation Plans (SIPs). SIPs are typically a comprehensive set of reduction strategies and emissions budgets designed to bring the area into attainment.

MFE is in Hidalgo County, Texas. According to the U.S. EPA's *Green Book – National Area and County-Level Multi-Pollutant Information*, Hidalgo County is in attainment for all federal criteria pollutants. Attainment designation varies by NAAQS criteria pollutant, as shown in **Exhibit 1T**.

BIOLOGICAL RESOURCES

U.S. Fish and Wildlife Service (USFWS) is charged with overseeing the requirements of the *Endangered Species Act* (ESA), specifically Section 7, which sets forth requirements for consultation to determine if a proposed action "may affect" a federally endangered or threatened species. If an agency determines that an action "may affect" a federally protected species, then Section 7(a)(2) requires the agency to consult with USFWS to ensure that any action the agency authorizes, funds, or carries out is not likely to jeopardize the continued existence of any federally-listed endangered or threatened species, or result in the destruction or adverse modification of critical habitat. If a species has been listed as a candidate species, Section 7(a)(4) states that each agency must confer with USFWS.

POLLUTANT		PRIMARY/ SECONDARY	AVERAGING TIME	LEVEL	FORM
Carbon Monoxide (CO)		primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead (Pb)		primary and secondary	Rolling 3 month average	0.15 µg/m^3 (1)	Not to be exceeded
Nitrogen Dioxide (NO_2)		primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	1 year	53 ppb (2)	Annual Mean
Ozone (O_3)		primary and secondary	8 hours	0.070 ppm (3)	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution (PM)	$PM_{2.5}$	primary	1 year	12.0 µg/m^3	annual mean, averaged over 3 years
		secondary	1 year	15.0 µg/m^3	annual mean, averaged over 3 years
		primary and secondary	24 hours	35 µg/m^3	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24 hours	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)		primary	1 hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

UNITS OF MEASURE: **ppm** - parts per million by volume **ppb** - parts per billion by volume **µg/m^3** - micrograms per cubic meter of air

1) In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m^3 as a calendar quarter average) also remain in effect.

(2) The level of the annual NO_2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

(3) Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O_3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O_3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.

(4) The previous SO_2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2) any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO_2 standards or is not meeting the requirements of a SIP call under the previous SO_2 standards (40 CFR 50.4(3)). A SIP call is an Environmental Protection Agency (EPA) action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required National Ambient Air Quality Standards (NAAQS).

Source: https://www.epa.gov/criteria-air-pollutants/naaqs-table.

Additional federal laws protecting fish, wildlife, and plants include the *Migratory Bird Treaty Act* (MBTA), which prohibits activities that would harm migratory birds, their eggs, or nests, and the *Bald and Golden Eagle Protection Act* (BaGEPA), which prohibits the take (defined as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb") of bald and golden eagles, including their parts, nests, or eggs, without a permit. Executive Order (E.O.) 13312, *Invasive Species* aims to prevent the introduction of invasive species because of a proposed action. (E.O. 11990, *Protection of Wetlands* is discussed under the *Water Resources* section of this report.)

A USFWS Information for Planning and Consultation (IPaC) report indicates that there are nine protected species potentially occurring at the Airport. The Texas Parks and Wildlife Department (TWPD) also maintains a list of federally, state, and candidate-listed species in Texas. **Table 1M** lists all federally listed and State of Texas listed protected species. At both the federal and the state level, there are no critical habitats near the Airport.

Table 1N lists bird species protected under the MBTA and *Bald and Golden Eagle Protection Act* that may be affected by activities at the Airport; it is not an exhaustive list of every bird species potentially found at this location.

TABLE 1M
Federal and State Protected Species
Hidalgo County

Species Name	Scientific Name	Federal Status	State Status
Amphibians			
Black-spotted newt	*Notophthalmus meridionalis*	N/A	Threatened
Mexican treefrog	*Smilisca baudinii*	N/A	Threatened
Sheep frog	*Hypopachus variolosus*	N/A	Threatened
South Texas siren	*Siren sp 1*	N/A	Threatened
White-lipped frog	*Leptodactylus fragilis*	N/A	Threatened
Birds			
American Peregrine Falcon	*Falco peregrinus anatum*	Delisted	Endangered
Cactus Ferruginous Pygmy-Owl	*Glaucidium brasilianum cactorum*	N/A	Threatened
Common Black Hawk	*Buteogallus anthracinus*	N/A	Threatened
Gray Hawk	*Asturina nitida*	N/A	Threatened
Least Tern[1]	*Sterna antillarum*	Endangered	Endangered
Northern Aplomado Falcon	*Falco femoralis septentrionalis*	Endangered	Endangered
Northern Beardless-Tyrannulet	*Camptostoma imberbe*	N/A	Threatened
Peregrine Falcon	*Falco peregrinus*	Delisted	Threatened
Piping Plover	*Charadrius melodus*	Threatened	N/A
Red Knot	*Calidris canutus rufa*	Threatened	N/A
Red-Crowned Parrot	*Amazona viridigenalis*	Candidate	N/A
Reddish Egret	*Egretta rufescens*	N/A	Threatened
Rose-throated Becard	*Pachyramphus aglaiae*	N/A	Threatened
Texas Botteri's Sparrow	*Aimophila botterii texana*	N/A	Threatened
Tropical Parula	*Parula pitiayumi*	N/A	Threatened
White-faced Ibis	*Plegadis chihi*	N/A	Threatened
White-tailed Hawk	*Buteo albicaudatus*	N/A	Threatened
Wood Stork	*Mycteria Americana*	N/A	Threatened
Zone-tailed Hawk	*Buteo albonotatus*	N/A	Threatened

TABLE 1M (Continued)
Federal and State Protected Species
Hidalgo County

Species Name	Scientific Name	Federal Status	State Status
Fishes			
Rio Grande silvery minnow	*Hybognathus amarus*	N/A	Endangered
River goby	*Awaous banana*	N/A	Threatened
Flowering Plants			
Star Cactus	*Astrophytum asterias*	Endangered	Endangered
Texas Ayenia	*Ayenia limitaris*	Endangered	Endangered
Walker's Manioc	*Manihot walkerae*	Endangered	Endangered
Mammals			
Coues' Rice Rat	*Oryzomys couesi*	N/A	Threatened
Jaguar	*Panthera onca*	N/A	Endangered
Gulf Coast Jaguarundi	*Herpailurus yagouaroundi cacomitli*	Endangered	Endangered
Ocelot	*Leopardus pardalis*	Endangered	Endangered
Mollusks			
Mexican Fawnsfoot Mussel	*Truncilla cognate*	N/A	Threatened
Salina Mucket	*Potamilus metnecktayi*	N/A	Threatened
Texas Hornshell	*Popenaias popeii*	N/A	Threatened
Reptiles			
Black-striped Snake	*Coniophanes imperialis*	N/A	Threatened
Northern Cat-Eyed Snake	*Leptodeira septentrionalis*	N/A	Threatened
Reticulate Collared Lizard	*Crotaphytus reticulatus*	N/A	Threatened
Speckled Racer	*Drymobius margaritiferus*	N/A	Threatened
Texas Horned Lizard	*Phrynosoma cornutum*	N/A	Threatened
Texas Indigo Snake	*Drymarchon melanurus erebennus*	N/A	Threatened
Texas Tortoise	*Gopherus berlandieri*	N/A	Threatened

[1] Listed Federally as "Least Stern (*Sterna antillarum*); Listed State as Interior Least Tern (*Sterna antillarum anthalassos*) – these represent the same species of bird.
Sources: U.S. Fish and Wildlife Service Information for Planning and Consultation (accessed May 2017); Texas Parks & Wildlife Department (species list dated May 16, 2016; accessed May 2017).

TABLE 1N
Birds Protected Under the *Migratory Bird Treaty Act* and *Bald and Golden Eagle Protection Act*

Protected Species	Scientific Name	Season(s) Present
Altamira Oriole	*Icterus gularis*	Year-Round
Audubon's Oriole	*Icterus graduacauda*	Year-Round
Bell's Vireo	*Vireo bellii*	Breeding
Buff-bellied Hummingbird	*Amazilia yucatanensis*	Year-Round
Burrowing Owl	*Athene cunicularia*	Wintering
Cassin's Sparrow	*Aimophila cassinii*	Year-Round
Chestnut-collared Longspur	*Calcarius ornatus*	Wintering
Curve-billed Thrasher	*Toxostoma curvirostre*	Year-Round
Dickcissel	*Spiza americana*	Breeding
Elf Owl	*Micrathene whitneyi*	Breeding
Green Parakeet	*Aratinga holochlora*	Year-Round
Harris's Hawk	*Parabuteo unicinctus*	Year-Round
Hooded Oriole	*Icterus cucullatus*	Breeding
Hudsonian Godwit	*Limosa haemastica*	Migrating
Lark Bunting	*Kalamospiza melanocorys*	Wintering

TABLE 1N (Continued)
Birds Protected Under the *Migratory Bird Treaty Act* and *Bald and Golden Eagle Protection Act*

Protected Species	Scientific Name	Season(s) Present
Least Bittern	*Lxobrychus exilis*	Breeding
Lesser Yellowlegs	*Tringa flavipes*	Wintering
Loggerhead Shrike	*Lanius lubovicianus*	Wintering
Long-billed Curlew	*Numenius americanus*	Wintering
Mountain Plover	*Charadrius montanus*	Wintering
Northern Beardless-tyrannulet	*Camptostoma imberbe*	Year-Round
Peregrine Falcon	*Falco peregrinus*	Wintering
Red-billed Pigeon	*Patagioenas flavirostris*	Year-Round
Red-crowned Parrot	*Amazona viridigenalis*	Year-Round
Rose-throated Becard	*Pachyramphus alglaeiae*	Year-round
Short-eared Owl	*Asio flammeus*	Wintering
Snowy Plover	*Charadrius alexandrines*	Breeding
Solitary Sandpiper	*Tringa solitaria*	Wintering
Sprague's Pipit	*Anthus spragueii*	Wintering
Tropical Parula	*Parula pitiayumi*	Breeding
Varied Bunting	*Passerina versicolor*	Breeding
Verdin	*Auriparus flaviceps*	Year-Round
White-collared Seedeater	*Sporophila torqueola*	Year-Round
White-tailed Hawk	*Buteo albicaudatus*	Year-Round

Source: U.S. Fish and Wildlife Service Information for Planning and Consultation (accessed May 2017)

CLIMATE

Carbon dioxide equivalent, or CO_2e, is used to describe different greenhouse gases (GHG) in a common unit. For any quantity and type of GHG, CO_2e represents the amount of CO_2 that would have the equivalent global warming potential.

The EPA's *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2015*, found that the transportation sector, which includes aviation, accounted for 27 percent of U.S. greenhouse gas (GHG) emissions in 2015. Of this, aviation contributed 160.7 million metric tons (MMT) of carbon dioxide equivalent (CO_2e), or nearly nine percent of all transportation emissions.[17, 18] Transportation sources include cars, trucks, ships, trains, and planes. Most of the GHG emissions from transportation are CO_2 emissions resulting from the combustion of petroleum-based products in internal combustion engines. Relatively small amounts of methane (CH_4), hydrofluorocarbon (HFC) and nitrous oxide (N_2O) are emitted during fuel combustion.

From 1990 to 2015, total transportation emissions increased. The upward trend is largely due to increased demand for travel; however, much of this travel was done in passenger cars and light-duty trucks. In addition to transportation-related emissions, **Figure 1A** shows all GHG emissions sources in the U.S. in 2015.

[17] Aviation activity consists of emissions from jet fuel and aviation gasoline consumed by commercial aircraft, general aviation, and military aircraft.
[18] Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2015, Table 2-13 (available: https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2015)

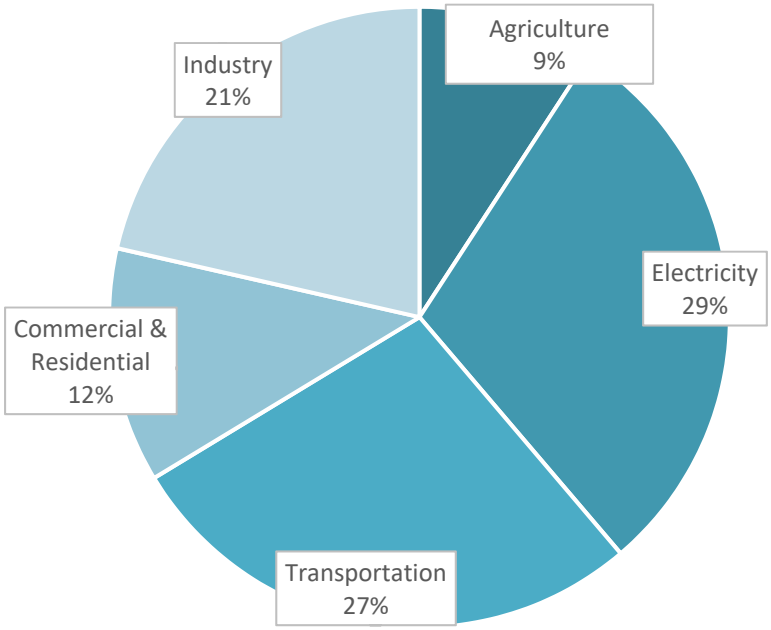


FIGURE 1A 2015 SOURCES OF GREENHOUSE GAS EMISSIONS IN THE U.S.
SOURCE: U.S. EPA (2017)

Increasing concentrations of GHGs can affect global climate by trapping heat in the Earth's atmosphere. Scientific measurements have shown that Earth's climate is warming, with concurrent impacts, including warmer air temperatures, rising sea levels, increased storm activity, and greater intensity in precipitation events. This climate change is a global phenomenon that can also have local impacts (IPCC 2014). GHGs, such as water vapor (H_2O), carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and ozone (O_3), are both naturally occurring and anthropogenic (man-made).

Research has also shown a direct correlation between fuel combustion and GHG emissions. GHGs from anthropogenic sources include CO_2, CH_4, N_2O, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). CO_2 is the most important anthropogenic GHG because it is a long-lived gas that remains in the atmosphere for up to 100 years.

COASTAL RESOURCES

Federal activities involving or affecting coastal resources are governed by the *Coastal Barriers Resource Act*, the *Coastal Zone Management Act*, and E.O. 13089, *Coral Reef Protection*. The Airport is approximately 80 miles west of the nearest ocean, thus causing no potential impacts to marine quality.

DEPARTMENT OF TRANSPORTATION (DOT) ACT: SECTION 4(f)

Section 4(f) of the DOT Act, which was recodified and renumbered as Section 303(c) of Title 49 United States Code (USC), states that the Secretary of Transportation shall not approve any program or project that requires the use of any publicly owned land from a historic site, public park, recreation area, or waterfowl or wildlife refuge of national, state, regional, or local importance unless there is no feasible and prudent alternative to the use of such land, and the project includes all possible planning to minimize harm resulting from the use.

The term "use" includes not only the physical taking of such lands, but "constructive use" of such lands. "Constructive use" of lands occurs when "a project's proximity impacts are so severe that the protected activities, features, or attributes that qualify a resource for protection under Section 4(f) are substantially impaired" (Title 23 Code of Federal Regulations [CFR] Section 771.135).

Table 1P lists all nationally registered historic places, public parks, and wildlife refuges that are within five miles of the Airport. There are no recreation areas or wilderness areas within five miles of the Airport. Section 4(f) resources are shown on **Exhibit 1U**.

TABLE 1P
Section 4(f) Protected Resources

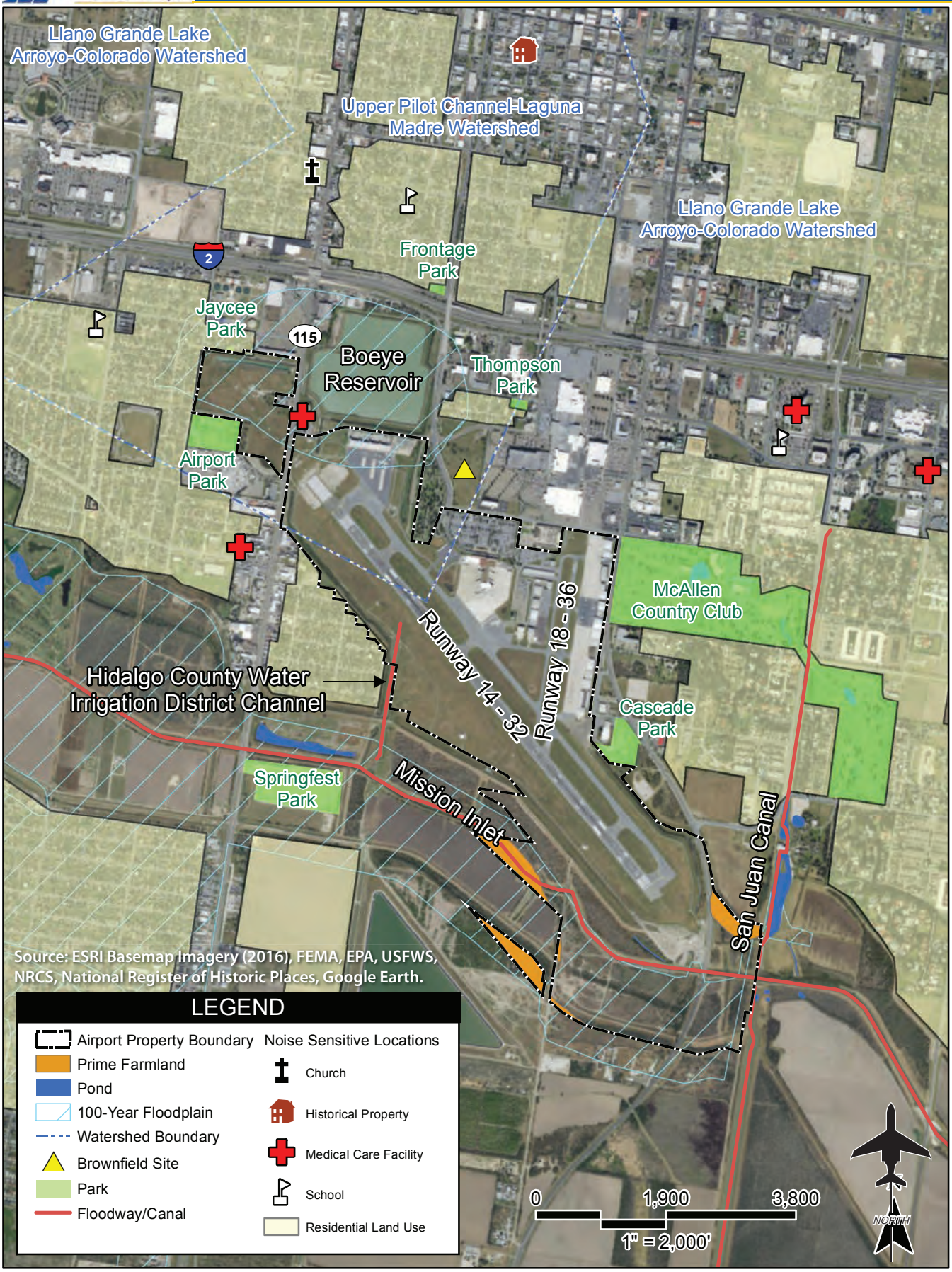
Name	Distance from Airport	Direction from Airport
National Register of Historic Places		
Cine El Rey	1.1 miles	Northeast
Oblate Park Historic District	4.5 miles	Northwest
Louisiana-Rio Grande Canal Company Irrigation System	0.0 miles	East
Public Parks		
Spring Fest Park	0.4 miles	West
Thompson Park	0.3 miles	Northeast
Frontage Park	0.4 miles	North
Jaycee Park	0.0 miles	North
Airport Park	0.0 miles	Northwest
Cascade Park	0.0 miles	Southeast
Wildlife Refuge		
Rio Grande Valley National Wildlife Refuge	3.5 miles	Southwest

Source: National Park Service (accessed May 2017); U.S. Geological Survey (accessed May 2017)

FARMLANDS

The *Farmland Protection Policy Act* (FPPA) is intended to minimize the impact federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. For FPPA, farmland includes prime farmland, unique farmland, prime farmland if drained, and land of statewide or local importance. Farmland subject to FPPA requirements does not have to be currently used for cropland. It can also be forest land, pastureland, or other land, but not water or urban built-up land.

The U.S. Department of Agriculture, Natural Resources Conservation Service (USDA-NRCS) Web Soil Survey is a common source of information for soil types within mapped areas. According to the tool, 19 acres of the Airport (3.1 percent of the total Airport property) is classified as prime farmlands. These soils are shown on **Exhibit 1U**. The remaining parts of Airport property consist of no unique farmland, land of statewide or local importance, or prime farmland if drained.


Llano Grande Lake
Arroyo-Colorado Watershed
Upper Pilot Channel-Laguna Madre Watershed
Llano Grande Lake
Arroyo-Colorado Watershed
Frontage Park
Jaycee Park
Boeye Reservoir
Thompson Park
Airport Park
McAllen Country Club
Runway 14 - 32
Runway 18 - 36
Hidalgo County Water Irrigation District Channel
Cascade Park
Springfest Park
Mission Inlet
San Juan Canal
Source: ESRI Basemap Imagery (2016), FEMA, EPA, USFWS, NRCS, National Register of Historic Places, Google Earth.
LEGEND
Airport Property Boundary
Prime Farmland
Pond
100-Year Floodplain
Watershed Boundary
Brownfield Site
Park
Floodway/Canal
Noise Sensitive Locations
Church
Historical Property
Medical Care Facility
School
Residential Land Use
0
1,900
3,800
1" = 2,000'
NORTH

HAZARDOUS MATERIALS, SOLID WASTE, AND POLLUTION PREVENTION

Federal, state, and local laws, including the *Resource Conservation Recovery Act* (RCRA) and the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA), as amended (also known as the Superfund), regulate hazardous materials use, storage, transport, and disposal. These laws may extend to past and future landowners of properties containing these materials. Disturbing areas that contain hazardous materials or contaminants can cause significant impacts to soil, surface water, groundwater, air quality, and the organisms using these resources.

According to the EPA's EJSCREEN, there is one Brownfield located at 1701 Uvalde Street, located adjacent to Airport property. The site consists of 15 acres and was historically used as a municipal solid waste facility, transfer station, sewage treatment plant, and recycling center. The City of McAllen owns the land, which is currently considered vacant..

The Airport is equidistance from Republic Services La Gloria Landfill and Edinburg Landfill, both of which are approximately 15 miles north.

There are no Superfund sites or hazardous waste facilities near the Airport.

HISTORICAL, ARCHITECTURAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

Determination of a project's environmental impact to historic and cultural resources is made under guidance in the *National Historic Preservation Act* (NHPA) *of 1966*, as amended, the *Archaeological and Historic Preservation Act* (AHPA) *of 1974*, the *Archaeological Resources Protection Act* (ARPA), and the *Native American Graves Protection and Repatriation Act* (NAGPRA) *of 1990*, among others. Impacts can occur when a proposed project causes an adverse effect on a property which has been identified (or is unearthed during construction) as having historical, architectural, archaeological, or cultural significance.

As mentioned above, there are three sites listed on the NRHP within five miles of the Airport. These include: Louisiana-Rio Grande Canal Company Irrigation System; Cine El Rey; and Oblate Park Historic District.

The nearest Indian/Native American feature is the Kickapoo Reservation, over 200 miles northwest of the Airport.

LAND USE

Existing land uses around the Airport are discussed earlier in this chapter. **Exhibit 1B** also illustrates all existing land uses around the Airport.

NATURAL RESOURCES AND ENERGY SUPPLY

Energy usage at the Airport includes the consumption of aviation fuel (Jet A and 100LL), gasoline and diesel fuel for vehicles and maintenance equipment, natural gas, and electricity. Utility providers are discussed in greater detail earlier in the chapter.

NOISE AND COMPATIBLE LAND USE

Federal land use compatibility guidelines are established under 14 CFR Part 150, *Airport Noise Compatibility Planning*. Per 14 CFR Part 150, residential land uses and schools are noise-sensitive land uses that are not considered compatible with a 65 decibel (dB) Day-Night Average Sound Level (DNL).[19] Other noise-sensitive land uses (such as religious facilities, hospitals, or nursing homes), if located within a 65 dB DNL contour, are generally compatible when an interior noise level reduction of 25 dB is incorporated into the design and construction of the structure. Special consideration also needs to be given to noise-sensitive areas within Section 4(f) properties where the land use compatibility guidelines in 14 CFR Part 150 do not account for the value, significance, and enjoyment of the area in question (FAA 2015).

TABLE 1Q
Noise-sensitive Uses

Name	Distance from Airport	Direction from Airport
Medical Facilities		
Hope Family Health Center	0.3 miles	West
Juan Aguilera MD and Associates	0.0 miles	North
McAllen Medical Center	0.6 miles	East
Rio Grande Surgery Center	0.9 miles	East
McAllen Heart Hospital	0.9 miles	East
Places of Worship		
St. Joseph the Worker Church	0.5 miles	North
7th Day Adventist Church	0.6 miles	West
Iglesia Biblica Cristiana	0.8 miles	Northeast
Schools/Daycares		
Taylor Christian School	0.6 miles	North
Jose de Escandon Elementary	0.4 miles	Northwest
Brown Middle School	1.0 mile	West
Little Dreamers	0.7 miles	Northeast
Residential		
Single- and multi-family uses	0.0 miles	North, east & west

Source: National Park Service (accessed May 2017); U.S. Geological Survey (accessed May 2017)

There are single- and multi-family residential uses to the north, east, and west of the Airport. In addition to residential uses, there are medical facilities, places of worship, and schools near the Airport. These uses are shown on **Exhibit 1U** and included in **Table 1Q**.

[19] Noise-sensitive land uses are generally residences, places of worship, hospitals and health care facilities, and educational facilities. Places of worship are defined as permanently established facilities intended solely for use as places of worship and not meant to be converted to other potential uses. For a hospital and/or health care facility to be considered a noise-sensitive medical facility, it must provide for overnight stays or provide for longer recovery periods, where rest and relaxation are key considerations for use of the facility. Schools are facilities that provide full time use for instruction and training to students.

SOCIOECONOMIC IMPACTS, ENVIRONMENTAL JUSTICE, AND CHILDREN'S ENVIRONMENTAL HEALTH AND SAFETY RISKS

Within a one-mile radius of the Airport, there is an estimated population of 2,942 people (2010 -2014 American Community Survey [ACS] Estimates). Minority population, especially those of Hispanic descent, comprises much of this area, with 2,559 people (95 percent). **Table 1R** provides the race makeup within
one-mile of the Airport. The 2010 – 2014 ACS five-year estimates report that only half (51 percent) of those residing around the Airport are employed (of those ages 16 years and over). The per capita income in this section of the population is approximately $18,460 annually.

In the census tract that the Airport is in, there are an estimated 8,663 people, of which 2,987, or 35 percent, are considered be living below the poverty level.

As previously discussed, there are residential land uses, elementary schools, and public parks located within one mile of the Airport. The closest landfills are over 15 miles away.

TABLE 1R
Race Makeup One-Mile Around Airport

Race	Total
Hispanic	
White	2,696
Black	8
American Indian	6
Asian	40
Pacific Islander	0
Some other race	190
Two or more races	1
Total Hispanic Population	**2,559**
Non-Hispanic	
White alone	335
Black alone	8
American Indian alone	0
Asian alone	40
Pacific Islander alone	0
Other race alone	0
Two or more races	0
Total Non-Hispanic Population	**383**

Source: 2010-2014 American Community Survey Five-year Estimates.

VISUAL RESOURCES

The Comprehensive Plan for McAllen (2008) cites the importance of the "exemplary viewsheds" in the community. The plan notes that many of these viewsheds, which were historically undervalued, have been filled in or developed. The few remaining natural viewsheds are thus critical for the City to preserve from future development. The Airport is not cited as an infringement upon these viewsheds.

In the City of McAllen's Code of Ordinances, there is an Appendix that relates entirely to zoning at the Airport (Subpart B, Appendix A). Appendix A is meant to protect the Airport from nonconforming uses, like light poles in a safety zone, that would comprise the safety of flyers using the Airport. There are no specific requirements as they relate to lighting at the Airport in the City's Code of Ordinances.

WATER RESOURCES

Wetlands: Certain drainages (both natural and human-made) that are considered "waters of the U.S." come under the purview of the U.S. Army Corps of Engineers (USACE) under Sections 401 and 404 of the *Clean Water Act*; wetlands are also protected. In addition, E.O. 11990, *Protection of Wetlands* provides definitions and calls for safeguarding wetlands. Wetlands typically exhibit three characteristics: hydrology, hydrophytes (plants able to tolerate various degrees of flooding or frequent saturation), and poorly drained or "hydric" soils.

There are no hydric soils anywhere on Airport property, nor are there any wetlands on Airport property.

Floodplains: E.O. 11988, *Floodplain Management* directs federal agencies to act to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by the floodplains. The limits of base floodplains are determined by Flood Insurance Rate Maps (FIRMs) prepared by Federal Emergency Management Agency (FEMA). Based on FIRM panel 48003430010C from 1982, there is a 100-year floodplain within the Mission Inlet levee/berms. There is also a 100-year floodplain around Boeye Reservoir, as well as the area directly west of Boeye Reservoir, which currently encompasses the Airport's MALSR. These floodplains are shown on **Exhibit 1U**.

Surface Waters: Surface waters include rivers, streams, creeks, lakes, and reservoirs. The primary uses of surface water are for drinking water and other public uses, irrigation, and for industrial purposes (i.e., cooling electricity-generating equipment at a power plant).

There are several ponds surrounding the Airport, as shown on **Exhibit 1U**; however, none of these are on Airport property. There is an extensive drainage network that runs around and within the Airport, made up primarily of two drainage channels – the Airport drainage ditch and the Mission Inlet. An in-depth discussion of the drainage system is included previously and is illustrated on **Exhibit 1M**.

Watersheds are made up of all surface waters (lakes, streams, etc.) and groundwater that drain to a common place, such as a reservoir, mouth of a bay, or stream channel. Larger watersheds contain multiple smaller watersheds, or subwatersheds. The Airport is within the South Laguna Madre Watershed (Hydrologic Unit Code 8 [HUC] 12110208); however, the actual Airport property is in two subwatersheds. The northern part of the Airport is in the Upper Pilot Channel-Laguna Madre subwatershed, which is HUC12 121102080300. The southern half of the Airport is in subwatershed Llano Grande Lake-Arroyo Colorado (HUC12 121102080100). Airport drainage flows south into the Llano Grande Lake-Arroyo Colorado subwatershed. The subwatershed boundary line is shown on **Exhibit 1U**.

The South Wastewater Treatment Plant is located just west of Boeye Reservoir. The plant uses an activated sludge process to clean the raw wastewater that enters the system. Once the water has undergone mechanical and chemical treatment, the water is discharged into the Mission Floodway Channel. This plant operates under a permit that is designed to control pollutant discharges, regulating the manner, nature, volume, and frequency for discharging from a particular source. The permit adheres to standards set by the Texas Commission on Environmental Quality (TCEQ) and the EPA. The South Wastewater Treatment Plan can handle up to 10 million gallons per day, and provides approximately 240 million gallons of reclaimed (and treated) water to the McAllen Palm View Gold Course for irrigation annually.[20]

Groundwater: The nearest sole source aquifer, which is an aquifer that has been designated by the EPA as the primary source of drinking water for an area, is the Edwards Aquifer I (San Antonio Area). Generally, a sole source aquifer provides a minimum of 50 percent of the drinking water that is consumed in the area overlying the aquifer. Additionally, McAllen Public Utilities has a well in proximity of the Southwest Water Treatment Plant that accounts for three percent of raw water, with 97 percent coming from the Rio Grande River, from Irrigation District 3.

Wild and Scenic Rivers: Wild and scenic rivers refer to designations within the National Park Services' Nationwide Rivers Inventory. Public Law 90-542 states that such rivers are free-flowing and possess "outstanding remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values".[21] Although the Rio Grande River is only a few miles south of the Airport, the section of this river that is classified as Wild and Scenic is over 300 miles away. Note that designated segments do *not* need to include the entire river.

[20] http://mcallenpublicutility.com/departments/wastewater-systems/wastewater-plants/
[21] www.rivers.org

McAllen International Airport

Chapter 2

Aviation Demand Forecasts

CHAPTER TWO

Aviation Demand Forecasts

The definition of demand that may reasonably be expected to occur during the useful life of an airport's key components (e.g., runways, taxiways, terminal buildings, etc.) is an important factor in facility planning. In airport master planning, this involves projecting potential aviation activity for at least a 20-year timeframe. Aviation demand forecasting for McAllen International Airport (MFE or Airport) will focus on demand indicators, including commercial airline passenger enplanements and operations, general aviation based aircraft, based aircraft fleet mix, and operations, as well as military operations and overall operational peaking periods.

The Federal Aviation Administration (FAA) has oversight responsibility to review and approve aviation forecasts developed in conjunction with airport planning studies. In addition, aviation activity forecasts may be an important input to future benefit-cost analyses associated with airport development, and FAA reviews these analyses when federal funding requests are submitted.

The FAA will review individual airport forecasts with the objective of comparing them to its *Terminal Area Forecasts* (TAF) and the *National Plan of Integrated Airport Systems* (NPIAS). Even though the TAF is updated annually, it is developed by FAA personnel in Washington D.C. and it is very common to have a disparity between the TAF and more localized master planning forecast efforts. Historically, the disparity was primarily due to the TAF forecasters' lack of knowledge about local conditions or recent trends. In recent years, however, the FAA has improved its forecast model to be a demand-driven forecast for aviation services based upon local and national economic conditions, as well as conditions within the aviation industry.

As stated in FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems* (NPIAS), forecasts should be:

- Realistic;
- Based on the latest available data;
- Reflective of current conditions at the airport (as a baseline);
- Supported by information in the study; and
- Able to provide adequate justification for airport planning and development.

This forecast effort was completed in October of 2017 with a base year of 2016. Thus, the FAA *Terminal Area Forecasts* published in January 2017 were utilized. A summary of the TAF for MFE is presented in **Table 2A**. The following sections of this chapter will discuss the reasonableness of each forecast, as well as establish the opinion of range that will be utilized in the remainder of the Master Plan.

TABLE 2A
2017 FAA Terminal Area Forecast
McAllen International Airport

	2016	2021	2026	2031	2036
ENPLANEMENTS					
Air Carrier	233,074	287,957	319,474	355,306	396,312
Commuter	131,816	113,610	126,000	139,872	155,517
Total Enplanements	**364,890**	**401,567**	**445,474**	**495,178**	**551,829**
ANNUAL OPERATIONS					
Itinerant					
Air Carrier	7,905	8,811	9,919	10,988	12,201
Air Taxi	2,915	2,050	1,997	2,155	2,315
General Aviation	29,525	29,087	29,092	29,097	29,102
Military	6,403	6,403	6,403	6,403	6,403
Total Itinerant	**46,748**	**46,351**	**47,411**	**48,643**	**50,021**
Local					
General Aviation	8,753	9,600	9,720	9,840	9,960
Military	634	634	634	634	634
Total Local	**9,387**	**10,234**	**10,354**	**10,474**	**10,594**
Total Operations	**56,135**	**56,585**	**57,765**	**59,117**	**60,615**
Based Aircraft	**152**	**159**	**173**	**183**	**193**

Source: FAA Terminal Area Forecast (Jan. 2017)

The forecast process for an airport master plan consists of a series of basic steps that vary in complexity depending upon the issues to be addressed and the level of effort required. The steps include a review of previous forecasts, determination of data needs, identification of data sources, collection of data, selection of forecast methods, preparation of the forecasts, and evaluation and documentation of the results. FAA Advisory Circular (AC) 150/5070-6B (Change 2), *Airport Master Plans*, outlines seven standard steps involved in the forecast process, including:

1) **Identify Aviation Activity Measures**: The level and type of aviation activities likely to impact facility needs. For general aviation, this typically includes based aircraft and operations.

2) **Review Previous Airport Forecasts**: May include the FAA *Terminal Area Forecast*, state or regional system plans, and previous master plans.

3) **Gather Data**: Determine what data are required to prepare the forecasts, identify data sources, and collect historical and forecast data.

4) **Select Forecast Methods**: There are several appropriate methodologies and techniques available, including regression analysis, trend analysis, market share or ratio analysis, exponential smoothing, econometric modeling, comparison with other airports, survey techniques, cohort analysis, choice and distribution models, range projections, and professional judgment.

5) **Apply Forecast Methods and Evaluate Results**: Prepare the actual forecasts and evaluate for reasonableness.

6) **Summarize and Document Results**: Provide supporting text and tables as necessary.

7) **Compare Forecast Results with FAA's TAF**: Follow guidance in FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems*. In part, the Order indicates that forecasts should not vary significantly (more than 10 percent) from the TAF. When there is a greater than 10 percent variance, supporting documentation should be supplied to the FAA. (FAA Southwest Region has provided additional guidance indicating forecasts are consistent with the TAF when they differ by less than 10 percent in the first five years, and less than 15 percent in the 10-year period.)

Aviation activity can be affected by many influences on the local, regional, and national levels, making it virtually impossible to predict year-to-year fluctuations of activity over 20 years with any certainty. Therefore, it is important to remember that forecasts are to serve only as guidelines, and planning must remain flexible enough to respond to a range of unforeseen developments.

The following forecast analysis for MFE was produced following these basic guidelines. Existing forecasts are examined and compared against current and historic activity. The historical aviation activity is then examined along with other factors and trends that can affect demand. The intent is to provide an updated set of aviation demand projections for MFE that will permit airport management to make planning adjustments as necessary to maintain a viable, efficient, and cost-effective facility.

SERVICE AREA

The initial step in determining the aviation demand for an airport is to define its generalized service area for various segments of aviation. The service area is determined primarily by evaluating the location of competing airports, their capabilities, their services, and their relative attraction and convenience. In determining the aviation demand for an airport, it is necessary to identify the role of the airport, as well as the specific areas of aviation demand the airport is intended to serve. For the Airport, the primary

roles are to accommodate commercial passenger airline service, as well as general aviation demand in the region.

The service area for an airport is a geographic region from which an airport can be expected to attract the largest share of its activity. The definition of the service area can then be used to identify other factors, such as socioeconomic and demographic trends, which influence aviation demand at an airport. Aviation demand will be impacted by the proximity of competing airports, the surface transportation network, and the strength of commercial airline and/or general aviation services provided by an airport and competing airports.

As in any business enterprise, the more attractive the facility is in terms of service and capabilities, the more competitive it will be in the market. If an airport's attractiveness increases in relation to nearby airports, so will the size of its service area. If facilities and services are adequate and/or competitive, some level of aviation activity might be attracted to an airport from more distant locales.

The size of an airport's service area will vary depending on numerous factors, but is primarily limited by the proximity of other airports providing similar services. This is especially true for commercial services as competition for passengers often shapes an airline's decision to operate in a specific community. As such, an examination of other nearby and regional commercial service airport competitors can provide an understanding of the service area limits at MFE. Currently, there are 24 primary commercial service airports in the state of Texas. **Table 2B** presents passenger enplanement rankings, including MFE.

TABLE 2B
Passenger Service in Texas

Rank	City	Airport	CY 2016 Enplanements	% of state Enplanements	Drive Distance from MFE (miles)
1	Fort Worth	Dallas-Fort Worth International	31,274,875	39.17%	527
2	Houston	George Bush Intercontinental/Houston	20,027,073	25.08%	369
3	Dallas	Dallas Love Field	7,554,421	9.46%	514
4	Houston	William P Hobby	6,285,016	7.87%	356
5	Austin	Austin-Bergstrom International	6,090,078	7.63%	317
6	San Antonio	San Antonio International	4,177,076	5.23%	248
7	El Paso	El Paso International	1,414,089	1.77%	788
8	Midland	Midland International Air and Space Port	471,311	0.59%	576
9	Lubbock	Lubbock Preston Smith International	447,945	0.56%	629
10	**McAllen**	**McAllen International**	**365,928**	**0.46%**	**-**
11	Amarillo	Rick Husband Amarillo International	334,666	0.42%	755
12	Corpus Christi	Corpus Christi International	325,815	0.41%	149
13	Harlingen	Valley International	263,614	0.33%	42
14	Killeen	Killeen-Fort Hood Regional	157,015	0.20%	377
15	Brownsville	Brownsville/South Padre Island International	120,151	0.15%	66
16	Laredo	Laredo International	100,978	0.13%	153
17	Abilene	Abilene Regional	84,073	0.11%	486
18	College Station	Easterwood Field	78,907	0.10%	375
19	Waco	Waco Regional	64,353	0.08%	422
20	San Angelo	San Angelo Regional/Mathis Field	60,277	0.08%	455
21	Tyler	Tyler Pounds Regional	52,494	0.07%	538
22	Wichita Falls	Sheppard AFB/Wichita Falls Municipal	40,078	0.05%	580
23	Beaumont	Jack Brooks Regional	26,518	0.03%	441
24	Longview	East Texas Regional	22,182	0.03%	547

Sources: US DOT - Bureau of Transportation Statistics (all airports except MFE); MFE Airline Activity Reports

COMPETING COMMERCIAL SERVICE AIRPORTS

The most common criteria in a passenger's selection of an airport are the proximity (convenience) and airfare (ticket price); however, several other factors can influence the passenger's decision. Business travelers often prefer expedient travel and may pay higher airfares for that convenience. The business traveler also desires reliable service with the most options possible such as diverse destinations, frequency of flights, favorable departure or arrival times, etc. Leisure travelers typically make airfare the most important factor for choosing an airline, or a more distant airport. Discount airlines have proven nationwide that leisure passengers, and even some business travelers, will choose airports outside their local area due to low fares.

Another factor is the level of service offered from an airport. Level of service factors that can affect the secondary service area include frequency of service, number of airlines, size and/or type of aircraft, and nonstop destinations available. The biggest factor, however, tends to be airfare. Competition on routes and low-fare airlines are major factors that can draw vacation travelers to drive as much as three hours to a larger airport.

The surface transportation network provides options for local travelers to use other commercial service airports in the region. Regional competing airports include Valley International (HRL) in Harlingen, Brownsville/South Padre (BRO), Corpus Christi (CRP), and Laredo International (LRD). Each of these airports are within a three-hour drive time or less from MFE. Airline service factors for these airports will contribute greatly to whether a passenger will elect to use one of these regional airports instead of MFE. The following is a brief discussion of the primary competing commercial service airports. A summary of these competing airports and current service at MFE is provided in **Table 2C**.

TABLE 2C
Competing Commercial Service Airport Summary

Airport	CY 2016 Enplanements	Airlines	Daily Departures	Non-Stop Destinations	2016 Avg. One-Way Ticket	2016 Avg. Yield	Drive Time from MFE
McAllen International	**365,928**	**4**	**14**	**6**	**$294.77**	$0.2383	--
Valley International	263,614	4	9	3	$213.24	$0.2375	50min
Brownsville/South Padre	120,151	2	6	2	$303.80	$0.2449	1h 15min
Corpus Christi Intl	325,815	3	16	2	$254.21	$0.2454	2h 20min
Laredo International	100,978	3	8	3	$263.68	$0.2334	2h 45min

Average Yield is calculated as fare cost per miles traveled.
Sources: US DOT - Bureau of Transportation Statistics (Valley, Brownsville, Corpus Christi, Laredo enplanements); Airport websites (airlines/departures); MFE Airline Activity Reports (enplanements);

Valley International (HRL) is a non-hub primary commercial service airport which had 263,614 passenger enplanements in 2016, ranking it 13th in the state. The airport has service from four carriers (Southwest, United, Delta [seasonal], and Sun Country [seasonal]) offering up to nine daily non-stop departures serving three non-stop destinations (Austin, Houston [HOU], Houston [IAH] and Minneapolis [seasonal]). The average one-way ticket from HRL in 2016 cost $213.24, which is the lowest within the region and its

average yield (cost per miles traveled) was $0.2375. HRL Drive time to HRL from MFE is approximately 50 minutes.

Brownsville/South Padre (BRO) is a non-hub primary commercial service airport offering six daily departures serving two destinations (Houston and Dallas/Ft. Worth). Airlines currently serving BRO include American and United. In 2016, BRO had 120,151 enplanements, which ranked it 15th in the state. BRO's average one-way ticket in 2016 was the highest in the region at $303.80 and its average yield was second highest at $0.2449. Drive time to BRO from MFE is approximately one hour and 15 minutes.

Corpus Christi (CRP) is a non-hub primary commercial service airport. CRP is currently served by three airlines (Southwest, United, and American) serving two non-stop destinations (Houston and Dallas/Ft. Worth) with 16 daily departures. In 2016, CRP had 325,815 passenger enplanements, ranking it 12th in the state. CRP's average 2016 one-way ticket cost was $254.21 and it had the highest average yield at $0.2454. Drive time to CRP from MFE is approximately two hours and 20 minutes.

Laredo International (LRD) is a non-hub primary commercial service airport offering eight daily flights to three non-stop destinations. Airlines serving LRD include Allegiant, which serves Las Vegas, American, which serves Dallas/Ft. Worth, and United, which goes to Houston. LRD had 100,978 passenger enplanements in 2016, which ranks 16th in the state. LRD's average one-way ticket price in 2016 was $263.68 and it had the lowest average yield at $0.2334. Drive time to LRD from MFE is approximately two hours and 45 minutes.

McAllen International Airport (MFE) is currently served by Allegiant Air, American, United, and Aeromar Airlines providing the most non-stop destinations in the region including Dallas/Ft. Worth, Houston, Las Vegas, Orlando (seasonal), Mexico City, and Los Angeles. There are up to 14 daily departures from MFE, which is second in the region only to CRP, and 2016 average one-way ticket prices were the second highest in the region at $294.77. MFE's average yield fell in the middle of its regional competitors at $0.2383.

Aeropuerto Internacional de Reynosa (REX) is currently served by Aeromexico and Viva Aerobus with daily non-stop service to Mexico City, Cancun, Guadalajara, and Veracruz. REX was recently also served by Volaris and Interjet and offered up to eleven daily departures. Effective November 1, 2017, upon Volaris' and Interjet's exit from the REX market, the total daily departures have decreased to six daily departures.

SERVICE AREA SUMMARY

Commercial Air Service Area

Each of the three commercial service airports serving the Rio Grande Valley (Hidalgo, Starr, Cameron, and Willacy Counties) serve unique markets that draw from a common service area. BRO is the most direct destination airport for leisure travelers to South Padre Island and to the City of Brownsville, which is the largest population center in the region; HRL is centrally located between the largest population

centers in the Valley (Brownsville and McAllen) and is served by Southwest, which targets low cost travelers. MFE is located in Hidalgo County which is the core of business and retail activity within the Valley and provides a greater variety of airlines and destinations served. Additionally, MFE is geographically closer to Monterrey, Tamaulipas and other Northern Mexico areas, which have become important feeders to MFE's air service market.

Due to the Rio Grande Valley's relative isolation from the rest of Texas, passenger leakage from the local market is not as big a concern as it is at many other small- and non-hub airports. CRP and LRD, which are the nearest commercial services airports to the region, serve the same destinations as MFE so there is little incentive for Valley residents to make an over two-hour drive to Laredo or Corpus Christi to take flights to Dallas/Ft. Worth or Houston. For this reason, MFE's primary service area is defined as the Rio Grande Valley region. The primary commercial air service area is depicted on **Exhibit 2A**. As the only airport in the region to offer non-stop service to Mexico City, MFE attracts Mexican travelers as well. Therefore, a secondary market includes the borderplex encompassing Reynosa, Mexico and northern portions of the Mexican state of Tamaulipas. Mexican travelers can enter the U.S. at the Hidalgo Port, located approximately seven miles south of MFE. With a strong ultra low cost carrier (ULCC) presence, low cost fares, as well as multiple non-stop destinations in Mexico, REX is a key competitor for service to and from Mexico. Passenger leakage to REX negatively impacts MFE's Mexico City route.

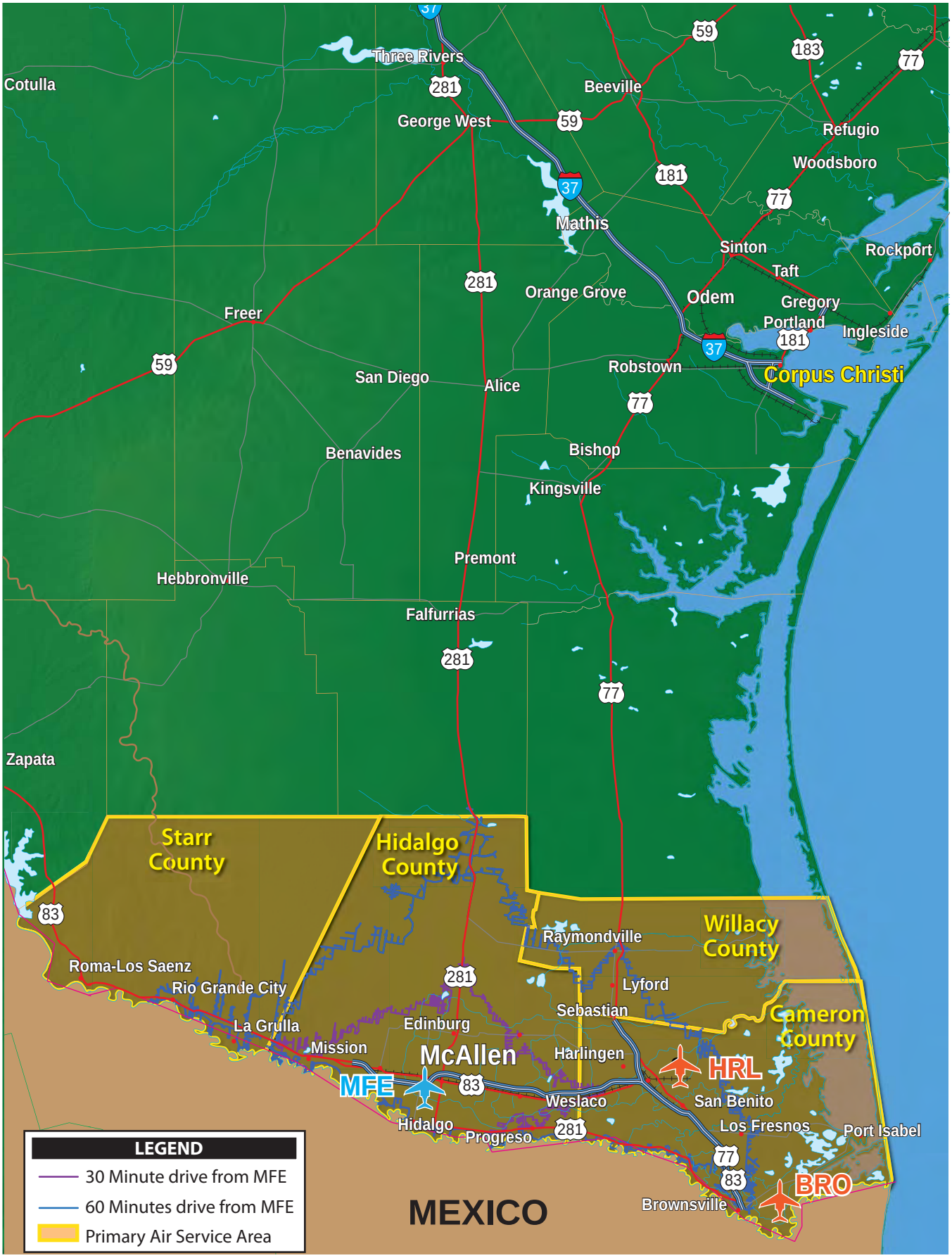
Based Aircraft Service Area

The service area for based aircraft is more localized due to the availability of other airports that serve general aviation exclusively such as South Texas International Airport at Edinburg (EBG) and the Mid Valley Airport (T65) in Weslaco. An examination of based aircraft at MFE indicate the majority are registered to addresses within Hidalgo County and within a 30-minute drive time from MFE, as depicted on **Exhibit 2B**. Therefore, for the purposes of this study, the general aviation service area is limited to Hidalgo County.

SOCIOECONOMIC TRENDS

The socioeconomic conditions provide an important baseline for preparing aviation demand forecasts. Local socioeconomic variables, such as population, employment, and income, are indicators for understanding the dynamics of the community and can relate to local trends in aviation activity. Analysis of the demographics of the airport service area will give a more comprehensive understanding of the socioeconomic situations affecting the region which supports MFE. The following is a summary of historical demographic trends as well as forecasts of those socioeconomic characteristics.

Table 2D summarizes historical and forecast population, employment, income, and gross regional product (GRP) estimates for the Rio Grande Valley region. Population within the Valley grew at a CAGR of 3.5 percent from 1970 to 2000, reflecting a significant growth period. That growth slowed slightly since 2000, growing at a CAGR of 2.0 percent. The Texas Water Development Board projects population within the Valley to grow at a CAGR of 2.2 percent and exceeding 2.0 million by 2036. Employment and GRP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George West
Beeville
Refugio
Woodsboro
Mathis
Sinton
Rockport
Taft
Orange Grove
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Gregory
Portland
Ingleside
Freer
Corpus Christi
San Diego
Alice
Robstown
Benavides
Bishop
Kingsville
Premont
Hebbronville
Falfurrias
Zapata
Starr County
Hidalgo County
Willacy County
Cameron County
Raymondville
Lyford
Sebastian
Roma-Los Saenz
Rio Grande City
La Grulla
Edinburg
Mission
McAllen
Harlingen
MFE
HRL
San Benito
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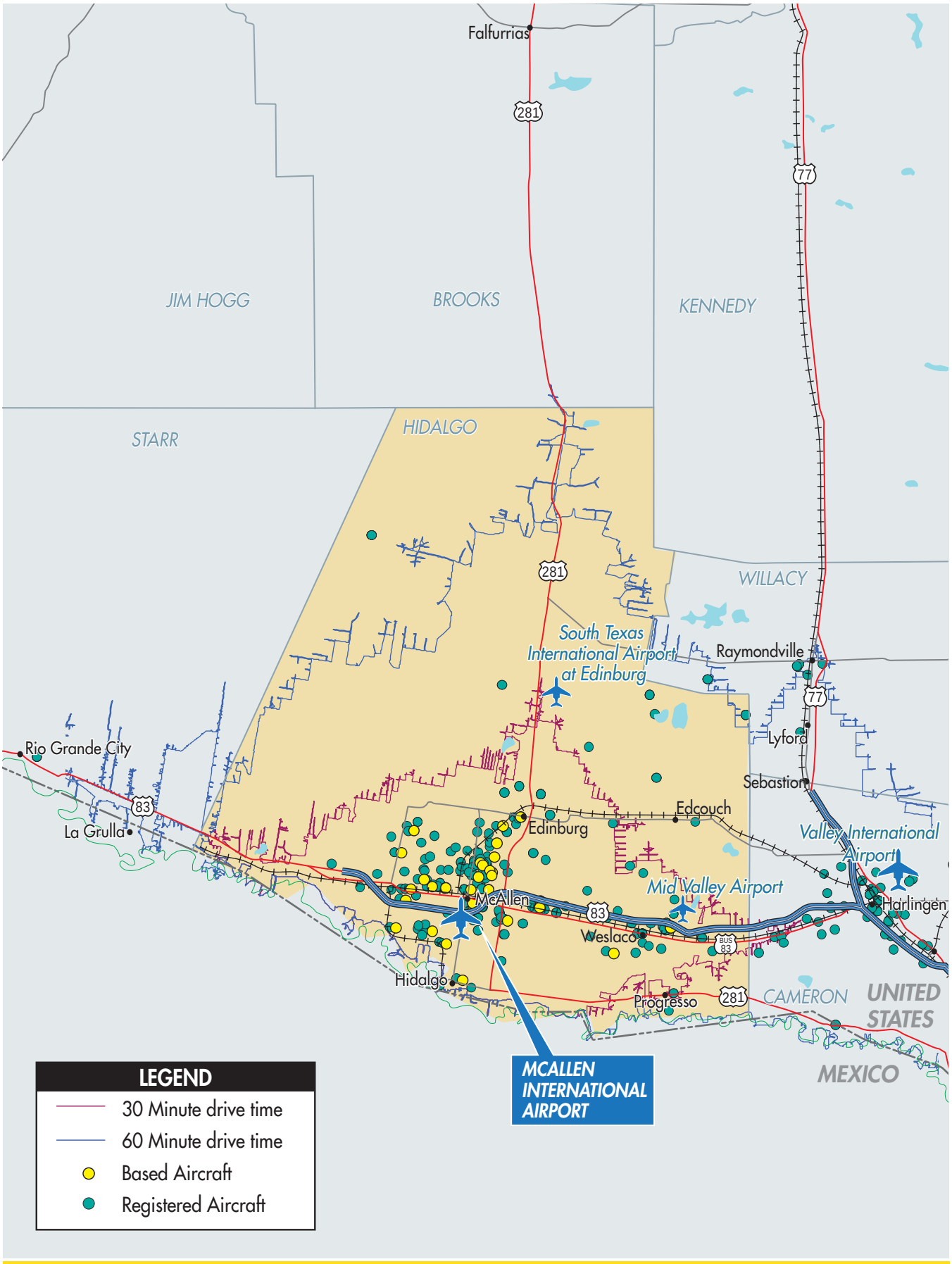
Primary Air Service Area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South Texas International Airport at Edinburg
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La Grulla
Edcouch
Edinburg
Valley International Airport
Mid Valley Airport
McAllen
Harlingen
Weslaco
BUS 83
Hidalgo
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CAMERON
UNITED STATES
MEXICO
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also experienced significant growth from 1970 to 2000, growing at a CAGR of 4.1 percent and 5.2 percent respectively. Growth of per capita personal income (PCPI) inflation-adjusted to 2009 dollars was slightly behind the other categories from 1970 to 2000 at 2.4 percent CAGR. Growth within these categories outpaced population from 2000 to 2016, with employment growing at a CAGR of 3.0 percent, PCPI at 3.8 percent, and GRP at 4.4 percent. Employment and GRP are projected to continue to grow at a faster pace than population through 2036, reaching 968,223 employed and $68.4 billion in GRP. PCPI growth is projected to slow to a CAGR of 0.5 percent through 2036, reaching $32,794. These socioeconomic categories indicate a strong local economy and a fertile service area for aviation-services demand.

TABLE 2D
Socioeconomic Trends
Rio Grande Valley

Year	Population	Employment	Income – PCPI ($2009)	Gross Regional Product ($millions)
1970	355,180	112,266	$8,173	$3,830
1980	537,811	192,618	$10,760	$8,213
1990	707,432	248,788	$12,245	$10,755
2000	983,148	373,270	$16,520	$17,681
CAGR 1970-2000	3.5%	4.1%	2.4%	5.2%
2001	1,006,745	387,047	$17,148	$18,612
2002	1,036,324	402,932	$17,440	$19,981
2003	1,068,089	413,379	$18,507	$21,232
2004	1,098,702	431,876	$18,360	$23,021
2005	1,127,924	449,954	$18,299	$24,052
2006	1,156,034	469,960	$18,453	$25,437
2007	1,182,675	492,169	$19,333	$26,538
2008	1,211,220	505,959	$19,985	$26,835
2009	1,240,017	508,807	$20,311	$27,005
2010	1,264,095	514,120	$25,437	$28,467
2011	1,296,629	533,964	$26,538	$29,366
2012	1,314,144	541,565	$26,835	$29,926
2013	1,323,924	553,234	$27,005	$31,451
2014	1,334,976	563,793	$28,467	$32,578
2015	1,350,534	579,359	$29,366	$33,771
2016	1,358,133	595,055	$29,926	$34,996
CAGR 2000-2016	2.0%	3.0%	3.8%	4.4%
2021	1,587,111	676,451	$25,467	$41,611
2026	1,747,301	765,829	$28,100	$49,291
2031	1,918,137	863,205	$30,549	$58,184
2036	2,079,777	968,223	$32,794	$68,419
CAGR 2016-2036	2.2%	2.5%	0.5%	3.4%

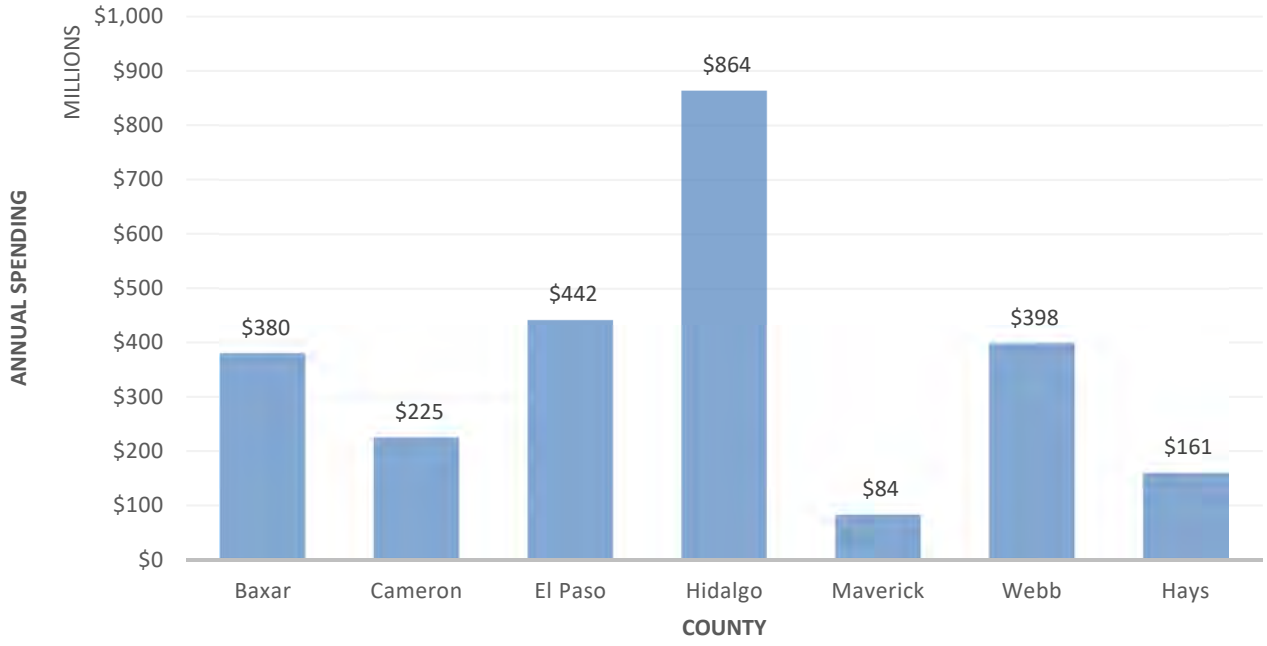
Rio Grande Valley consists of Hidalgo, Starr, Cameron, and Willacy Counties
CAGR – Compound Annual Growth Rate
PCPI – Per Capita Personal Income
Sources: Population – U.S. Census Bureau; Texas Demographic Center; Texas Water Development Board.
Employment, Income, and Gross Regional Product – Woods & Poole Economics.

MEXICAN VISITORS

McAllen is located only five miles from the U.S./Mexico border, and has become a key shopping and entertainment destination for Mexican visitors. Additionally, McAllen's strong industrial ties to Reynosa and combined population of more than two million people, have converted McAllen and Reynosa into one of the most dynamic urban centers along the United States-Mexico border. McAllen's geographic position links it to key northern Mexico markets like Monterrey, with Mexico's brand-new transcontinental highway leading to the McAllen-Hidalgo-Reynosa Bridge and the Anzalduas International Crossing. The 7,000,000 vehicles that cross these bridges each year contribute to the economic vitality of this border. Key indicators that support the importance of Mexico for McAllen include the following:

- McAllen / Reynosa are home to over 671 manufacturing companies (261 companies on the U.S. border and 410 companies on the Mexico border);
- McAllen Metro Area is the primary retail sector in the Valley and draws from a consumer base of 10,000,000 people within a 200-mile radius stretching to Monterrey, Nuevo Leon, Mexico.
- McAllen's retail sales sector has become the driving force in McAllen's economy, growing 138 percent over the last 10 years.
- Mexican shoppers account for approximately 40 percent of McAllen's retail activity.
- A 2012 Saber Institute Study on the Economic Impact of Mexican Visitors found that 34 percent of total Mexican spending in Texas occurred in the McAllen Metro Area. This was the greatest Mexican national spending trend in Texas and totalled $864 million (see **Figure 2A**).
- Over 7,000,000 vehicles cross the two McAllen border crossings.
- Over 238,000 bus passengers depart annually from McAllen to Monterrey.

FIGURE 2A
2012 Mexican National Annual Spending by County



Source: 2012 Saber Research Institute

According to the *Texas Overseas Visitors 2015 Report*[1], there were an estimated 619,000 Mexican air travelers to the State of Texas in 2015, most of which (71.8 percent) entered the U.S. through either Houston or Dallas/Ft. Worth. On average, Mexican travelers spent $1,277 per visitor per trip and spent eight days in Texas per trip.

MEXICAN ECONOMIC IMPACT

An April 12, 2013 report prepared by the Saber Research Institute titled, *The Spending Patterns and Economic Impacts of Mexican Nationals in A Twenty-County Region of South and Central Texas,* evaluated spending patterns by Mexican Nationals in San Antonio area counties and several other selected border counties including Hidalgo and Cameron counties. As was previously stated, this study found that the border counties studied had the largest impact from Mexican Nationals' spending, with Hidalgo County receiving the biggest impact (see **Figure 2A**). Total economic impact of Mexican National spending in Hidalgo County in 2012 was 9,646.8 jobs, income of almost $247 million dollars, value added (contribution to GRP) of almost $436 million dollars, and total economic output of almost $767 million dollars. Monthly, Mexican National spending in the region is boosted during the months of April, July, November, and December related to major holidays in those months. The total impact of Mexican National spending to the study region in 2012 was approximately $2.6 billion dollars contributing $1.5 billion to the gross domestic product of the region and supported over 29,456 full-time jobs and earning incomes of almost $926 million. Mexican National spending in the region also generates tax revenues. Hidalgo County in 2012 received approximately $35.4 million in indirect business taxes and $1.5 million in household taxes due to Mexican National spending.

WINTER TEXANS

The Rio Grande Valley has long been a winter destination for retirees from across the U.S. and Canada. These winter residents of the Valley are referred to as "Winter Texans." According to *The Winter Texan Report*, June 2016 prepared by the University of Texas, Rio Grande Valley Business & Tourism Research Center, the number of Winter Texans in the Valley during 2015-2016 is 96,000, which accounts for approximately seven percent of the total Valley population. The top origins of Winter Texans in the Valley include Canada (17.6 percent), Minnesota (14.3 percent), Iowa (11.5 percent), Missouri (7.8 percent), Illinois (7.6 percent) and Michigan (7.2 percent). Most Winter Texans (89.9 percent) own a Valley residence which can include a mobile home/park model, an RV, or a house/condominium. Winter Texans also contribute to the economic vitality of the Valley by spending approximately $760 million during the 2015-2016 winter season, which accounts for approximately 2.2 percent of GRP.

A summary of the total Winter Texan population since the 1986-87 season and the overall economic impact is provided in **Table 2E**. This data indicates the population of Winter Texans reached a peak of 144,000 during the 2009-10 winter season. Since 2009-10, the population has declined each year dropping down to levels last seen in the mid-1990s. The average expenditures per household have continued

[1] Produced by Travel Market Insights Inc. for Texas Tourism, Office of the Governor, Economic Development & Tourism Office.

to increase over time, but due to the declining population, the overall economic impact has also decreased from its peak year in 2009-10, when Winter Texans contributed $803 million in economic impact. The Winter Texan Report concludes that there is a trend of an aging Winter Texan population that is not being replaced by a younger retiree group. Due to their substantial influence on the Valley and its economy, however, the Valley should continue outreach efforts to ensure younger, baby boomer Winter Texans replace their aging predecessors.

TABLE 2E
Winter Texans in the Rio Grande Valley

Year	Winter Texans Population	Avg. Expenditure per Household per Visit	Direct Economic Impact (in millions)
1986-87	71,000	$2,592	$92
1987-88	76,000	$4,053	$154
1988-89	79,000	$4,051	$160
1989-90	81,000	$4,765	$193
1990-91	79,000	--	--
1991-92	84,000	$4,762	$200
1992-93	87,000	$5,103	$222
1994-95	97,000	$5,155	$250
1996-97	120,000	$5,317	$319
1998-99	124,000	$5,306	$329
2000-01	143,000	$4,601	$329
2002-03	123,000	$4,065	$250
2004-05	127,000	$6,614	$420
2005-06	127,000	$9,976	$634
2007-08	127,000	$9,555	$607
2009-10	144,000	$10,700	$803
2011-12	133,400	$10,800	$751
2013-14	100,000	$13,400	$710
2015-16	96,000	$14,900	$760

Source: The Winter Texan Report, June 2016 prepared by the University of Texas, Rio Grande Valley Business & Tourism Research Center

NATIONAL AVIATION TRENDS

Each year, the FAA updates and publishes a national aviation forecast. Included in this publication are forecasts for the large air carriers, regional/commuter air carriers, general aviation, and FAA workload measures. The forecasts are prepared to meet budget and planning needs of the FAA and to provide information that can be used by state and local authorities, the aviation industry, and the general public. The current edition when this chapter was prepared was FAA *Aerospace Forecasts – Fiscal Years 2017-2037*, published in March 2017. The FAA primarily uses the economic performance of the United States as an indicator of future aviation industry growth. Similar economic analyses are applied to the outlook for aviation growth in international markets. The following discussion is summarized from the FAA Aerospace Forecasts.

Since its deregulation in 1978, the U.S. commercial air carrier industry has been characterized by boom-to-bust cycles. The volatility that was associated with these cycles was thought by many to be a structural feature of an industry that was capital intensive but cash poor. However, the great recession of 2007-09 marked a fundamental change in the operations and finances of U.S. airlines. Air carriers fine-tuned their business models to minimize losses by lowering operating costs, eliminating unprofitable routes, and grounding older, less fuel-efficient aircraft. To increase operating revenues, carriers initiated new services that customers were willing to purchase and started charging separately for services that were historically bundled in the price of a ticket. The industry experienced an unprecedented period of consolidation with four major mergers in five years. These changes, along with capacity discipline exhibited by carriers, have resulted in a fifth consecutive year of profitability for the industry in 2016. Looking ahead, there is optimism that the industry has been transformed from that of a boom-to-bust cycle to one of sustainable profits.

ECONOMIC ENVIRONMENT

According to the FAA forecast report, as the economy recovers from the most serious economic downturn and slow recovery since the Great Depression, aviation will continue to grow over the long run. Fundamentally, demand for aviation is driven by economic activity. As economic growth picks up, so will growth in aviation activity. The FAA forecast calls for passenger growth over the next 20 years to average 1.9 percent annually. The steep decline in the price of oil in 2015-2016 was a catalyst for an uptick in passenger growth in 2016 that continues in 2017. The price of oil is projected to rise from around $39 per barrel in 2016 to $47 in 2017 and continue to rise, exceeding $100 by 2026 and approaching $132 by 2037.

U.S. economic performance in 2016 is estimated to have grown in real GDP to 16.6 trillion (inflation adjusted to 2009 dollars) and is forecast to grow at an average annual growth rate of 2.1 percent through 2037. Although the U.S. economy has managed to avoid a recession, a prolonged period of faster economic growth (e.g., > 3.0 percent) may not be forthcoming. Additional potential headwinds for the global economy include uncertainty surrounding “Brexit,” recessions in Russia and Brazil, inconsistent performance in other emerging economies, and a lack of further stimulus in the advanced economies. There is also uncertainty regarding the impact of the new U.S. administration’s policies on economic growth.

U.S. TRAVEL DEMAND

Mainline and regional carriers offer domestic and international passenger service between the U.S. and foreign destinations, although regional carrier international service is confined to the border markets in Canada, Mexico, and the Caribbean. According to FAA, three distinct trends are shaping today’s commercial air carrier industry: (1) continuing industry consolidation and restructuring; (2) continued capacity discipline in response to external shocks; and (3) the proliferation of ancillary revenues.

The restructuring and consolidation of the U.S. airline industry that began in the aftermath of the terror attacks of September 11, 2001 continued in 2015. American and US Airways combined their networks and reservations systems to form the world's largest airline with the last US Airways flight occurring in October 2015. In April 2016, Alaska Airlines announced its intention to merge with Virgin America to create the nation's 5th largest airline. Consequently, there are now only six dominant airlines in the U.S. – American, Delta, Southwest, United, Alaska/Virgin, and Jet Blue – controlling approximately 85 percent of the domestic market. It is highly unlikely the U.S. Government will approve any further mergers among these due to anti-trust regulations. In 2005, there were twelve major mainline airlines.

The mergers and increasing market presence of low cost carriers like Frontier, JetBlue, and Southwest have had clear implications on the fares, size of the aircraft being used, and the load factors.

One of the most striking outcomes of industry restructuring has been the unprecedented period of capacity discipline (achieving higher passenger loads through scheduled flight and fleet mix consolidation primarily), especially in domestic markets. Between 1978 and 2000, available seat miles (ASMs) in domestic markets increased at an average annual rate of four percent per year, recording only two years of decline. Even though domestic ASMs shrank by 6.9 percent in FY 2002, following the events of September 11, 2001, growth resumed and by FY 2007, domestic ASMs were 3.6 percent above the FY 2000 level. However, U.S. domestic ASMs are up just 4.1 percent when compared to 2007 as the industry responded first to the sharp rise in oil prices (up 155 percent between 2004 and 2008) and then the global recession that followed (2009 to the present).

In 2016, mainline carriers provided five percent more capacity than they did in 2007, while carrying eight percent more passengers. Capacity flown by the regional group has shrunk by 2.6 percent over the same period (with passengers carried down three percent).

The regional market has continued to shrink as the regionals compete for even fewer contracts with the remaining dominant carriers; this has meant slow growth in enplanements and yields. The regionals have less leverage with the mainline carriers than they have had in the past and are facing large pilot shortages and tighter regulations regarding pilot training. Labor costs are also increasing as they raise wages to combat the pilot shortage. Their capital costs have increased in the short-term as they continue to replace their 50-seat regional jets with more fuel efficient 70-seat jets. This move to the larger aircraft will prove beneficial in the future, however, since their unit costs are lower.

Another continuing trend is that of ancillary revenues. Carriers generate ancillary revenues by selling products and services beyond that of an airplane ticket to customers. This includes the un-bundling of services previously included in the ticket price, such as checked bags and on-board meals, and by adding new services, such as boarding priority and internet access. As a result of very low oil prices and ancillary revenue sources, U.S. passenger carriers posted net profits for the seventh consecutive year in 2016.

AIRLINE SERVICE FORECASTS

As previously mentioned, MFE is a primary commercial service airport categorized as a small-hub airport by the FAA. Small-hub primary commercial service airports account for at least 0.05 percent but less than 0.25 percent of domestic enplanements. As of September 2017, MFE had scheduled passenger service provided by four carriers: Allegiant Air, American Airlines, United Airlines, and Aeromar.

- Allegiant Air provides non-stop service to Las Vegas (LAS), Los Angeles (LAX), and seasonally to Orlando (SFB) from mid-May to mid-August and from mid-November to mid-January. Allegiant utilizes a variety of aircraft for its MFE routes including the 166-seat MD-83, the 215-seat Boeing 757-200, and the 156 seat Airbus A319. The airline plans to phase out the MD-83 aircraft by the end of October 2017 and to fully transition to an Airbus fleet by the middle of 2018.

- American Airlines provides non-stop service to Dallas/Ft. Worth (DFW). Its fleet mix of aircraft includes the 76-seat CRJ-900, the Airbus A319/A320 (128-150 seats), and the 137-seat MD-80.

- United Airlines has non-stop service to Houston (IAH) and utilizes a fleet mix that includes the 50-seat ERJ-145, 76-seat ERJ-175, 128-seat Airbus A319, and the Boeing 737 series 700 (118 seats), 800 (154 seats), and 900 (167 seats).

- Aeromar is a Mexican regional carrier that operates domestic and international routes as well as charter passenger and cargo flights. MFE is currently the only U.S. airport served by Aeromar's route system, which includes 28 Mexican destinations. Aeromar provides non-stop service to Mexico City (MEX) utilizing a fleet of 48-seat ATR 42s, and 68-seat ATR 42-600s.

To evaluate commercial service potential at MFE and the facilities necessary to properly accommodate present and future airline activity, two basic elements must be forecast: annual enplaned passengers and annual airline operations. Annual enplaned passengers serve as the most basic indicator of demand for commercial passenger service activity. The combination of enplanements and deplanements generally equals the total passengers using an airport. The annual number of enplanements is the figure utilized by the FAA to determine various entitlement funding levels for commercial service airports.

The term "enplanement" refers to a passenger boarding an airline flight. Enplaning passengers are then described in terms of either "originating" or "connecting/transferring." Originating passengers depart a specific airport for a destination or hub airport to connect/transfer to another flight. Connecting/transferring passengers are those who have departed from another location and are using the airport as an intermediate stop. These passengers may disembark their originating flight to wait in the terminal for their next flight or could simply remain on the aircraft at an intermediary stop as a "through" passenger. MFE and similar airports have almost exclusively originating passengers, while larger hubs like those in Dallas/Ft. Worth or Houston have a more significant percentage of passengers who are connecting/transferring.

As indicated earlier, an important resource utilized in aviation demand forecasting is the annual FAA aviation forecasts. The most recent available version is the FAA *Aerospace Forecasts – Fiscal Years 2016-2036*, published in March 2016. The FAA forecasts a variety of aviation demand indicators on an annual

basis. In the most current edition, fiscal year 2014 is presented as the baseline, with 2015 showing as an estimate and years 2016 through 2036 as projections. Many forecasting elements utilized in this analysis will consider the history and projections presented by the FAA in its annual forecast.

FAA COMMERCIAL AIR CARRIER FORECASTS

U.S. commercial air carriers' total number of domestic departures rose in 2016 for the first time since 2007, but still remain 17.3 percent below the 2007 level. ASMs, revenue passenger miles (RPMs), and enplanements all showed a rebound; these trends underlie the expanding size of aircraft and higher load factors. In 2016, the domestic load factor reached a historic high of 84.7 for commercial air carriers. System capacity growth was up 4.2 percent in 2016, with U.S. carriers prioritizing domestic capacity over the international market. U.S. carrier domestic capacity growth will exceed their international capacity growth in 2017, but carriers will start expanding capacity in international markets faster than domestic markets beginning in 2018. This trend is projected to continue through 2037.

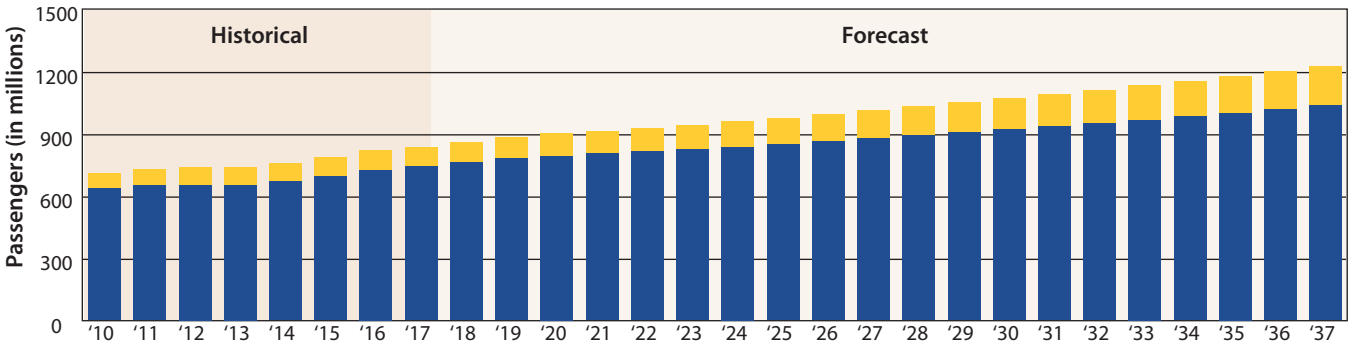
Increases in passenger volume and traffic offset lower yields and, along with higher ancillary revenues and falling fuel prices, resulted in U.S. carriers finishing up 2016 with record profits.

Supported by a growing U.S. and world economy, year over year RPM growth is forecast to be 2.4 percent on average over the period from 2016-2037. Over the same time period, system capacity growth averages 2.4 percent per year and system enplanements are projected to increase an average of 1.9 percent a year, with mainline carriers growing at 2.0 percent a year, slightly higher than their regional counterparts (up 1.6 percent). By 2037, U.S. commercial air carriers are projected to fly 1.81 trillion ASMs and transport 1.23 billion enplaned passengers – a total of 1.53 trillion passenger miles. Planes will remain crowded, with load factors projected to grow to 84.6 percent in 2037 (up 1.1 points compared to the beginning of the forecast period in 2016). **Exhibit 2C** presents the annual historical and forecast enplanement totals for both large air carriers and commuter airlines in the U.S. as forecast by the FAA.

FAA COMMERCIAL AIRCRAFT FLEET FORECAST

The commercial passenger carrier fleet is undergoing transformation. The mainline carriers are retiring older, less fuel-efficient aircraft (e.g., 737-300/400/500, 757/767, and MD-80) and replacing them with more technologically advanced A319/320 and 737-700/800/900 aircraft. The regional carriers are growing their fleet of 70-90 seat regional jet aircraft and reducing their fleet of 50-seat jet aircraft. Between 2016 and 2037, the number of jets in the U.S. mainline carrier fleet is forecast to grow from 4,073 to 5,199, an average of 54 aircraft a year. The regional carrier fleet is forecast to decline from 2,156 aircraft in 2016 to 2,027 in 2037 as the fleet shrinks by 14 percent (309 aircraft) between 2016 and 2025. **Exhibit 2D** presents the FAA commercial aircraft fleet forecast through 2037.

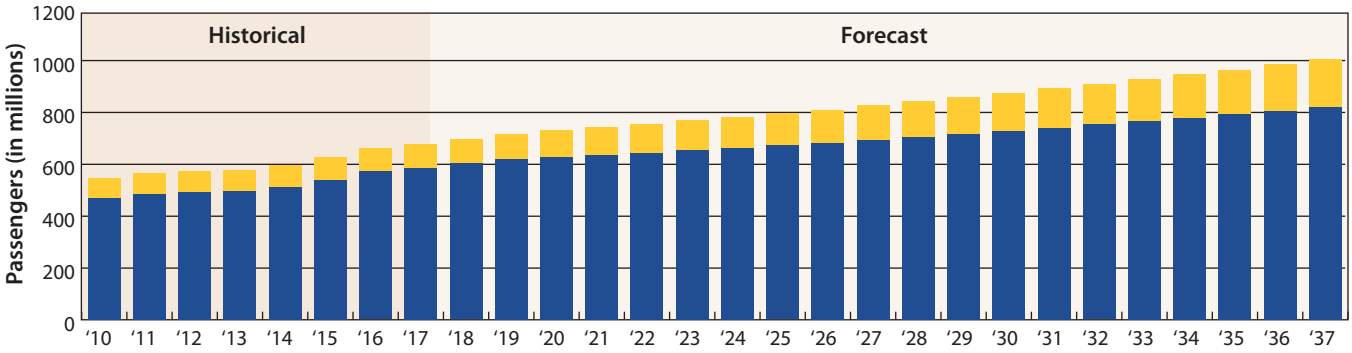
U.S. AIR CARRIER PASSENGER ENPLANEMENTS



SOURCE	2016	2022	2027	2037	AAGR 2016-2037
Domestic Revenue Enplanements	726	815	877	1,037	1.7%
International Revenue Enplanements	93	115	137	190	3.4%
TOTAL	820	931	1,014	1,227	1.9%

Note: All figures measured in millions

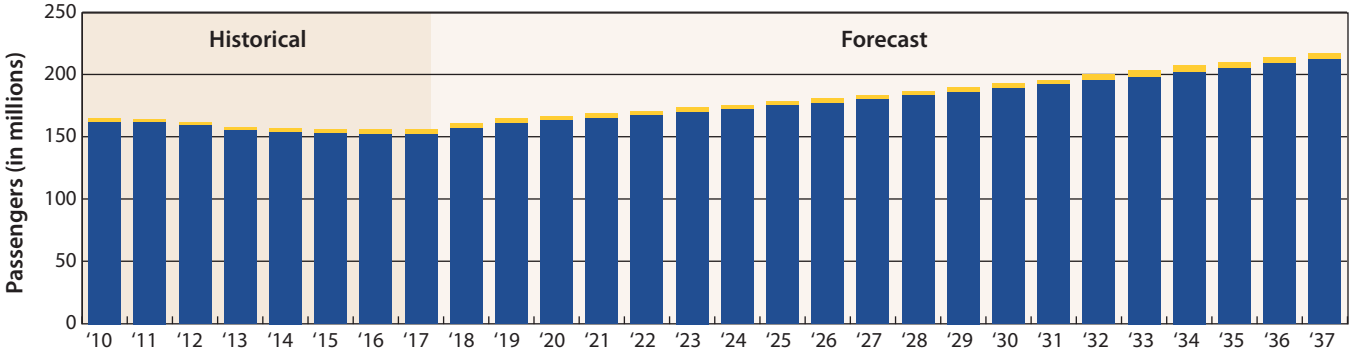
U.S. MAINLINE AIR CARRIER PASSENGER ENPLANEMENTS



SOURCE	2016	2022	2027	2037	AAGR 2016-2037
Domestic Revenue Enplanements	575	648	697	825	1.7%
International Revenue Enplanements	90	111	133	185	3.5%
TOTAL	665	759	830	1,009	2.0%

Note: All figures measured in millions

U.S. REGIONAL AIR CARRIER PASSENGER ENPLANEMENTS



SOURCE	2016	2022	2027	2037	AAGR 2016-2037
Domestic Revenue Enplanements	152	167	180	212	1.6%
International Revenue Enplanements	4	4	4	5	1.6%
TOTAL	155	171	184	217	1.6%

Note: All figures measured in millions. Totals may not equal due to rounding

Source: FAA Aerospace Forecast - Fiscal Years 2017-2037

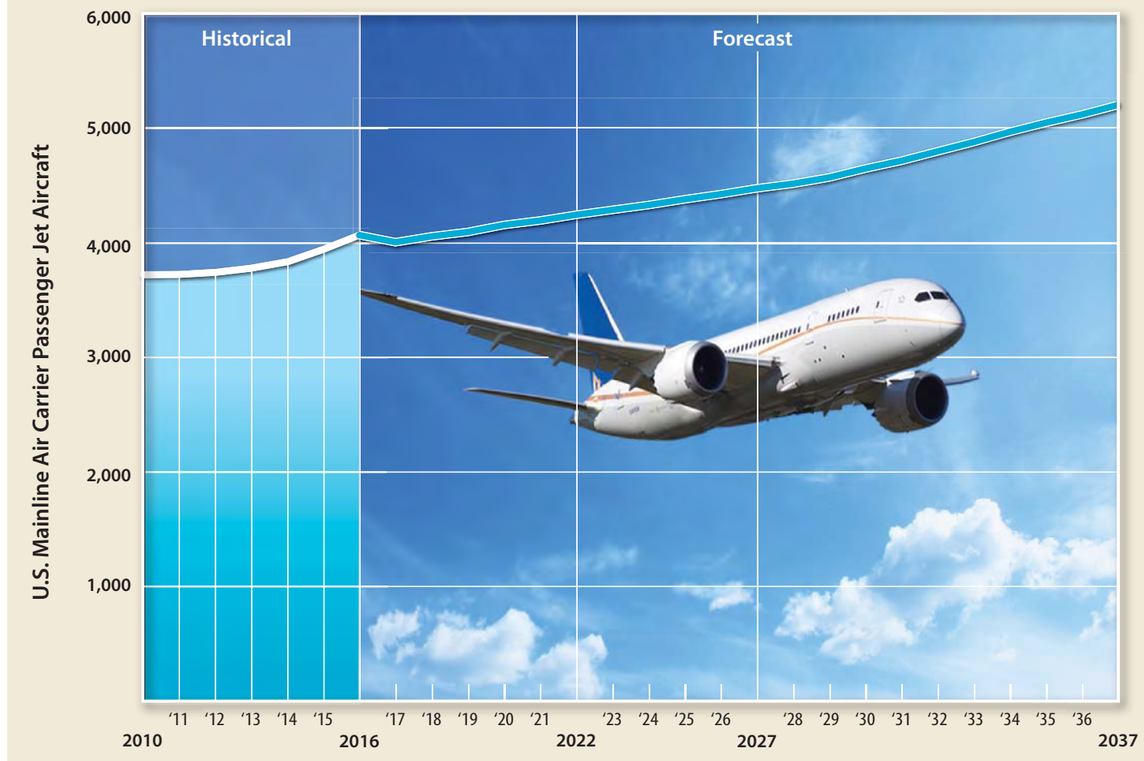
U.S. MAINLINE AIR CARRIER PASSENGER JET AIRCRAFT

	2016	2022	2027	2037	AAGR 2016-2037
Large Narrow Body					
2 Engine	3,457	3,555	3,713	4,232	1.0%
3-4 Engines	2	1	0	0	0.0%
Large Wide Body					
2 Engine	490	604	661	867	2.8%
3-4 Wide Body Engines	22	0	0	0	N/A
Total Large Jets	**3,971**	**4,160**	**4,374**	**5,099**	**1.2%**
Total Regional Jets	**97**	**85**	**102**	**100**	**0.1%**
Total Mainline Passenger Jets	**4,068**	**4,245**	**4,467**	**5,199**	**1.2%**

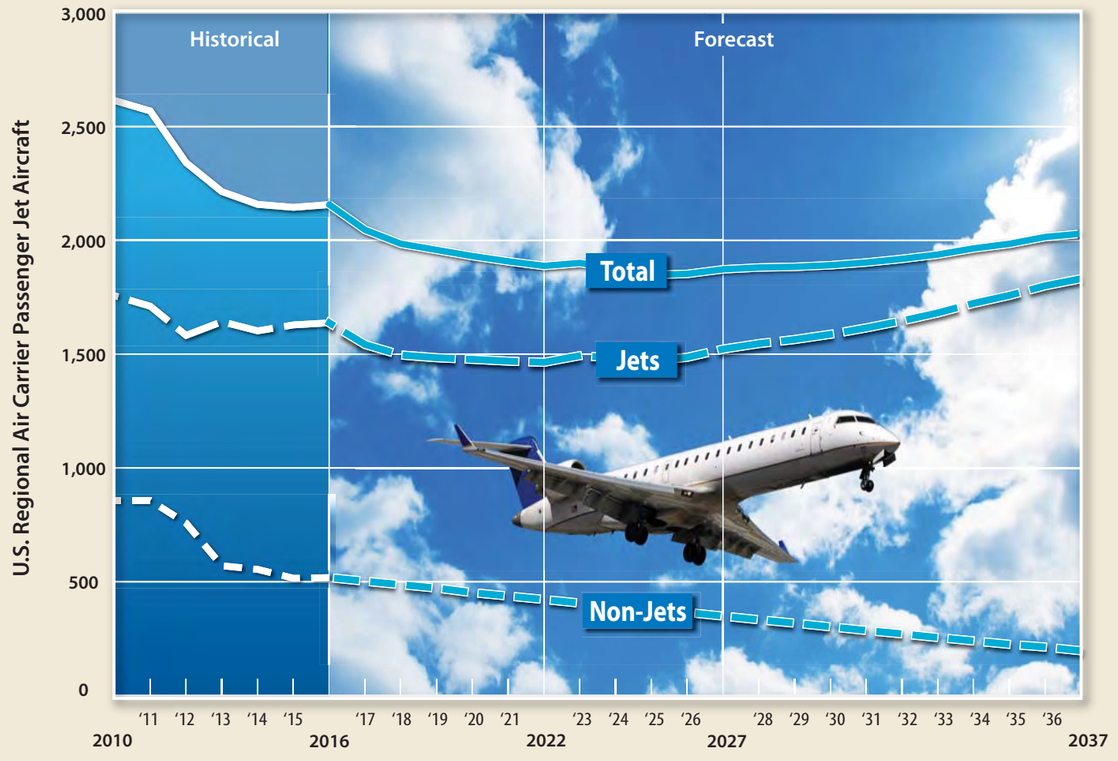
U.S. REGIONAL AIR CARRIERS PASSENGER AIRCRAFT

	2016	2022	2027	2037	AAGR 2016-2037
Less than 30 Seats					
Turboprop	420	328	258	114	-6.0%
31-40 Seats					
Turboprop	59	46	36	16	-6.0%
Over 40 Seats					
Turboprop	40	49	56	69	2.6%
Jet	1,637	1,464	1,522	1,828	0.5%
Non-Jet Total	**519**	**423**	**350**	**199**	**-4.5%**
Jet Total	**1,637**	**1,464**	**1,522**	**1,828**	**0.5%**
Total Regional Passenger Aircraft	**2,156**	**1,887**	**1,872**	**2,027**	**-0.3%**

Total Mainline Passenger Jets



Total Regional Passenger Aircraft



Source: FAA Aerospace Forecast - Fiscal Years 2017-2037

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HISTORICAL AIRLINE PASSENGER ACTIVITY

Table 2F provides a history of passenger enplanements at MFE since 1993. Over the past 23 years, MFE has experienced passenger activity ranging from a period high of 426,418 in 2007 to a low of 272,678 in 1993. Overall, MFE has a modest growth trend with a few periods of decline. Most notably, from 2001 to 2003, enplanements declined with the recession of the early 2000s that was brought on by the dot-com bubble and the September 11th terrorist attacks. Another decline occurred from 2008 through 2012 reflecting the impact of the Great Recession from late 2007 through mid-2009 and the slow recovery that followed. Enplanements went on the upswing between 2013 and 2015, but were slowed by an 8.6 percent decline in 2016.

From 1993-1999, annual enplanements averaged approximately 314,000 each year. From 2000-2009, the annual average enplanements grew to 347,000, and since 2000, the average grew again to 363,000. The CAGR over that 23-year period is 1.3 percent.

TABLE 2F
Historic Passenger Enplanements
McAllen International Airport

Year	Total Enplanements
1993	272,678
1994	338,358
1995	324,785
1996	311,639
1997	312,685
1998	309,265
1999	327,668
2000	328,061
2001	300,915
2002	278,696
2003	284,689
2004	317,806
2005	368,492
2006	407,143
2007	426,418
2008	385,586
2009	369,567
2010	356,885
2011	342,733
2012	332,984
2013	352,717
2014	390,758
2015	400,059
2016	365,928
CAGR	1.3%

Source: Airport records.

Enplanements by Airline

Table 2G presents annual enplanements by operator for 2012 through 2016. In 2012, MFE was served by American, United, Allegiant, and Delta, which had a non-stop route to Atlanta (ATL). However, by April of that year, Delta discontinued its service at MFE. In 2012, United accounted for the most enplanements at 39.6 percent, with American only slightly behind at 38 percent. Aeromar, which did not begin service at MFE until March of 2013, did not have any enplanements in 2012. The Airport also did not report any Part 135 air taxi or charter enplanements in 2012. Over this five-year period, American's share has grown to 48.6 percent by 2016, while United has dropped off to 34.4 percent. Allegiant's share has also dropped slightly from 19.3 percent in 2012 to 15.0 percent in 2016. Aeromar's share is significantly less than the other operators at 1.7 percent in 2016. Other Air Taxi/Charter enplanements has averaged only 860 enplanements per year over this time, representing approximately 0.2 percent of enplanements over five years.

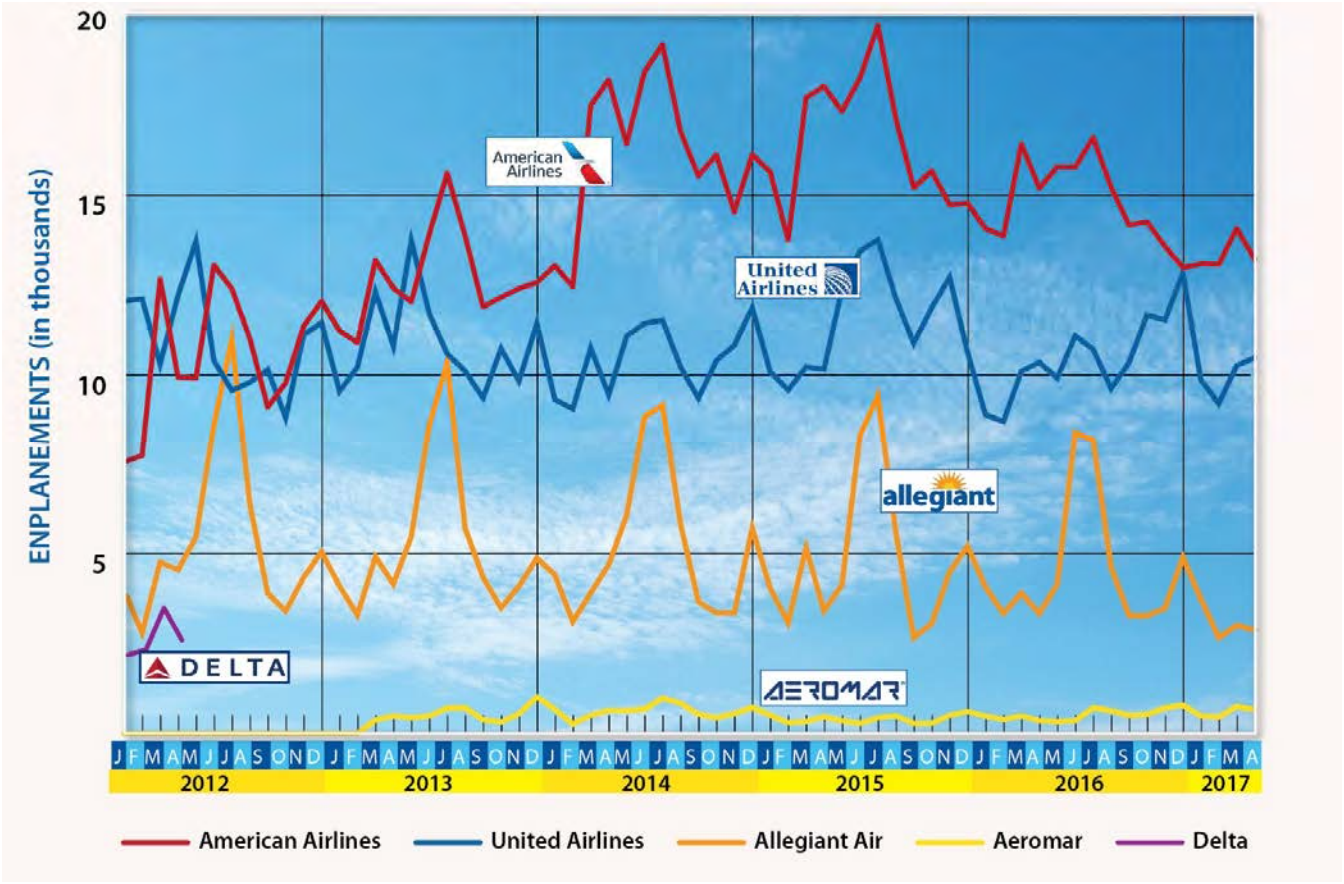
TABLE 2G
Passenger Enplanements by Operator
McAllen International Airport

	2012	%	2013	%	2014	%	2015	%	2016	%
American	126,684	38.0%	152,235	43.2%	194,385	49.7%	198,019	49.5%	177,977	48.6%
United	131,760	39.6%	130,447	37.0%	125,362	32.1%	137,941	34.5%	125,842	34.4%
Allegiant	64,109	19.3%	63,444	18.0%	62,128	15.9%	58,614	14.7%	54,957	15.0%
Aeromar	0	0.0%	5,419	1.5%	7,412	1.9%	4,762	1.2%	6,217	1.7%
Delta	10,431	3.1%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Other Air Taxi/Charters	0	0.0%	1,172	0.3%	1,471	0.4%	723	0.2%	935	0.3%
Total	332,984	100.0%	352,717	100.0%	390,758	100.0%	400,059	100.0%	365,928	100.0%

Source: Airport records.

Figure 2B depicts monthly enplanements by the passenger airlines from January 2012 through April of 2017. This chart highlights American's growth that begin in 2013, reaching peaks during the summer months of 2014 and 2015. The summer of 2016 did not result in similar summer peaks for American, and monthly counts have dropped back to pre-2014 levels. Allegiant's monthly counts highlight their summer peaks boosted by their seasonal route to Orlando, which have gradually weakened since 2012.

FIGURE 2B
Monthly Enplanements by Airline (January 2012-April 2017)



Top 25 Domestic Origin and Destination Markets

The U.S. Department of Transportation (DOT) maintains a rolling quarterly survey of 10 percent of all airline tickets sold for each commercial service airport. This Origin & Destination (O&D) Survey provides information on passengers' starting and ending cities and shows the volume of traffic between city pairs. The figures do not include "through" connecting/transfer passengers. The DOT data does not include international markets; therefore, O&D data for destinations in Mexico and other international markets are not included.

Information obtained from the domestic O&D Survey provides final destinations for those traveling from MFE to destinations within the U.S. Destination data is typically useful in examining the strength of the local market to and from other markets. **Exhibit 2E** shows the top 20 markets for 2006, 2012, and 2016 and MFE's current non-stop markets.

The results of the destination market analysis show that Las Vegas, Dallas, and Houston have been the top three results over the last decade. By 2012, Las Vegas overtook Dallas and Houston for the top destination market, which it has maintained through 2016. In 2016, a total of 72 percent of passenger enplanements are destined for one of the top 20 domestic markets. Airlines at MFE currently offer non-stop service, either year-round or seasonally, to five of its top six destinations, the exception being New York. Other top ten domestic destinations without non-stop service include Chicago, Miami, Washington DC, and Detroit. None of the other Rio Grande Valley airports offer non-service to these destinations, but all are within the mainline-carrier networks with connections in Dallas/Ft. Worth or Houston. The only airports in Texas with non-stop service to most or all these markets are the medium and large-hub airports in San Antonio, Austin, Houston, and Dallas.

Potential new non-stop destinations for MFE are likely to coincide with these top markets, such as New York, which has increased by 40.5 percent over the past 10 years, or Phoenix, which is a hub for Allegiant Air. Seasonal markets serving Winter Texan home states like Minnesota (Minneapolis) could be established to compete with seasonal service offered at HRL or to establish new connections with Winter Texan markets in Michigan (Detroit) or Illinois (Chicago).

Passengers that change flights at an airport are still counted as enplaned passengers at that airport, but are not considered as originations unless they do so on a separate ticket itinerary. In those cases, the passenger must check-in again for the new flight. **Exhibit 2E** differentiates between total enplanements and originations for 2006, 2012, and 2016. This data shows the percentage of originations averages approximately 92.2 percent over the three years, which is typical for a small-hub airport.

Top 25 International O&D Markets

Data on top international O&D markets was obtained from MFE's *Routes Conference: 2017* report, which details the top 25 international markets along with the daily, directional passengers and fare for the 12-month period ending at the second quarter of 2016. This report indicates that Cancun is the top international market with 3.6 daily passengers followed by Tokyo (2.8 daily passengers), Nuevo Laredo (2.3),

2016 TOP TWENTY DOMESTIC DESTINATIONS/NON-STOP SERVICE CITY PAIRS

Top Twenty Domestic Destinations

Rank	Destination	2006	Destination	2012	Destination	2016
1	Houston	46,250	Las Vegas	52,350	Las Vegas	53,390
2	Dallas	41,030	Dallas	37,800	Dallas	39,790
3	Las Vegas	37,410	Houston	23,210	Houston	21,390
4	Chicago	14,970	New York	16,690	New York	17,930
5	Los Angeles	13,740	Los Angeles	14,870	Los Angeles	14,650
6	New York	12,760	Orlando	10,870	Orlando	11,640
7	Orlando	12,310	Chicago	10,160	Chicago	10,190
8	Detroit	10,180	Miami	7,090	Washington DC	9,230
9	Atlanta	9,110	Washington DC	6,730	Miami	7,870
10	Washington DC	8,990	Detroit	6,290	Detroit	5,970
11	Indianapolis	6,110	Atlanta	6,110	Minneapolis	5,090
12	Denver	5,240	Minneapolis	4,980	Atlanta	5,090
13	Austin	5,080	Phoenix	4,300	Phoenix	4,770
14	Minneapolis	4,970	Boston	4,040	Philadelphia	4,100
15	St. Louis	4,420	Philadelphia	3,990	San Francisco	4,080
16	Raleigh-Durham	4,370	Seattle	3,860	Seattle	4,010
17	Miami	4,120	San Francisco	3,800	Boston	3,860
18	El Paso	4,020	Denver	3,530	Denver	3,470
19	Seattle	3,730	San Diego	3,480	San Diego	3,470
20	Tampa	3,700	Charlotte	3,210	Charlotte	3,390
Top 20 Total		**252,510**		**227,360**		**233,381**
Total Originations		**365,040**		**322,680**		**324,180**
Total Enplanements		**407,143**		**332,984**		**359,711**
% Originations		**89.7%**		**96.9%**		**90.1%**

Non-Stop Service Cities (2016)

- Dallas (DFW)
- Houston (IAH)
- Mexico City (MEX) - *not depicted*
- Orlando (SFB) - Seasonal
- Las Vegas (LAS)
- Los Angeles (LAX)

Toronto (2.2), and Madrid (2.0) rounding out the top five. Canadian markets account for five of the top 25 markets followed by Mexico with three. The top international O&D market data is summarized in **Table 2H**.

In addition to MFE's existing non-stop service to Mexico City (MEX), interest has been shown from the Mexican State of Guanajuato in establishing a route with the Del Bajio International Airport (BJX). It is viewed that this would be a strong market for MFE since McAllen has tourism and manufacturing ties to that area.

TABLE 2H
Top International O&D Markets: 12-Months Ending 2Q16
McAllen International Airport

		Daily, Directional	
Rank	**Market (Airport Code)**	**Passengers**	**Fare**
1	Cancun (CUN)	3.6	$281
2	Tokyo (NRT)	2.8	$967
3	Nuevo Laredo (MNL)	2.3	$502
4	Toronto (YYZ)	2.2	$365
5	Madrid (MAD)	2.0	$680
6	London (LHR)	2.0	$657
7	Paris (CDG)	1.8	$595
8	San Jose, Costa Rica (SJO)	1.7	$303
9	Seoul (ICN)	1.7	$909
10	Calgary (YYC)	1.3	$320
11	Nassau (NAS)	1.3	$296
12	Barcelona (BCN)	1.2	$651
13	Rome (FCO)	1.2	$613
14	Vancouver (YVR)	1.2	$323
15	Winnipeg (YWG)	1.2	$298
16	Buenos Aires (EZE)	1.2	$781
17	Guatemala City (GUA)	1.1	$376
18	San Jose Cabo (SJD)	1.1	$256
19	Frankfurt (FRA)	1.1	$694
20	Shanghai (PVG)	1.1	$593
21	Montreal (YUL)	1.1	$391
22	Bogota (BOG)	0.9	$364
23	Panama City (PTY)	0.9	$310
24	Sao Paulo (GRU)	0.9	$547
25	Punta Cana (PUJ)	0.9	$311

Source: McAllen International Airport, Routes Conference: 2017, Interjet Airlines.

ENPLANEMENT FORECASTS

As discussed in this chapter's introduction, the first step involved in updating an airport's forecasts includes reviewing previous forecasts in comparison to actual activity to determine what changes, if any, may be necessary. After that comes the consideration of any new factors that could impact the forecasts, such as changes in the socioeconomic climate or the effects of changes in air carrier services.

Previous Enplanement Forecasts

There are three existing forecasts of enplanement activity at MFE to consider:

- McAllen-Miller International Airport, *Airport Master Plan Update, 2005*
- McAllen-Miller International Airport, *Airport Terminal Capacity Study*, September 10, 2009
- FAA *Terminal Area Forecast* (base year 2016)

The forecasts from the 2005 Master Plan are nearly 12 years old, during which time there has been a significant national recession, as well as significant restructuring and consolidation in the airline industry. The FAA TAF forecast is published annually and is intended to be utilized as a starting point for considering the reasonableness of master plan forecasts. The Terminal Capacity Study was undertaken after passenger traffic growth at MFE rapidly increased from 2002 to 2007 resulting in terminal congestion. This study included an update of enplanement forecasts. The base year for the Terminal Capacity Study was 2007, which ended up being the peak year for the past 23 years. Since this study was completed, enplanement levels have only exceeded 400,000 one year (in 2015). **Table 2J** presents the previous master plan, Terminal Capacity Study, and TAF enplanement forecasts for MFE. Actual historical enplanements for MFE are also presented for comparative purposes.

TABLE 2J
Previous Enplanement Forecasts
McAllen International Airport

Year	Actual Enplanements	2005 Master Plan – Recommended	2017 FAA TAF	2009 Terminal Capacity Study
2003	284,689	284,567	263,431	
2004	317,806	307,800	294,792	
2005	368,492		341,910	
2006	407,143		386,180	
2007	426,418		411,431	426,418
2008	385,586		385,086	447,739
2009	368,492	363,000	360,608	470,126
2010	356,885		344,101	493,632
2011	342,733		335,008	518,314
2012	332,984		333,994	544,229
2013	352,717		332,769	556,598
2014	407,143	404,000	367,597	569,247
2015	400,059		390,358	582,184
2016	365,928		364,890	595,414
2017			365,013	608,946
2018			374,694	622,785
2019		444,000	383,461	636,938
2020			392,475	651,413
2021			401,567	666,217
2022			410,417	681,358
2023			419,051	
2024		485,000	427,622	
2025			436,280	
2026			445,474	
2036			551,829	
CAGR	1.9%	2.6%	2.3%	3.2%

CAGR: Compound annual growth rate

It should be noted, however, the FAA TAF forecasts are based upon the T-100 enplanement data collected by the U.S. Department of Transportation (DOT). This includes revenue passengers only. The enplanement history presented in Chapter One and in **Tables 2F** and **2G** is from Airport records. They are collected from monthly landing and enplanement reports provided by each airline operating at MFE. A primary difference is that the airlines also report non-revenue passengers (e.g., flight crews repositioning, free travel earned from frequent flyer programs). These travelers do not pay ticket taxes to DOT, so they are not factored into FAA entitlement grants to MFE. They do, however, pay a passenger facility charge (PFC) to MFE in support of capital improvements and debt service.

Time-Series and Regression Enplanement Forecasts

A variety of time-series extrapolation and regression analyses using multiple variables, including aviation and socioeconomic factors, were tested in relation to historic MFE enplanement levels. For regression analysis, it is optimal to have an "r^2" value near or above 0.90, which generally represents a very strong correlation and greater statistical reliability. Several variables were tested to determine if they might

produce more reliable statistical trends. The variables tested were: 1) Rio Grande Valley population; 2) Rio Grande Valley employment; 3) Rio Grande Valley gross regional product (GRP); 4) Rio Grande Valley per capita personal income (PCPI); and 5) U.S. Commercial Enplanements. The results of the time-series and regression analysis are shown in **Table 2K**. As can be seen, the results did not provide values above the 0.90 threshold. The highest "r^2" value for a single variable was 0.648 for the U.S. Commercial Enplanements. The lack of a correlation for all variables is not surprising as the enplanement level has fluctuated over the years compared to the tested variables, which have experienced relatively steady growth.

TABLE 2K
Enplanement Projections
Time-Series and Regression Analyses

		History	Forecast			
	r^2	2016	2021	2026	2036	CAGR
Time Series from 1993-2016	0.406	365,928	403,000	422,000	459,000	1.1%
Regressions						
Population	0.418	365,928	413,000	436,000	485,000	1.4%
Employment	0.356	365,928	422,000	455,000	529,000	1.9%
Gross Regional Product	0.350	365,928	426,000	463,000	555,000	2.1%
Domestic Enplanements	0.648	365,928	492,000	545,000	687,000	3.2%

Source: Coffman Associates analysis.

Travel Propensity Factor

There are a variety of local factors that affect the potential for passengers within an area to travel. A key statistic to consider is the relationship between an airport's enplanement levels to the population it serves. The ratio of enplanements to population is termed the Travel Propensity Factor (TPF).

The TPF is predominantly impacted by the proximity of an airport to other regional airports with higher levels of service or "hub" airports. Regional airports with higher TPF ratios tend to be located farther from hub airports in relatively isolated areas. These airports generally have a service area that extends into adjacent, well-populated regions or have some type of air service advantage that attracts more of those passengers that might otherwise choose to drive to a more distant hub airport. Generally, the higher the TPF, the more likely air travelers are to utilize the local airport for commercial service. **Table 2L** presents a historical review of the TPF for MFE since 2000.

A more detailed TPF history for MFE is presented in **Table 2L**. The TPF for MFE has generally trended downward since its peak of 0.406 in 1994, as population growth has outpaced enplanement growth. Following the 2001 recession and the events of 9-11, the TPF increased from 0.267 in 2003 to 0.361 in 2007, its most significant growth period during this timeframe. Following the Great Recession in late 2007, TPF once again declined to a low of 0.253 in 2012 before increasing back up to 0.296 in 2015. The TPF dropped again in 2016 to 0.269. Since MFE's peak enplanement year in 2007, MFE's TPF has averaged 0.290.

Table 2L presents two enplanement projections based upon the TPF. The first projection maintains the current TPF throughout the forecast period, which results in 560,000 enplanements by 2036. The second projection increases the TPF to near the average level experienced over the past 10 years, resulting in 600,000 enplanements by 2036.

TABLE 2L
Travel Propensity Projections
McAllen International Airport

Year	MFE Enplanements	Rio Grande Valley Population	Travel Propensity Factor
1993	272,678	801,025	0.340
2000	328,061	983,148	0.334
2001	300,915	1,006,745	0.299
2002	278,696	1,036,324	0.269
2003	284,689	1,068,089	0.267
2004	317,806	1,098,702	0.289
2005	368,492	1,127,924	0.327
2006	407,143	1,156,034	0.352
2007	426,418	1,182,675	0.361
2008	385,586	1,211,220	0.318
2009	369,567	1,240,017	0.298
2010	356,885	1,264,095	0.282
2011	342,733	1,296,629	0.264
2012	332,984	1,314,144	0.253
2013	352,717	1,323,924	0.266
2014	390,758	1,334,976	0.293
2015	400,059	1,350,534	0.296
2016	365,928	1,358,133	0.269
Constant Travel Propensity Factor (CAGR = 2.2%)			
2021	428,000	1,587,111	0.269
2026	471,000	1,747,301	0.269
2036	560,000	2,079,777	0.269
Increasing Travel Propensity Factor (CAGR = 2.5%)			
2021	435,000	1,587,111	0.274
2026	487,000	1,747,301	0.279
2036	600,000	2,079,777	0.289

CAGR: Compound Annual Growth Rate (2016-2036)

Market Share of U.S. Domestic Enplanements

The next forecasting method employed considers MFE's market share of U.S. domestic enplanements. National forecasts of U.S. domestic enplanements are compiled each year by the FAA and consider the state of the economy, fuel prices, and prior year developments. The most recent publication is FAA *Aerospace Forecasts – Fiscal Years 2017-2037*. Included are forecasts of total domestic passenger enplanements. Enplanement forecasts based on MFE's historic market share of total carrier enplanements have been developed as follows.

Two enplanement projections have been developed and are presented in **Table 2M**. The first projection maintains MFE's current market share of U.S. domestic enplanements at 0.050 percent. This results in 514,000 enplanements by 2036. MFE's market share since 1993 has not fluctuated to a significant degree in recent years, averaging approximately 0.055 percent. Therefore, a second projection considers

maintaining MFE's average market share through the forecast period. This projection results in 561,000 enplanements by 2036.

TABLE 2M
Market Share Projections of U.S. Domestic Enplanements
McAllen International Airport

Year	MFE Enplanements	US Domestic Enplanements	MFE Market Share
1993	272,678	470,400,000	0.058%
2000	328,061	641,200,000	0.051%
2001	300,915	625,300,000	0.048%
2002	278,696	574,600,000	0.049%
2003	284,689	587,300,000	0.048%
2004	317,806	628,500,000	0.051%
2005	368,492	669,500,000	0.055%
2006	407,143	668,400,000	0.061%
2007	426,418	688,500,000	0.062%
2008	385,586	680,700,000	0.057%
2009	369,567	630,800,000	0.059%
2010	356,885	634,811,369	0.056%
2011	342,733	650,094,479	0.053%
2012	332,984	653,787,441	0.051%
2013	352,717	653,504,790	0.054%
2014	390,758	668,953,036	0.058%
2015	400,059	696,264,000	0.057%
2016	365,928	726,193,000	0.050%
Constant Market Share of U.S. Domestic Enplanements (CAGR = 1.7%)			
2021	405,000	804,649,855	0.050%
2026	435,000	863,243,186	0.050%
2036	514,000	1,019,447,701	0.050%
Average Market Share of U.S. Domestic Enplanements (CAGR = 2.2%)			
2021	443,000	804,649,855	0.055%
2026	475,000	863,243,186	0.055%
2036	561,000	1,019,447,701	0.055%

CAGR: Compound Annual Growth Rate (2016-2036)

Market Share of Regional Enplanements

The FAA's TAF includes enplanement forecasts for each commercial service airport in the Rio Grande Valley: MFE, HRL, and BRO. **Table 2N** summarizes enplanement history for each of these airports along with their representative market share. In 2016, MFE accounted for 48.81 percent of enplanements in the Rio Grande Valley, followed by HRL at 35.16 percent and BRO at 16.03 percent. Historic trends show that MFE's and BRO's market share has gradually been increasing while HRL's has been decreasing. MFE's has grown by 9.19 percent since 2000. Therefore, a projection was prepared based upon this historic trend. Through 2036, the FAA TAF projects a total of 1,131,976 enplanements in the Rio Grande Valley. Should MFE maintain this growth trend through the next 20 years, its market share could reach 58 percent, or 657,000 enplanements. This projection maintains similar trends for HRL and BRO, with HRL's market share falling to 22 percent and BRO's growing to 20 percent.

TABLE 2N
Rio Grande Valley Enplanement Market

Year	Enplanements				Market Share (%)		
	MFE	HRL	BRO	Total	MFE	HRL	BRO
2000	328,061	433,935	68,760	830,756	39.49%	52.23%	8.28%
2001	300,915	439,932	71,647	812,494	37.04%	54.15%	8.82%
2002	278,696	390,584	67,885	737,165	37.81%	52.98%	9.21%
2003	284,689	391,401	60,207	736,297	38.66%	53.16%	8.18%
2004	317,806	433,385	66,587	817,778	38.86%	53.00%	8.14%
2005	368,492	429,396	76,573	874,461	42.14%	49.10%	8.76%
2006	407,143	431,365	90,580	929,088	43.82%	46.43%	9.75%
2007	426,418	442,838	91,258	960,514	44.39%	46.10%	9.50%
2008	385,586	417,557	82,723	885,866	43.53%	47.14%	9.34%
2009	369,567	367,269	80,350	817,186	45.22%	44.94%	9.83%
2010	356,885	373,438	84,401	814,724	43.80%	45.84%	10.36%
2011	342,733	359,166	85,244	787,143	43.54%	45.63%	10.83%
2012	332,984	375,472	86,090	794,546	41.91%	47.26%	10.84%
2013	352,717	347,829	100,793	801,339	44.02%	43.41%	12.58%
2014	390,758	293,306	183,604	867,668	45.04%	33.80%	21.16%
2015	400,059	259,864	143,353	803,276	49.80%	32.35%	17.85%
2016	365,928	263,614	120,151	749,693	48.81%	35.16%	16.03%
Increasing Market Share of Regional Enplanements							
2021	431,000	268,629	143,450	842,833	51.11%	31.87%	17.02%
2026	492,000	263,395	166,003	921,558	53.41%	28.58%	18.01%
2036	657,000	249,035	226,395	1,131,976	58.00%	22.00%	20.00%

MFE – McAllen International Airport
HRL – Valley International Airport
BRO – Brownsville/South Padre Island International Airport
Sources: HRL & BRO data - FAA Passenger Boarding (Enplanement) Data for U.S. Airports, Preliminary CY 2016 Data; MFE data – Airport records.

Selected Airline Enplanement Forecast

The ten new enplanement projections prepared for this Master Plan are summarized in **Table 2P** and charted on **Exhibit 2F**. The table includes the FAA TAF and a projection that utilizes the Terminal Capacity Study enplanement growth rate (2.3 percent) for comparison to the new projections. The various enplanement projections presented above resulted in a broad forecast range. On the high end, the regression with domestic enplanements projection resulted in 687,000 enplanements by 2036. On the low end, the time series regression resulted in 441,000 enplanements by 2036.

As one of the fastest growing areas in Texas in terms of population and economic activity, MFE is poised to experience enplanement growth over time. The increasing TPF projection, which increases the TPF to average levels experienced in the past ten years, is on the higher end of the forecast spectrum but reasonably reflects the potential enplanement market for MFE should population grow as projected. For this reason, the increasing TPF projection will be carried forward in this Master Plan as the selected forecast. The selected forecast results in 600,000 enplanements by 2036 at a CAGR of 2.5 percent.

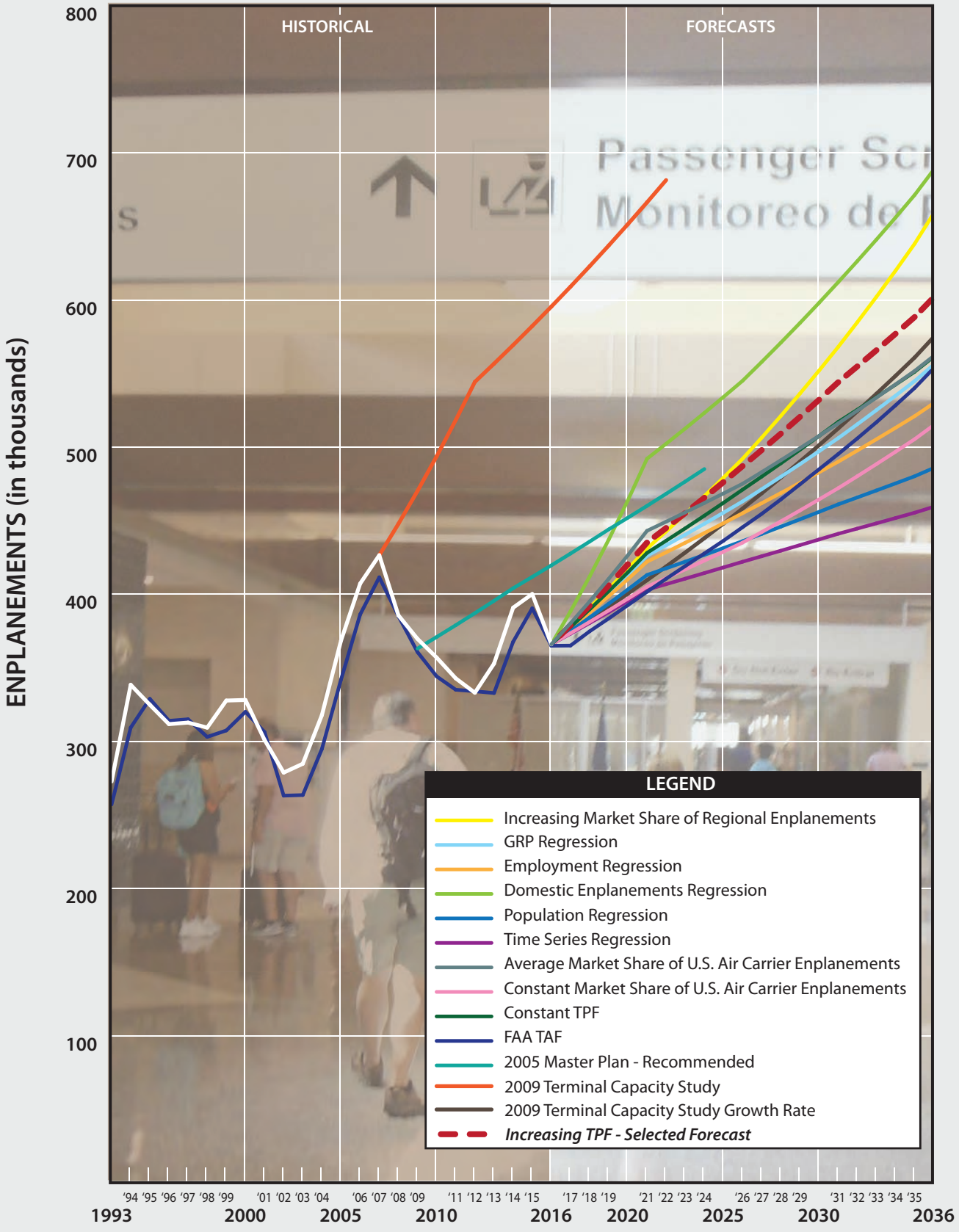

ENPLANEMENTS (in thousands)
800
700
600
500
400
300
200
100
HISTORICAL
FORECASTS
'94 '95 '96 '97 '98 '99 '01 '02 '03 '04 '06 '07 '08 '09 '11 '12 '13 '14 '15 '17 '18 '19 '21 '22 '23 '24 '26 '27 '28 '29 '31 '32 '33 '34 '35
1993
2000
2005
2010
2016
2020
2025
2030
2036
LEGEND
Increasing Market Share of Regional Enplanements
GRP Regression
Employment Regression
Domestic Enplanements Regression
Population Regression
Time Series Regression
Average Market Share of U.S. Air Carrier Enplanements
Constant Market Share of U.S. Air Carrier Enplanements
Constant TPF
FAA TAF
2005 Master Plan - Recommended
2009 Terminal Capacity Study
2009 Terminal Capacity Study Growth Rate
Increasing TPF - Selected Forecast

TABLE 2P
Enplanement Projection Summary
McAllen International Airport

2016 Enplanements – 365,928	2021	2026	2036	CAGR 2016-2036
Regressions				
Time Series 1993-2016	403,000	422,000	441,000	1.1%
Population	413,000	436,000	485,000	1.4%
Employment	422,000	455,000	529,000	1.9%
Gross Regional Product	426,000	463,000	555,000	2.1%
Domestic Enplanements	492,000	545,000	687,000	3.2%
Travel Propensity Factor (TPF) Projections				
Constant TPF	428,000	471,000	560,000	2.2%
Increasing TPF – Selected Forecast	**435,000**	**487,000**	**600,000**	**2.5%**
Market Share of U.S. Air Carrier Enplanements				
Constant	405,000	435,000	514,000	1.7%
Average	443,000	475,000	561,000	2.2%
Market Share of Regional Enplanements				
Increasing	431,000	492,000	657,000	3.0%
Comparable Projections				
FAA TAF – 2017	401,567	445,474	551,829	2.1%
Terminal Capacity Study Growth Rate	409,442	458,130	573,564	2.3%

CAGR: Compound Annual Growth Rate (2016-2036)
Source: Coffman Associates analysis

SOUTHWEST AIRLINES SCENARIO

As was previously mentioned, Southwest Airlines currently operates at one airport in the Rio Grande Valley, Valley International Airport (HRL). Southwest provides non-stop service from HRL to Houston with 49 weekly departures. From 2012 to 2016, Southwest averaged approximately 213,429 annual enplanements at HRL. In 2016, Southwest accounted for 203,638 enplanements of HRL's 263,614 total enplanements, or approximately 77.2 percent.

Questions have been raised about the potential for Southwest Airlines to either serve both HRL and MFE or move its HRL operation to MFE, and what impact that would have on MFE enplanements. Since HRL and MFE share the same general service area, if Southwest moved its service from HRL to MFE entirely and maintained its existing destination and departure schedule, MFE's enplanements could increase by approximately 200,000. This discounts the fact that United already provides service to Houston from MFE, so there likely would be a certain amount of redistribution that would reduce the enplanement impact of Southwest at MFE. Due to the proximity of MFE and HRL, it is highly unlikely that Southwest would choose to provide service at both airports, making it more likely for Southwest to operate at a single Valley airport.

Historically, Southwest has not shown interest in providing service at MFE, and there is no indication now that the airline would consider either initiating additional service at MFE or transferring its HRL operation to MFE. Ultimately, it is impossible to accurately forecast the potential impact of Southwest operations at MFE without knowledge of potential routes and departure schedules. For the purposes of this Master Plan, it is assumed that Southwest will continue to operate exclusively at HRL.

AIRLINE FLEET MIX AND OPERATIONS FORECAST

The airline fleet mix defines key parameters in airport planning, including critical aircraft (for pavement design and ramp geometry), terminal complex layout, and maximum stage length capabilities (affecting runway length evaluations). A projection of the airline fleet mix for MFE has been developed by reviewing equipment used by the carriers. All regional airlines with an affiliation to another carrier are grouped under the parent company.

Changes in equipment, airframes, and engines have always had a significant impact on airlines and airport planning. There are many ongoing programs by the manufacturers to improve performance characteristics. These programs continue to focus on improvements in fuel efficiency. RJs also became a larger factor as the airlines looked for ways to reduce costs. Many airlines replaced larger commercial jets, as well as commuter turboprops, on smaller emerging routes with RJs.

Commuter airlines are transitioning to advanced turboprop aircraft and RJs to fit their market needs. Many of these aircraft have greater seating capacity, lower operating costs, and are considerably more comfortable for the flying public. The RJs made their initial impact in the 44- to 50-seat range. RJ aircraft eventually became available with as few as 37 seats and as many as 100 seats. This bridged a long-existing gap in seating capacity, making RJs the aircraft of choice at non-hub and small-hub airports.

As the price of fuel rose, however, the 50-seat and smaller RJs have been found to be less cost-effective than their counterparts over 60 seats. In fact, the higher seat capacity turboprops, such as the Q400 and even ATR-72, have been more cost-effective than the 50-seat jet carrying the same number of passengers. As a result, the 50-seat RJs are no longer in production, and can eventually be expected to be eliminated from the fleet. This will occur over time, however, as some regional carriers will maintain them for some services, as well as in codesharing with major airlines that have restrictive scope clauses with pilots' unions that prohibit codesharing on aircraft above a certain seating capacity.

In addition, turboprops that have been the workhorses for the small commuter markets are also no longer in production. In fact, the only commuter turboprops still in production are the ATR 42 in the 40- to 60-seat range, as well as the Q-400 and ATR-72, each with more than 60 seats. Unless there is a new aircraft manufactured in the range of 10 to 39 seats, smaller markets that cannot support the larger turboprops could lose service from anything over nine-seat aircraft.

Table 2Q presents the historical airline operational fleet mix for 2012 and 2016 along with the forecast fleet mix. In 2012, 50-seat aircraft (Embraer ERJ 135/145) conducted the most departures of any aircraft type with 1,531 annual departures. The MD-80 conducted the second most with 1,449 departures in 2012. By 2016, the transition away from the 50-seat RJs is evident, with departures dropping to 443 by those aircraft. Airlines have also begun to transition from the MD-80 to more modern Airbus A319/320 and Boeing 737 aircraft. By 2016, the MD-80 had dropped to 960 departures, while departures by the A319/320 and Boeing 737 reached 1,049. This reduction in departures by the MD-80 is the primary reason average seats per departure declined from 99.54 in 2012 to 97.13 in 2016. Growth in the larger capacity aircraft is anticipated to continue with progressively more departures by the Boeing and Airbus aircraft over the course of the planning period. By 2036, the Boeing 737 and Airbus A319/320 are anticipated to account for 4,470 annual departures. As a result, average seats per departure should continue to increase to 124.31 in 2036.

TABLE 2Q
Commercial Airline Fleet Mix / Operations Forecast
McAllen International Airport

Airline/Aircraft	Seats	Departures				
		Actual		Forecast		
		2012	2016	2021	2026	2036
American						
B737 800	154	-	5	400	500	850
A319/320	128-150	-	259	500	700	1,000
MD80	137	1,297	887	-	-	-
CRJ 900	76	-	949	1,200	1,000	750
ERJ 145	50	37	-	-	-	-
United						
B737 700/800/900	118-167	308	487	500	600	1,000
A319/320	128-150	72	260	400	500	800
ERJ 170/175	76	-	510	800	800	500
DH8	71	512	-	-	-	-
CRJ 700	70	-	49	-	-	-
ERJ 135/145	50	1,494	443	-	-	-
Allegiant						
B757 200	215	221	201	-	-	-
A319/320	156-177	-	38	385	635	820
MD 83	166	153	73	-	-	-
Aeromar						
ATR 42 600	68	-	9	50	115	200
ATR 42	48	-	306	265	350	430
Delta						
CRJ 700	70	232	-	-	-	-
Avg. Seats per Departure		99.54	97.13	109.26	114.70	124.31
Boarding Load Factor		77.15%	84.22%	87.50%	81.65%	76.01%
Enplaned per Departure		76.95	81.77	95.60	93.65	94.49
Annual Enplanements		332,984	365,928	435,000	487,000	600,000
Annual Departures		4,327	4,475	4,550	5,200	6,350
Annual Operations		8,654	8,950	9,100	10,400	12,700
Air Carrier Ops (>60 seats)		5,589	7,454	8,570	9,700	11,840
Commuter/AT Ops (<60 seats)		3,065	1,496	530	700	860

Notes: Seating configurations vary by airline and aircraft make/model. An average seat count was utilized for aircraft with multiple models operating at MFE.
Sources: Seating data – seatguru.com; Historic departures – Airport records and AirportIQ Data Center; Forecasts – Coffman Associates analysis.

The boarding load factor (BLF) is defined as the ratio of passengers boarding aircraft compared to the seating capacity of the aircraft. The BLF at MFE was 77.15 percent in 2012. Due to the reduction in average seats per departure and increased enplanements, BLF at MFE increased to 84.22 percent in 2016. In the short term, the BLF is projected to increase slightly to 87.50 percent, then gradually reduce to 76.01 percent by 2036 as the fleet mix continues to transition to larger aircraft with greater seating capacities. Total airline operations are projected to grow from 8,950 in 2016 to 12,700 by 2036.

AIR CARGO FORECASTS

Air freight includes the combined activities of the scheduled passenger airlines carrying freight on scheduled flights and the dedicated all-cargo carriers. Air mail may also be carried by both the scheduled

passenger airlines and all-cargo carriers. Freight and mail together make up air cargo activity at an airport. This section describes the national aviation trends in the air cargo airline industry, historical activity at MFE, and future projections of air cargo activity.

NATIONAL AIR CARGO TRENDS

Air cargo activity has historically had a high correlation to gross domestic product (GDP). Other factors that affect air cargo growth are real yields, fuel price volatility, and globalization. Ongoing trends that are and will continue to impact the air cargo market include security regulations by the FAA and TSA, maturation of the domestic express market, a shift from air to other modes (especially truck), use of all-cargo carriers (e.g. FedEx) by the U.S. Postal Service to transport mail, and the increased use of mail substitutes (e-mail and cloud-based services).

Before 2001, air cargo was the fastest growing sector of the aviation industry. From 1994 through 2000, total tons and revenue ton-miles (RTMs) grew at annual average rates of 8.0 and 8.6 percent, respectively. An economic slowdown in the U.S., combined with the collapse in the high-tech industry and a slowing of imports, resulted in declines of 5.0 percent in tons and 3.9 percent in RTMs in 2002. Domestic RTMs grew modestly through 2007 and then realized a steep decline that coincided with the 2008-2009 national recession. In 2006, RTMs had reached 15.4 billion tons; by 2009, 11.9 billion RTMs were realized. U.S. carriers flew 35.5 billion RTMs in 2016, down 0.9 percent from 2015 with domestic cargo RTMs increasing 1.8 percent to 13.3 billion while international RTMs fell 2.4 percent to 22.2 billion. Domestic RTMs are forecast to grow 1.7 percent in 2017 as the U.S. economy continues to recover. Domestic RTMs are forecast to grow at an average annual rate of 1.3 percent, reaching 15.7 billion by 2036. Domestic RTMs flown by all-cargo carriers comprised 89.0 percent of total RTMs in 2016, with passenger carriers flying the remainder. The all-cargo share is forecast to grow to 90.5 percent by 2037.

The FAA notes there are several structural changes that are occurring within the air cargo industry. Among them are the following:

- **Security regulations** – On August 3, 2007, *Recommendations of the 9/11 Commission Act of 2007* was signed into law. Section 1602 of this Act states that air cargo placed on passenger aircraft will receive the same level of screening as passenger-checked baggage. Legislation called for the establishment of a system by 2010 that required 100 percent inspection of cargo transported by passenger aircraft.

- **Market maturation** – The express market in the United States has matured after dramatic growth over the last two decades and represents much of the domestic air cargo activity.

- **Modal shift** – Improved service and economics from the use of alternative modes of cargo transported by the integrated cargo carriers (e.g., FedEx and UPS) has matured.

- **Increases in air fuel surcharges** – Fuel costs are a significant factor for all aviation.

- **Increased USPS use of all-cargo carriers** – This initially resulted from the U.S. Postal Service's (USPS) need to improve control over delivery. The trend has continued due to security regulations.

- **Increased use of mail substitutes** – Substitutes such as e-mail affect mail volume.

The FAA forecast for RTMs was based on several specific assumptions exclusive to the air cargo industry. First, security restrictions will remain in place. Second, most of the shift from air to ground transportation has occurred. Finally, long-term cargo activity is tied to economic growth.

The top half of **Exhibit 2G** depicts the FAA forecasts for air cargo.

The number of large cargo jet aircraft is forecast to increase from 810 aircraft in 2016 to 1,028 in 2036 driven by the growth in freight RTMs. The narrow-body cargo jet fleet is projected to increase by one aircraft a year as 757s and 737s are converted from passenger use to cargo service. The wide body cargo fleet is forecast to increase by 10 aircraft a year as new 747-800, 767-300, and 777-200 aircraft are added to the fleet, replacing older MD-11 and 767-200 freighters.

REGIONAL CARGO MARKET

According to the Hidalgo County Metropolitan Planning Organization's (MPO's) *2015-2040 Metropolitan Transportation Plan* (MTP), Hidalgo County's economic vitality is largely driven by international freight movement. The North American Free Trade Agreement (NAFTA) catalyzed border industrialization and the development of the maquiladora industry, especially within Hidalgo County. According to the MTP, air cargo activity at MFE typically serves time-sensitive, high value commodities such as documents and precious equipment, 80 percent of which is related in some form to finished auto products. MFE also handles a significant amount of Mexican cargo shipments that is generated by the maquiladora industries and energy sectors and is expected to continue to grow well into 2040.

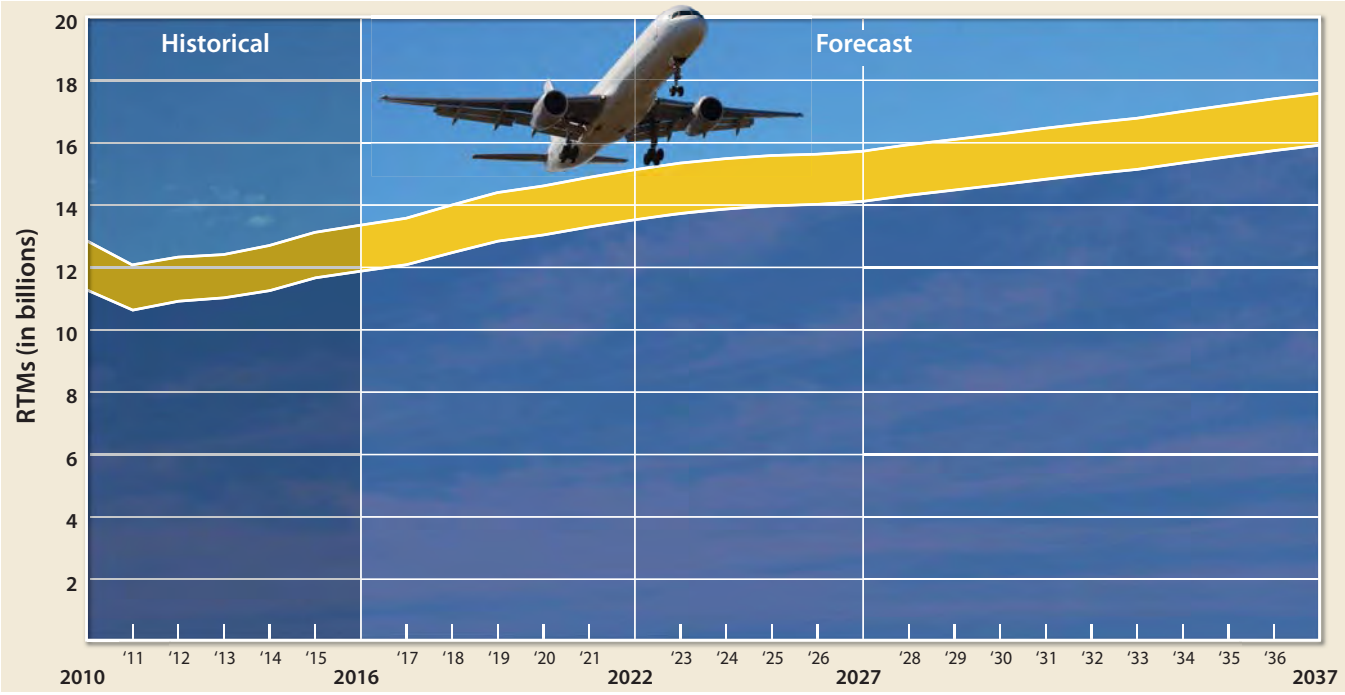
Hidalgo Port of Entry

The McAllen-Hidalgo-Reynosa International Bridge (Hidalgo Bridge) is the nearest border crossing point to MFE. The Hidalgo Bridge is jointly operated by the Cities of McAllen, Hidalgo, and other Mexican interests and is operated 24 hours a day, 365 days a year for commercial, pedestrian, and POV traffic. The Bridge is on FM 115 (International Boulevard), which connects directly to Interstate 69, which is a priority freight corridor route that will ultimately extend from Mexico to Canada. The Hidalgo Port of Entry (POE) has helped to make the City of McAllen one of the leading retail trade areas in the Lower Rio Grande Valley and helped the city recover from the 2008 recession faster than many other cities, both in the Rio Grande Valley and nationally[2].

Beginning on September 1, 1996, all commercial traffic bound for the McAllen-Hidalgo-Reynosa International Bridge was directed to the Pharr-Reynosa International Bridge. The redirection of this commercial truck traffic relieved commercial traffic congestion on the McAllen-Hidalgo-Reynosa Bridge as well as

[2] Sourced from the Hidalgo County Metropolitan Planning Organization, *2015-2040 Metropolitan Transportation Plan*.

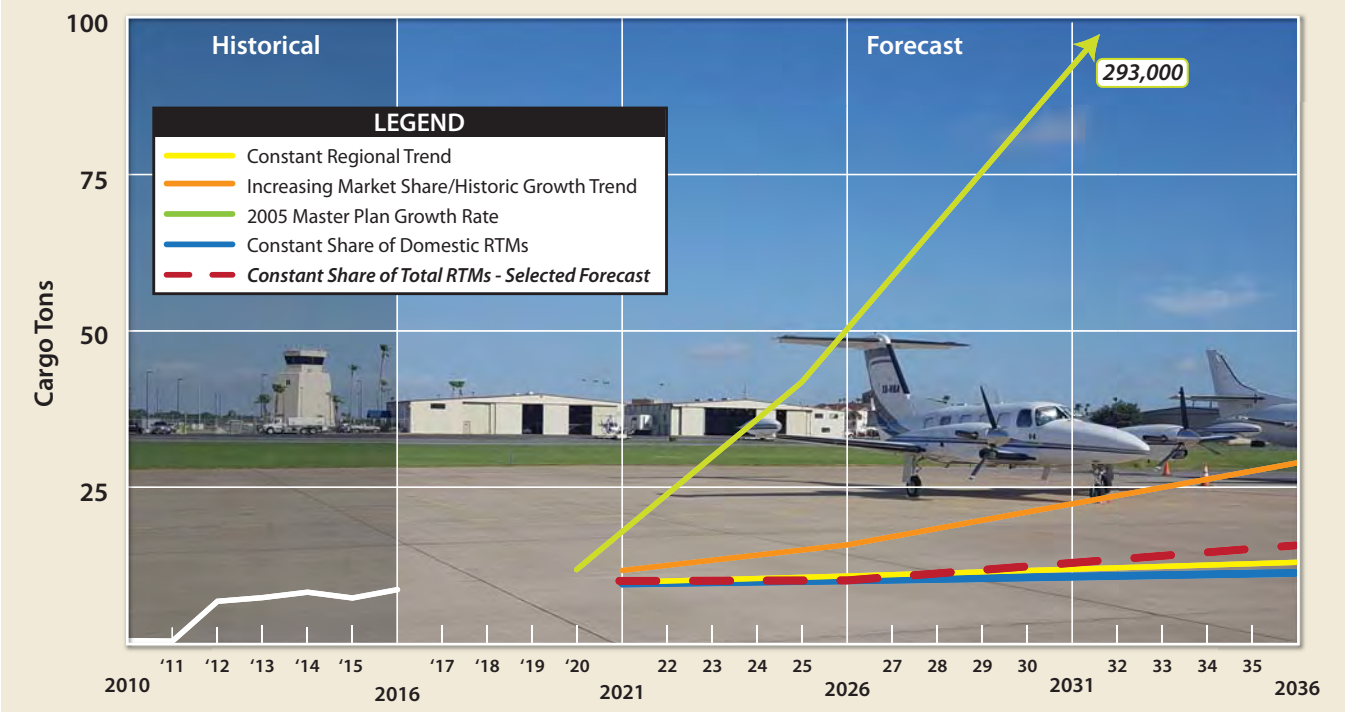
DOMESTIC AIR CARGO REVENUE TON MILES (RTMs)[1]
U.S. COMMERCIAL CARRIER



REVENUE TON MILES[2]	2016	2022	2027	2037	AAGR 2016-2037
All-Cargo Carriers	11,851	13,499	14,089	15,890	1.4%
Passenger Carriers	1,469	1,597	1,600	1,659	0.6%
TOTAL	**13,320**	**15,096**	**15,689**	**17,548**	**1.3%**

[1] Includes freight/express and mail revenue ton miles on mainline air carriers and regionals/commuters.
[2] In millions of tons
Source: FAA Aerospace Forecasts 2017-2037

MCALLEN INTERNATIONAL AIRPORT AIR CARGO TOTAL TONS



the negative impacts of truck traffic to the urbanized areas of McAllen, Hidalgo, and Reynosa, Mexico. The Pharr-Reynosa International Bridge operates from 6:00 a.m. to 12:00 a.m. 365 days a year for POVs and from 7:00 a.m. to 10:00 p.m., Monday through Friday and 8:00 a.m. to 4:00 p.m., Saturday and Sunday for commercial/cargo vehicles. This bridge is the busiest commercial POE in the county, the seventh busiest truck-crossing port in the country, and the second busiest bridge processing produce goods. Goods crossing this POE into the U.S. include primarily produce and construction and manufacturing goods, primarily fruit, televisions, computer monitors, car parts, and phone equipment. Goods crossing into Mexico include petroleum, car parts, computer chips, and wire.

The Hidalgo POE is located approximately four miles away from the McAllen Foreign Trade Zone (FTZ). According to the McAllen FTZ website, the site consists of over 775 acres including an 80-acre industrial park with nearly 700,000 square feet of warehouse space, office space and meeting space, and over five acres of outside storage space. Recent projects within the FTZ include a 100,000-square foot expansion of the ScanTech Sciences facility that will be used as an Electronic Cold-Pasteurization food treatment center. This new facility is expected to begin operations by the beginning of 2018.

Table 2R summarizes border crossing/entry data for the Hidalgo POE from 1995 through 2016. According to this data, most indicators present a negative growth trend except for truck traffic, which increased at a CAGR of 5.7 percent since 1995.

TABLE 2R
Hidalgo Port of Entry Crossing/Entry Data

Year	Pedestrians	Personal Vehicle Passengers	Personal Vehicles	Bus Passengers	Buses	Trucks
1995	2,541,556	23,864,739	5,630,431	683,118	37,126	177,459
1996	2,603,443	21,070,912	6,098,540	804,442	40,277	205,028
1997	2,429,241	23,318,753	6,604,555	964,975	50,541	234,800
1998	2,377,143	24,943,370	7,126,677	1,515,376	62,962	266,547
1999	2,559,617	29,118,835	8,319,581	1,247,191	54,598	325,225
2000	2,575,622	21,947,731	8,779,691	648,751	31,836	374,150
2001	2,325,812	17,713,609	7,549,907	659,450	33,017	368,395
2002	1,958,914	17,613,527	8,136,100	632,923	31,952	390,282
2003	2,138,232	15,587,611	7,169,629	655,430	32,805	406,064
2004	2,011,500	15,514,648	7,183,674	650,100	32,701	454,351
2005	1,774,184	13,989,453	6,969,846	369,443	27,964	491,077
2006	1,989,201	12,632,201	6,480,467	95,343	27,344	457,825
2007	2,168,660	13,304,851	6,835,305	310,225	28,942	486,756
2008	2,089,603	13,467,615	6,982,770	333,840	33,127	476,000
2009	2,257,385	12,073,543	6,177,838	300,778	28,407	419,426
2010	2,245,341	10,691,969	5,604,124	310,943	20,031	459,331
2011	1,998,203	9,040,470	4,878,003	303,758	20,992	453,235
2012	2,073,485	9,484,335	4,894,486	302,789	20,476	481,620
2013	2,061,995	9,608,966	4,768,256	334,477	22,521	510,706
2014	2,290,469	9,252,030	4,565,037	349,417	26,087	530,093
2015	2,474,962	9,271,544	4,594,298	301,160	25,776	546,259
2016	2,414,852	9,635,092	4,721,387	288,020	25,045	568,235
CAGR	-0.2%	-4.2%	-0.8%	-4.0%	-1.9%	5.7%

CAGR – Compound Annual Growth Rate, 1995-2016.
Source: U.S. Department of Transportation, Bureau of Transportation Statistics, Border Crossing/Entry Data, Hidalgo Port of Entry

AIR CARGO FORECAST

Air cargo at MFE is handled by a variety of operators including all-cargo operators (primary and other) and airline operators. MFE operators by category and the aircraft utilized include:

Primary All-Cargo:

- United Parcel Service (UPS) | Boeing 757-200

Other All-Cargo:

- Ameristar Air Cargo |DC-9-15F
- Gulf and Caribbean Cargo | Convair CV-580, Boeing 727-200
- Kalitta Charters | DC-15-15F / Convair CV-640, Boeing 727-200
- Northern Air Cargo Inc. | Boeing 737-100/200/300
- Everts Air Cargo | MD 80/81/82/83/88
- USA Jet Airlines Inc. | DC-9-15F

Airline Operators:

- American Airlines | MD 80/81/82/83/88, Airbus A319
- United Air Lines | Boeing 737-700/800/900, Airbus A320-100/200, Airbus A319

Table 2S details the last ten years of total cargo enplanement/deplanement data. Total cargo at MFE had been declining overall from 2006 to 2011. In 2012, UPS began operating at MFE, which resulted in a 1,329.2 percent increase in total tons handled from 479.8 tons in 2011 to 6,856.7 tons in 2012. Since 2012, MFE has had only one down year in 2015. MFE experienced its peak cargo year in 2016 with 8,722.0 tons handled.

TABLE 2S
Total Annual Air Cargo
McAllen International Airport

Year	Enplaned tons	Deplaned tons	Total tons	% Change
2006	650.9	553.6	1,204.5	--
2007	464.5	671.6	1,136.1	-5.7%
2008	195.6	338.1	533.6	-53.0%
2009	204.6	324.4	528.9	-0.9%
2010	204.2	352.1	556.3	5.2%
2011	153.5	326.3	479.8	-13.8%
2012	2,849.8	4,006.9	6,856.7	1,329.2%
2013	2,933.3	4,507.3	7,440.5	8.5%
2014	3,025.2	5,288.1	8,313.3	11.7%
2015	2,570.1	4,814.4	7,384.5	-11.2%
2016	3,500.5	5,221.4	8,722.0	18.1%

Source: Airport records (2012-2016); Bureau of Transportation Statistics, Air Carrier Statistics (Form 41 Traffic) – T-100 Domestic Segment Data (2006-2011)

Table 2T summarizes enplaned air cargo volume distribution by operator at MFE since 2006. The source for this data is the Bureau of Transportation Statistics, Air Carrier Statistics (Form 41 Traffic) – T-100 Domestic Segment Data, which differs slightly from Airport records. Prior to 2012, enplaned cargo distribution was evenly distributed between other all-cargo operators and the airlines. In 2012, UPS began operating at MFE, which boosted total cargo tonnage enplaned by over 2,647 tons. Since 2012, UPS has averaged 92.2 percent of all enplaned cargo. In 2016, UPS accounted for over 80 percent of all cargo enplaned. Other all-cargo operators have increased their activity in the last couple of years going from 1.1 percent of all enplaned cargo in 2012 to 19.1 percent in 2016. Airline operators have gradually reduced the amount of cargo enplaned at MFE from 339.6 tons in 2006 down to 16.3 tons in 2016.

The 2005 Master Plan generated forecasts for air cargo tonnage with a baseline of 2004 and projecting through 2024. Reported data for 2004 was a total of 3,400 tons forecasted to grow to 114,300 tons by 2024 at a CAGR of 19.2 percent. Actual cargo activity growth has not kept pace with these forecasts growing at a CAGR of 6.2 percent since 2012.

TABLE 2T
Enplaned Cargo Volume Distribution (tons)
McAllen International Airport

Year	UPS	Other All-Cargo	Airline Cargo	Total
2006	-	311.3	339.6	650.9
%	0.0%	47.8%	52.2%	100.0%
2007	-	252.3	212.2	464.5
%	0.0%	54.3%	45.7%	100.0%
2008	-	42.5	153.1	195.6
%	0.0%	21.7%	78.3%	100.0%
2009	-	76.7	127.9	204.6
%	0.0%	37.5%	62.5%	100.0%
2010	-	72.9	131.3	204.2
%	0.0%	35.7%	64.3%	100.0%
2011	-	76.6	76.9	153.5
%	0.0%	49.9%	50.1%	100.0%
2012	2,727.3	30.2	43.1	2,800.6
%	97.4%	1.1%	1.5%	100.0%
2013	2,882.8	67.6	22.2	2,972.5
%	97.0%	2.3%	0.7%	100.0%
2014	3,000.5	70.2	15.8	3,086.5
%	97.2%	2.3%	0.5%	100.0%
2015	2,573.9	295.1	18.3	2,887.4
%	89.1%	10.2%	0.6%	100.0%
2016	3,114.6	741.4	16.3	3,872.2
%	80.4%	19.1%	0.4%	100.0%

Source: Bureau of Transportation Statistics, Air Carrier Statistics (Form 41 Traffic) – T-100 Domestic Segment Data.

A market share analysis was conducted examining cargo volumes at MFE in relation to the RTMs of domestic cargo in the U.S. A historic comparison back to 2010, shown in **Table 2U**, shows MFE's market share of domestic RTMs has grown slightly from 0.00005577 percent in 2012 (when UPS began operating at MFE) to 0.00006548 percent in 2016. A forecast maintaining this market share of domestic RTMs results in an MFE air cargo total of 11,400 tons by 2036 at a CAGR of 1.3 percent. A second market share analysis was prepared to examine growth at the rate forecast for total (domestic and international) cargo RTMs. MFE's market share in this category is also increased from 2012, up from 0.00001876 percent to 0.00002458 percent in 2016. With international cargo projected to grow at a faster rate than domestic, maintaining this market share of total RTMs constant results in 15,800 tons of cargo handled at MFE by 2036 at a CAGR of 3.0 percent.

TABLE 2U
Cargo Activity
McAllen International Airport

Year	MFE Air Cargo Total (tons)[1]	Domestic Cargo RTMs[2] (millions)	MFE Market Share	Total Cargo RTMs[2] (millions)	MFE Market Share
2010	556	12,823.1	0.00000434%	35,887.6	0.00000155%
2011	480	12,046.9	0.00000398%	37,277.0	0.00000129%
2012	6,857	12,294.8	0.00005577%	36,557.2	0.00001876%
2013	7,441	12,376.8	0.00006012%	34,817.5	0.00002137%
2014	8,313	12,666.2	0.00006563%	35,169.4	0.00002364%
2015	7,385	13,088.7	0.00005642%	35,800.5	0.00002063%
2016	8,722	13,319.5	0.00006548%	35,482.7	0.00002458%
Constant Market Share of Domestic Cargo RTMs – 1.3% CAGR					
2021	9,700	14,851.2	0.00006548%	40,523.1	0.00002394%
2026	10,200	15,595.0	0.00006548%	46,956.0	0.00002172%
2036	11,400	17,371.1	0.00006548%	64,314.5	0.00001773%
Constant Market Share of Total Cargo RTMs – 3.0% CAGR					
2021	10,000	14,851.2	0.00006733%	40,523.1	0.00002458%
2026	11,500	15,595.0	0.00007374%	46,956.0	0.00002458%
2036	15,800	17,371.1	0.00009096%	64,314.5	0.00002458%
Increasing Market Share/Historic Growth Trend – 6.2% CAGR					
2021	11,800	14,851.2	0.0000795%	40,523.1	0.00002912%
2026	15,900	15,595.0	0.0001020%	46,956.0	0.00003386%
2036	29,000	17,371.1	0.0001669%	64,314.5	0.00004509%
2005 Master Plan Growth Rate – 19.2% CAGR					
2021	21,000	14,851.2	0.00014140%	40,523.1	0.00005182%
2026	51,000	15,595.0	0.00032703%	46,956.0	0.00010861%
2036	293,000	17,371.1	0.00168671%	64,314.5	0.00045557%

Historical data sources: [1]Airport records; [2]*FAA Aerospace Forecasts Fiscal Years 2016-2036;* [3]AirportIQ Data Center Forecasts – Coffman Associates analysis.

Based upon recent trends, a third forecast was prepared, which increases MFE's market share of both domestic and total RTMs and maintains its 4-year CAGR of 6.2 percent. Cargo activity is closely tied to economic activity and, accounting for the growth potential of the Rio Grande Valley, it is reasonable to expect MFE's market share of cargo activity to continue to grow over time. This forecast results in 29,000 tons of cargo handled at MFE by 2036.

For comparison purposes, a new forecast was prepared based upon the 2005 Master Plan CAGR of 19.2 percent. This forecast results in 114,300 tons of cargo handled at MFE by 2036. While growth potential needs to be considered, recent trends and data do not justify utilizing a 19.2 percent CAGR over the course of the planning period.

Market Share of Regional Cargo Handled

Table 2V summarizes cargo history back to 2006 for the other airports in the Rio Grande Valley along with Laredo International Airport (LRD), which has significant cargo activity and is located along the U.S./Mexico border like MFE. Since 2006, total cargo handled among these airports has not experienced significant increases or decreases, averaging 64,500 tons between 2006 and 2015. However, in 2016, total tons jumped to 80,047.9 tons, an increase of 24.1 percent over the average. Factoring for the 2016 increase, total cargo tons handled at these airports has grown at a CAGR of 1.9 percent over the past ten years.

TABLE 2V
Regional Air Cargo Market Forecasts

Year	Cargo Handled (tons)					Market Share (%)			
	MFE	HRL	BRO	LRD	Total	MFE	HRL	BRO	LRD
2006	1,204.5	33,689.1	103.1	31,416.3	66,413.0	1.8%	50.7%	0.2%	47.3%
2007	1,136.1	37,011.5	515.5	29,940.2	68,603.3	1.7%	53.9%	0.8%	43.6%
2008	533.6	34,458.2	491.0	25,936.8	61,419.6	0.9%	56.1%	0.8%	42.2%
2009	528.9	28,417.6	181.3	21,894.5	51,022.3	1.0%	55.7%	0.4%	42.9%
2010	556.3	33,992.2	306.5	32,583.8	67,438.8	0.8%	50.4%	0.5%	48.3%
2011	479.8	29,962.5	593.2	35,012.9	66,048.3	0.7%	45.4%	0.9%	53.0%
2012	6,856.7	26,209.3	355.9	30,926.4	64,348.2	10.7%	40.7%	0.6%	48.1%
2013	7,440.5	29,961.3	225.1	28,664.4	66,291.4	11.2%	45.2%	0.3%	43.2%
2014	8,313.3	29,115.9	345.5	29,220.7	66,995.4	12.4%	43.5%	0.5%	43.6%
2015	7,384.5	31,216.3	1,278.1	26,467.9	66,346.8	11.1%	47.1%	1.9%	39.9%
2016	8,722.0	41,110.9	577.2	29,637.8	80,047.9	10.9%	51.4%	0.7%	37.0%
Constant Regional Trend Forecast – 2.1% CAGR									
2021	9,900	40,000	700	37,200	87,900	11.3%	45.6%	0.8%	42.4%
2026	10,900	44,000	800	40,900	96,500	11.3%	45.6%	0.8%	42.4%
2036	13,100	53,000	900	49,300	116,300	11.3%	45.6%	0.8%	42.4%

MFE – McAllen International Airport
HRL – Valley International Airport
BRO – Brownsville/South Padre Island International Airport
LRD – Laredo International Airport
Sources: Bureau of Transportation Statistics, Air Carrier Statistics (Form 41 Traffic) – T-100 Domestic Segment Data; MFE data (2012-2016) – Airport records.

Prior to UPS starting service in 2012, MFE's market share of cargo handled among these airports had averaged 1.2 percent. Once UPS started service, MFE's market share jumped to 10.7 percent in 2012 and has averaged 11.3 percent over the past five years. The most significant cargo activity occurs at LRD, which has UPS and FedEx operating, and HRL, which has FedEx and ABX Air. BRO accounts for the least amount of cargo activity, averaging only 0.8 percent in the last five years.

Assuming 2016 is not an anomaly year and cargo activity among these airports will continue to grow based upon the 10-year CAGR of 1.9 percent, this results in a forecast of 116,300 tons of cargo handled by 2036. Carrying forward each airport's average market share over the forecast period results in MFE accounting for 13,100 tons of cargo handled by 2036 at a CAGR of 2.1 percent.

Selected Air Cargo Forecast

The four new cargo projections prepared for this Master Plan are summarized in **Table 2W** and charted on **Exhibit 2G**. The projections prepared provide a CAGR range between 1.3 percent and 19.2 percent. Based upon recent historic trends and currently available data, the CAGR projected by the 2005 Master Plan (19.2 percent) is far higher than the other projections and is not likely to occur. The increasing market share / historic growth trend projection (6.2 percent CAGR) reflects the period since UPS began operating at MFE, which only covers a five-year period. This is a short period to base a long-range forecast and, over time, it is likely that the CAGR will moderate to a level more reflective of national trends. The constant regional cargo market trend examines cargo activity at MFE as well as competing regional airports and maintains the recent historic growth trend. While this projection resulted in a modest 2.1 percent CAGR at MFE, several assumptions had to be made about activity growth across four different airports, which make this forecast less reliable than the others prepared. Finally, the constant share of domestic RTM projection does not reflect MFE's potential for international cargo activity. For this reason, the constant share of total RTMs will be carried forward as the selected Master Plan forecast of cargo activity at MFE, growing at a CAGR of 3.0 percent and reaching 15,800 tons by 2036.

TABLE 2W
Cargo (tons) Projection Summary
McAllen International Airport

2016 Total Cargo (tons): 8,722.0	2021	2026	2036	CAGR 2016-2036
Market Share of Cargo RTMs				
Constant Share of Domestic RTMs	9,700	10,200	11,400	1.3%
Constant Share of Total RTMs	**10,000**	**11,500**	**15,800**	**3.0%**
Increasing Share/Historic Growth	11,800	15,900	29,000	6.2%
Regional Air Cargo Market				
Constant Trend	9,900	10,900	13,100	2.1%
Comparable Projections				
2005 Master Plan Growth Rate	21,000	51,000	293,000	19.2%

CAGR: Compound Annual Growth Rate
RTM: Revenue Ton Miles
Source: Coffman Associates analysis

ALL-CARGO OPERATIONS

Additional flights and larger aircraft will be necessary to absorb some of the long-range growth in cargo handled at MFE. Thus, air cargo operations were projected to increase, although not as fast as cargo handled. As shown in **Table 2X**, all-cargo operations (excluding airline cargo operations) totaled 722 in 2016, which has grown from 498 in 2012. Most cargo operations at MFE over the past five years have

been conducted by the Boeing 757-200, utilized by UPS. As cargo volumes grow, part of the growth can be expected to be added to existing flights as load factors increase.

Table 2X also presents the operational forecasts for the all-cargo carriers, considering the aircraft size and load factors. Operations are anticipated to increase at a CAGR of 1.8 percent through 2036, which is a slower pace than cargo pounds (3.0 percent). This is a result of an anticipated fleet mix transition to larger capacity aircraft and higher load factors over time. This forecast results in 1,040 total all-cargo operations by 2036.

TABLE 2X
All-Cargo Fleet Mix and Operations Forecast

Fleet Mix	Actual					Forecast		
Payload Capacity (lbs.)	2012	2013	2014	2015	2016	2021	2026	2036
All-Cargo Commercial Jet								
>100,000	0.0%	0.0%	0.0%	0.6%	0.0%	2.0%	10.0%	20.0%
80,000-100,000	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	2.0%
60,000-80,000	92.4%	88.2%	85.2%	81.2%	70.9%	68.5%	61.0%	50.0%
40,000-60,000	0.8%	1.4%	6.0%	10.1%	18.0%	20.0%	22.5%	25.5%
20,000-40,000	2.8%	6.3%	4.7%	5.5%	10.5%	9.0%	5.0%	2.0%
<20,000	4.0%	4.2%	4.0%	2.6%	0.6%	0.5%	0.5%	0.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Avg. Capacity (lbs.)	74,700	72,700	72,100	71,300	68,200	68,300	71,900	75,500
Load Factor	35.8%	35.1%	38.1%	33.0%	34.8%	35.0%	37.0%	40.0%
Lbs./Operation	26,737	25,541	27,454	23,545	23,717	23,905	26,603	30,200
All-Cargo (tons)	6,657	7,330	8,181	7,252	8,562	9,923	11,411	15,678
Annual Departures	249	287	298	308	361	415	430	520
Annual Operations	498	574	596	616	722	830	860	1,040

Aircraft Examples:

>100,000 | Boeing 767-300
80,000 - 100,000 | DC-8
60,000 – 80,000 | Boeing 757-200
40,000 - 60,000 | Boeing 737, MD 80
20,000 – 40,000 | Boeing 727, DC-9
<20,000 | Falcon 20, Convair CV-540

Sources: Actual fleet mix and operations - Bureau of Transportation Statistics, Air Carrier Statistics (Form 41 Traffic) – T-100 Domestic Segment Data; Actual all-cargo pounds – Airport records; Forecasts – Coffman Associates analysis.

OTHER AIR TAXI OPERATIONS

Other air taxi operations as reported by the airport traffic control tower (ATCT) include the air charter operators associated with various for-hire general aviation operations. Some operations by aircraft operated under fractional ownership programs are also counted as other air taxi operations. Since the airline operations and cargo operations have been forecast, this section reviews the growth potential for other air taxi operations.

Air taxi operations can include small commercial service aircraft operations as well as general aviation type aircraft for the "on-demand" commercial transport of persons and property in accordance with 14 Code of Federal Regulations (CFR) Part 135 and Subchapter K of 14 CFR Part 91. A summary of other air taxi operations since 2006 is provided in **Table 2Y**.

Based upon ATCT records, MFE recorded 10,636 total air carrier and air taxi operations in 2016. Subtracting airline and all-cargo operations results in 964 other air taxi operations in 2016 or 9.1 percent of air carrier/air taxi operations. Prior to 2013, other air taxi operations had averaged 13.9 percent of air carrier/air taxi operations; however, since UPS started service in 2012, other air taxi operations' average share dropped to 8.1 percent from 2013 to 2016. The other air taxi category has fluctuated from a low of 638 in 2013 to a high of 2,548 in 2006. In the past five years, the operations range has narrowed to a peak of around 1,500. Based upon the recent trends, the forecast for other air taxi operations is anticipated to account for between nine and ten percent of total air carrier/air taxi operations. This results in a forecast of 1,500 total other air taxi operations by 2036 and a CAGR of 2.2 percent.

TABLE 2Y
Other Air Taxi
McAllen International Airport

	Operations				
Year	Total Air Carrier/ Air Taxi	Scheduled Airline	All-Cargo	Other Air Taxi	Other Air Taxi %
2006	13,044	10,206	290	2,548	19.5%
2007	13,160	10,866	194	2,100	16.0%
2008	10,274	8,948	42	1,284	12.5%
2009	10,829	9,826	36	967	8.9%
2010	10,755	9,370	60	1,325	12.3%
2011	10,552	9,062	50	1,440	13.6%
2012	10,728	8,654	498	1,576	14.7%
2013	11,372	10,160	574	638	5.6%
2014	11,860	10,132	596	1,132	9.5%
2015	11,377	9,838	616	923	8.1%
2016	10,636	8,950	722	964	9.1%
Forecasts					
2021	10,930	9,100	830	1,000	9.1%
2026	12,460	10,400	860	1,200	9.6%
2036	15,240	12,700	1,040	1,500	9.8%
CAGR	1.8%	1.8%	1.8%	2.2%	

Sources: Total Air Carrier/Air Taxi - MFE ATCT counts; Scheduled Airline 2012-2016 – MFE records; Scheduled Airline 2006-2011 & All-Cargo 2006-2016 – Bureau of Transportation Statistics, Air Carrier Statistics (Form 41 Traffic) – T-100 Domestic Segment Data; Forecasts - Coffman Associates analysis.

GENERAL AVIATION FORECASTS

General aviation encompasses all portions of civil aviation except commercial service and military operations. To determine the types and sizes of facilities that should be planned to accommodate general aviation activity at MFE, certain elements of this activity must be forecast. These indicators of general aviation demand include based aircraft, aircraft fleet mix, and annual operations.

For the preparation of forecasts relating to based aircraft, a generalized service area has been identified as Hidalgo County. Most aircraft based at MFE are registered to addresses within a 30-minute drive time. Many of the surrounding counties such as Kenedy, Brooks, Jim Hogg, and Starr have very few if any registered aircraft. Registered aircraft within Willacy and Cameron Counties have more convenient

access to airports in those counties as well as two general aviation airports in Hidalgo County: South Texas International Airport at Edinburg (EBG) and the Mid Valley Airport (T65) in Weslaco. Therefore, the target market for general aviation based aircraft at MFE should be Hidalgo County.

NATIONAL GENERAL AVIATION TRENDS

The FAA forecasts the fleet mix and hours flown for single engine piston aircraft, multi-engine piston aircraft, turboprops, business jets, piston and turbine helicopters, light sport, experimental, and others (gliders and balloons). The FAA forecasts "active aircraft," not total aircraft. An active aircraft is one that is flown at least one hour during the year. From 2010 through 2013, the FAA undertook an effort to have all aircraft owners re-register their aircraft. This effort resulted in a 10.5 percent decrease in the number of active general aviation aircraft, mostly in the piston category.

After growing rapidly for most of the decade, the demand for business jet aircraft slowed over the past few years, as the industry was hard hit by the 2008-2009 economic recession. Nonetheless, the FAA forecast calls for growth through the long-term, driven by higher corporate profits and continued concerns about safety, security, and flight delays. Overall, business aviation is projected to outpace personal/recreational use.

In 2016, the FAA estimated there were 143,355 piston-powered aircraft in the national fleet. The total number of piston-powered aircraft in the fleet is forecast to decline by 0.8 percent from 2016-2037, resulting in 121,905 by 2037. This includes -0.9 percent annually for single engine pistons and -0.5 percent for multi-engine pistons.

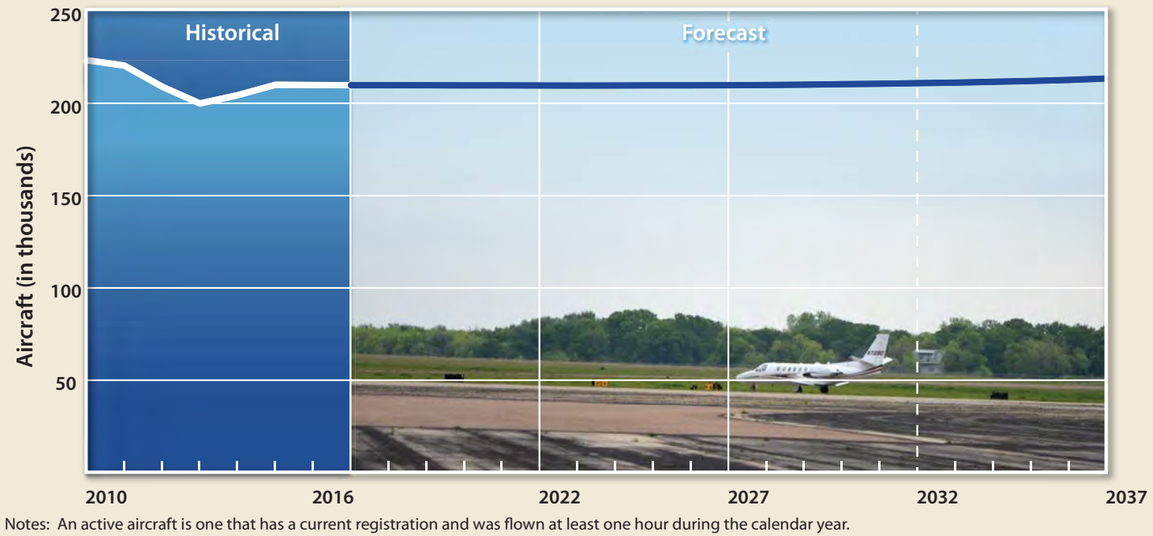
Total turbine aircraft are forecast to return to growth and have an annual growth rate of 1.9 percent through 2037. The FAA estimates there were 30,595 turbine-powered aircraft in the national fleet in 2016, and there will be 45,305 by 2037. This includes annual growth rates of 1.4 percent for turboprops, 2.3 percent for business jets, and 1.8 percent for turbine helicopters.

While comprising a much smaller portion of the general aviation fleet, experimental aircraft, typically identified as home-built aircraft, are projected to grow annually by 1.0 percent through 2037. The FAA estimates there were 28,475 experimental aircraft in 2016, and these are projected to grow to 35,310 by 2037. Sport aircraft are forecast to grow 4.1 percent annually through the long term, growing from 2,530 in 2016 to 5,885 by 2037. **Exhibit 2H** presents the historical and forecast U.S. active general aviation aircraft.

The FAA also forecasts total operations based upon activity at control towers across the U.S. Operations are categorized as air carrier, air taxi/commuter, general aviation, and military. General aviation operations, both local and itinerant, declined significantly because of the 2008-2009 recession and subsequent slow recovery. Through 2037, total general aviation operations are forecast to grow 0.3 percent annually. Air taxi/commuter operations are forecast to decline by 3.5 percent through 2026, and then increase slightly through the remainder of the forecast period. Overall, air taxi/commuter operations are forecast to decline by 0.9 percent annually from 2016 through 2037.

U.S. ACTIVE GENERAL AVIATION AIRCRAFT

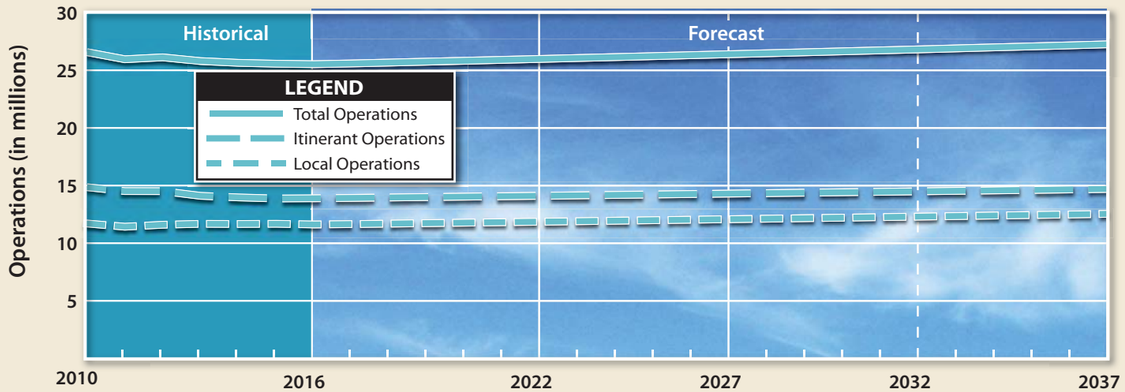
	2016E	2022	2027	2037	AAGR 2016-2037
Fixed Wing					
Piston					
Single Engine	126,820	120,600	115,245	105,550	-0.9%
Multi-Engine	13,200	12,965	12,705	11,970	-0.5%
Turbine					
Turboprop	9,460	9,115	9,755	12,585	1.4%
Turbojet	13,770	15,845	17,745	22,040	2.3%
Rotorcraft					
Piston	3,335	3,605	3,835	4,385	1.3%
Turbine	7,365	8,195	8,925	10,680	1.8%
Experimental					
	28,475	30,895	32,345	35,310	1.0%
Sport Aircraft					
	2,530	3,480	4,285	5,885	4.1%
Other					
	4,950	4,955	4,965	5,015	0.1%
Total Pistons	**143,355**	**137,170**	**131,785**	**121,905**	**-0.8%**
Total Turbines	**30,595**	**33,155**	**36,425**	**45,305**	**1.9%**
Total Fleet	**209,905**	**209,655**	**209,805**	**213,420**	**0.1%**



Notes: An active aircraft is one that has a current registration and was flown at least one hour during the calendar year.
Source: *FAA Aerospace Forecast - Fiscal Years 2017-2037*

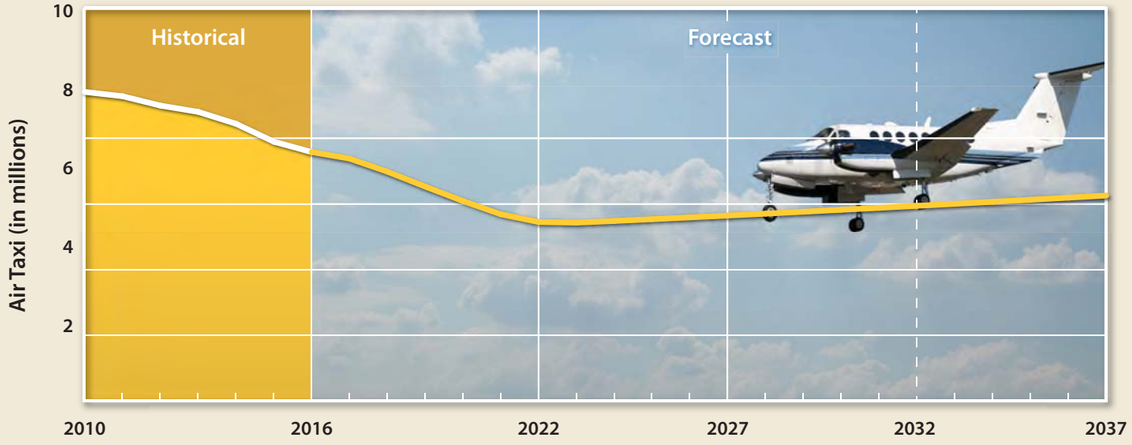
U.S. GENERAL AVIATION OPERATIONS

	2016E	2022	2027	2037	AAGR 2016-2037
Itinerant					
	13,904,397	14,121,057	14,312,108	14,713,479	0.3%
Local					
	11,632,078	11,873,443	12,090,250	12,548,870	0.4%
Total GA Operations	**25,536,475**	**25,994,500**	**26,402,358**	**27,262,349**	**0.3%**



U.S. GENERAL AVIATION AIR TAXI

	2016E	2022	2027	2037	AAGR 2016-2037
Air Taxi/Commuter Operations					
Itinerant	7,579,584	5,450,873	5,649,185	6,256,918	-0.9%



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General Aviation Aircraft Shipments and Revenue

As previously discussed, the 2008-2009 economic recession has had a negative impact on general aviation aircraft production, and the industry was slow to recover. Aircraft manufacturing declined for three straight years from 2008 through 2010. According to the General Aviation Manufacturers Association (GAMA), there is optimism that aircraft manufacturing will stabilize and return to growth, which has been evidenced since 2011. **Table 2Z** presents historical data related to general aviation aircraft shipments.

TABLE 2Z
Annual General Aviation Airplane Shipments
Manufactured Worldwide and Factory Net Billings

Year	Total	Single Engine Piston	Multi-Engine Piston	Turboprop	Jet	Net Billings ($millions)
1994	1,132	544	77	233	278	3,749
1995	1,251	605	61	285	300	4,294
1996	1,437	731	70	320	316	4,936
1997	1,840	1043	80	279	438	7,170
1998	2,457	1508	98	336	515	8,604
1999	2,808	1689	112	340	667	11,560
2000	3,147	1,877	103	415	752	13,496
2001	2,998	1,645	147	422	784	13,868
2002	2,677	1,591	130	280	676	11,778
2003	2,686	1,825	71	272	518	9,998
2004	2,963	1,999	52	319	592	11,918
2005	3,590	2,326	139	375	750	15,156
2006	4,054	2,513	242	412	887	18,815
2007	4,277	2,417	258	465	1,137	21,837
2008	3,974	1,943	176	538	1,317	24,846
2009	2,283	893	70	446	874	19,474
2010	2,024	781	108	368	767	19,715
2011	2,120	761	137	526	696	19,042
2012	2,164	817	91	584	672	18,895
2013	2,353	908	122	645	678	23,450
2014	2,454	986	143	603	722	24,499
2015	2,331	946	110	557	718	24,129
2016	2,262	890	129	582	661	20,719

Source: General Aviation Manufacturers Association 2016 Statbook

Worldwide shipments of general aviation airplanes remained relatively flat in 2016. A total of 2,262 units were delivered around the globe, as compared to 2,331 units in 2015. Worldwide general aviation billings declined by 14 percent in 2016.

Business Jets: General aviation manufacturers delivered 661 business jets in 2016, as compared to 718 units in 2015. Like 2015, demand was stronger in 2016 for large-cabin business jets than it was for medium and light business jets.

Turboprops: In 2016, 582 turboprop airplanes were delivered to customers around the world, a slight increase from the 557 delivered in 2015. Overall, the turboprop market has experienced significant gains since 2010.

Pistons: Piston deliveries remained flat, declining from 1,056 units during 2015 to 1,019 in 2016. The piston segment continued to fare best for unit deliveries among the three segments by which GAMA tracks the airplane manufacturing industry. This is due in part by deliveries to flight schools in emerging markets.

BASED AIRCRAFT

The number of based aircraft is the most basic indicator of general aviation demand. By first developing a forecast of based aircraft for the Airport, other general aviation activity and demand can be projected. The process of developing forecasts of based aircraft begins with an analysis of aircraft ownership in the primary general aviation service area through a review of historical aircraft registrations.

Area Aircraft Ownership (Registered Aircraft)

Historic aircraft registrations within Hidalgo County from 1993 to 2016 is summarized in **Table 2AA**. These figures are derived from the FAA aircraft registration database that categorizes registered aircraft by county based on the zip code of the registered aircraft. Although this information generally provides a correlation to based aircraft, it is not uncommon for some aircraft to be registered in a county, but based at an airport outside the county or vice versa.

Exhibit 2B depicts the location of the registered aircraft within the County. From this depiction, it is evident that most aircraft registered in the County are concentrated within a 30-minute drivetime of MFE. County registrations reached their peak in 2011 at 423 aircraft and have gradually decreased to a 23-year low of 299 in 2016. The most significant decline came in 2012 when the County lost 55 registered aircraft. This decline is likely due to the FAA's effort to create a more accurate aircraft registration database by requiring aircraft owners to re-register their aircraft. On July 20, 2010, the FAA issued a rule that terminated the registration of all aircraft registered before October 1, 2010 over a three-year period and required re-registration to retain U.S. civil aircraft status. As a result, previously registered aircraft that may have been sold, scrapped/destroyed, or registered to multiple addresses were dropped from the database. Over the 23-year period, registered aircraft have had a negative 1.0 percent CAGR.

With the number of registered aircraft identified, several projections of future registered aircraft are considered. Several regression and time-series analyses were first considered. Because of the declining trend in several variables, including registered aircraft and U.S. active aircraft, regression and time-series analyses did not result in reliable forecasts. As a result, these analytical methods were not considered further.

TABLE 2AA
Registered Aircraft
Hidalgo County

Year	SEP	MEP	TP	J	H	O	Total
1993	255	106	8	4	2	1	376
1994	250	98	8	8	2	1	367
1995	254	93	7	7	2	1	364
1996	251	88	4	4	4	1	352
1997	254	91	7	3	4	1	360
1998	239	89	10	6	6	1	351
1999	234	91	15	7	6	1	354
2000	267	101	12	7	7	1	395
2001	264	97	21	13	7	2	404
2002	261	97	21	13	7	2	401
2003	236	88	42	15	8	2	391
2004	236	89	41	17	9	2	394
2005	233	88	39	21	8	2	391
2006	246	101	12	14	8	2	383
2007	227	100	13	15	11	10	376
2008	220	87	29	17	11	10	374
2009	232	85	30	19	11	11	388
2010	245	88	25	21	11	8	398
2011	257	92	27	24	14	9	423
2012	230	64	29	25	11	9	368
2013	207	50	28	29	8	7	329
2014	206	47	21	28	9	7	318
2015	199	45	21	29	12	9	315
2016	185	45	25	23	11	10	299

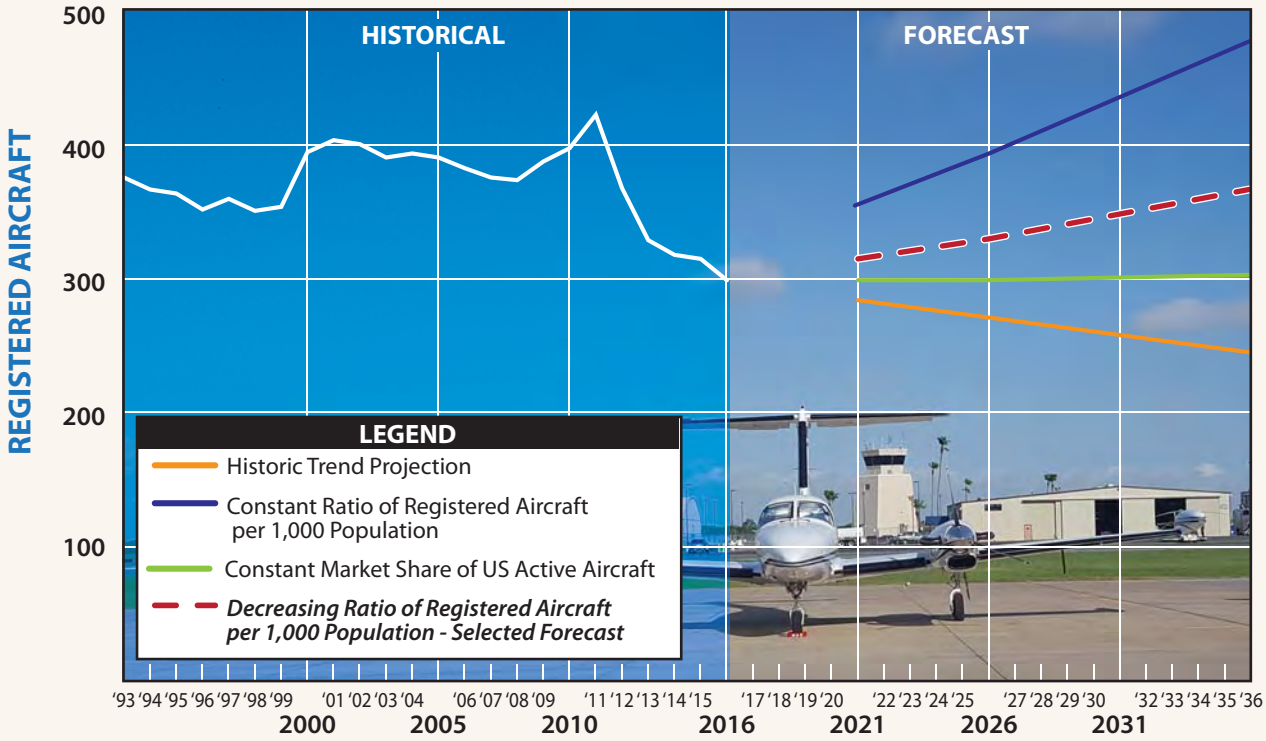
SEP – Single Engine Piston
MEP – Multi-Engine Piston
TP – Turboprop
J – Jet
H – Helicopter
O – Other (balloon, ultralight, unmanned aerial vehicle)

Source: FAA Aircraft Registration Database

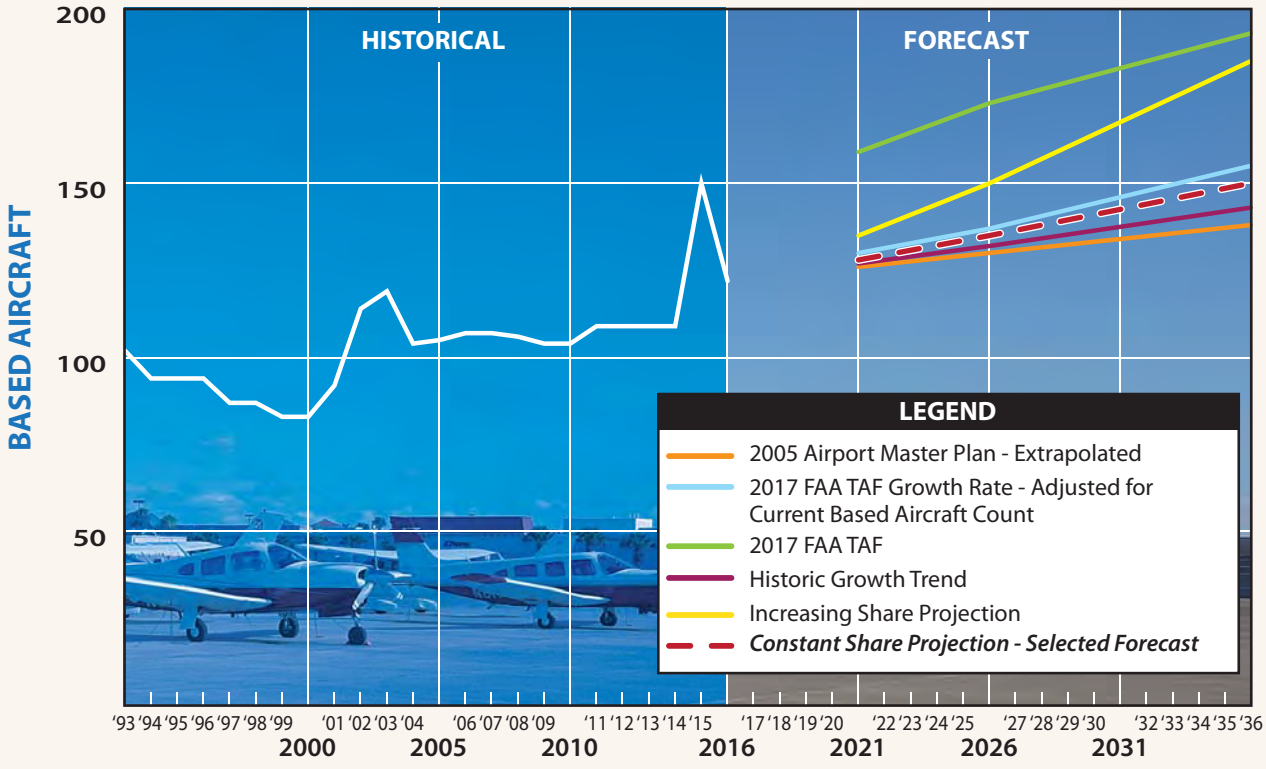
Exhibit 2J presents three projections of registered aircraft for Hidalgo County. Two projections consider the relationship between population and registered aircraft. In 2016, there was 0.35 registered aircraft per 1,000 people in Hidalgo County. By keeping this ratio as a constant, a forecast emerges that results in a 2.38 percent CAGR and 478 registered aircraft by 2036. Since the recent trend is a decreasing ratio, a second projection considers the potential for the ratio to continue to decrease as population growth outpaces aircraft registration growth. This projection results in 0.27 aircraft per 1,000 people by 2036 and 367 registered aircraft.

The next projection considers the relationship of registered aircraft to the number of national active aircraft. In 2016, registered aircraft in Hidalgo County represented 0.1424 percent of the national fleet. By maintaining this as a constant ratio, registered aircraft are forecast to grow at a CAGR of 0.07 percent, reaching 303 registered aircraft by 2036. A final projection was prepared that carries forward the historic trend of -1.0 percent CAGR. This results in 245 registered aircraft by 2036, which is 54 fewer than in 2016.

REGISTERED AIRCRAFT FORECASTS



BASED AIRCRAFT FORECASTS



Source: Texas Department of State, Health and Human Services Estimated Populations by County; Woods & Poole

While a conclusion could be made that registered aircraft within Hidalgo County will continue to decline according to the historic trend, there is also reason to believe that as the population base and economy continue to grow, there will be opportunities for growth in registered aircraft. The aviation industry is cyclical, and while registrations have trended downward in recent years, the County has been through down trends before and recovered. For this reason, the decreasing registrations per 1,000 population projection will be carried forward as the selected forecast. Aircraft registration growth is not likely to match population growth, but could at least return to a market share of nationally active aircraft of 0.1726 percent, which is the average over the last 23 years. This forecast results in 367 registered aircraft in the County by 2036 at a CAGR of 1.03 percent.

The registered aircraft projection is one data point to be used in the development of a based aircraft forecast. The following section will present several potential based aircraft forecasts, as well as the selected based aircraft forecast, to be utilized in this study.

Based Aircraft Forecast

Determining the number of based aircraft at an airport can be a challenging task. Aircraft storage can be somewhat transient in nature, meaning aircraft owners can and do move their aircraft. Some aircraft owners may store their aircraft at an airport for only part of the year. For many years, the FAA did not require based aircraft records; therefore, historical records are often incomplete or non-existent. For this study, a based aircraft history was established using Airport records in combination with the FAA TAF. According to current Airport records, the current based aircraft count stands at 122.

The FAA TAF is an initial forecast source for based aircraft at airports. The 2017 TAF estimated that there were 152 based aircraft in 2016, which is forecast to grow to 193 by 2036 for a CAGR of 1.2 percent. The 2017 TAF overestimates the current number of based aircraft by 30 aircraft. Another previously prepared forecast for based aircraft at MFE is the 2005 Master Plan (base year of 2004), which reports based aircraft growing to 136 by 2024 at a CAGR of 0.6 percent. Extrapolating that forecast results in 147 based aircraft by 2036. Utilizing the 2005 Master Plan growth rate of 0.6 percent produces a forecast of 138 based aircraft by 2036.

Several new forecasts of based aircraft for MFE have been developed. As with forecasts of registered aircraft, the goal is to develop a planning envelope of reasonable forecasts, then select a 20-year planning forecast for use in this study. The new forecasts are summarized in **Table 2BB**.

Several market share forecasts for based aircraft have been prepared utilizing the previously developed forecast of registered aircraft in Hidalgo County. In 2016, MFE, with 122 based aircraft, accounted for 40.8 percent of the registered aircraft in the County. By maintaining this percentage as a constant, a long-term forecast of based aircraft emerges which results in 150 based aircraft by 2036. A second projection considers increasing MFE's market share based upon the historic trend to 54.9 percent, resulting in 201 based aircraft by 2036.

TABLE 2BB
Based Aircraft Forecast
McAllen International Airport

Year	Hidalgo County Registered Aircraft	MFE Based Aircraft	Market Share
1993	376	102	27.1%
1994	367	94	25.6%
1995	364	94	25.8%
1996	352	94	26.7%
1997	360	87	24.2%
1998	351	87	24.8%
1999	354	83	23.4%
2000	395	83	21.0%
2001	404	92	22.8%
2002	401	114	28.4%
2003	391	119	30.4%
2004	394	104	26.4%
2005	391	105	26.9%
2006	383	107	27.9%
2007	376	107	28.5%
2008	374	106	28.3%
2009	388	104	26.8%
2010	398	104	26.1%
2011	423	109	25.8%
2012	368	109	29.6%
2013	329	109	33.1%
2014	318	109	34.3%
2015	315	150	47.6%
2016	299	122	40.8%
CAGR (1993-2016)	-1.0%	0.8%	
Constant Share Projection – Selected Forecast			
2021	315	128	40.8%
2026	330	135	40.8%
2036	367	150	40.8%
CAGR (2016-2036)	1.0%	1.0%	
Increasing Share Projection			
2021	315	135	42.9%
2026	330	150	45.4%
2036	367	185	50.4%
CAGR (2016-2036)	1.0%	2.1%	
Historic Growth Trend Projection			
2021	315	127	40.3%
2026	330	132	39.9%
2036	367	143	38.8%
CAGR (2016-2036)	1.0%	0.8%	
2017 FAA TAF			
2021	315	159	50.6%
2026	330	173	52.4%
2036	367	193	52.6%
CAGR (2016-2036)	1.0%	2.3%	
2017 FAA TAF Growth Rate - Adjusted for Current Based Aircraft Count			
2021	315	130	41.2%
2026	330	137	41.6%
2036	367	155	42.2%
CAGR (2016-2036)	1.0%	1.2%	
2005 Airport Master Plan[1]			
2021	315	126	40.0%
2026	330	130	39.3%
2036	367	138	37.7%
CAGR (2016-2036)	1.0%	0.6%	

[1]Forecast extrapolated to match this Master Plan forecast years by Coffman Associates.
CAGR: Compound Annual Growth Rate

Another forecast was prepared, which considers the historic growth rate of based aircraft. Since 1993, based aircraft at MFE have grown from 102 to 122 at a CAGR of 0.8 percent. Maintaining that historic growth trend through the forecast years results in 143 based aircraft by 2036. The 2017 FAA TAF, which reflects a current based aircraft count of 152, which is 30 more than what is currently reported by the Airport, projects based aircraft to grow at a CAGR of 1.2 percent. Another projection was prepared to reflect the 2017 TAF CAGR of 1.2 percent applied to the current based aircraft count, resulting in 155 based aircraft by 2036.

After examining each projection, the constant market share projection will be carried forward as the selected forecast. This forecast adds 28 new based aircraft at MFE over 20 years, accounting for the continued growth in population and the economy in the County that is likely to bring new based aircraft to MFE. Additionally, the Airport has the capability to expand its aircraft storage hangar capacity, which is a significant component of based aircraft growth. Should the region grow as projected and should new storage hangars be made available over time, it is reasonable that based aircraft could grow as forecasted over the next 20 years. **Exhibit 2J** illustrates the based aircraft forecasts.

BASED AIRCRAFT FLEET MIX

The fleet mix of based aircraft is oftentimes more important to airport planning and design than the total number of aircraft. For example, the presence of one or a few large business jets can impact design standards for the runway and taxiway system more than many smaller single engine piston-powered aircraft.

The based aircraft fleet mix forecast for MFE is presented in **Table 2CC**. The source for the fleet mix data is Airport records. Most based aircraft (44.3 percent) are small single-engine piston aircraft. Forecasts of the based aircraft fleet mix have been developed based upon the FAA's projections of the national fleet mix over the same time period and considering the potential for growth in business aviation activity at MFE. The result is an increase in more sophisticated aircraft within the multi-engine turboprop, jet, and helicopter categories and decreasing percentages for single- and multi-engine piston aircraft.

Ultimately, the jet category is the leading growth category, anticipated to grow by 2.6 percent over its current share, increasing by nine aircraft over the next 20 years. The multi-engine category (which includes both piston and turboprop aircraft) is also projected to grow by nine aircraft, primarily consisting of turboprops, and the helicopter category is projected to grow by four aircraft. The single-engine piston category, while decreasing its share, is still projected to account for the most based aircraft, growing by six aircraft by 2036. There are currently no aircraft based at MFE within the "other" category, which includes gliders and ultralights. The "other" category is not projected to have any based aircraft at MFE over the course of the planning period.

TABLE 2CC
Based Aircraft Fleet Mix
McAllen International Airport

	EXISTING		FORECAST					
Aircraft Type	**2016**	**%**	**2021**	**%**	**2026**	**%**	**2036**	**%**
Single Engine	54	44.3%	55	43.0%	57	42.2%	60	40.0%
Multi-Engine	32	26.2%	34	26.6%	36	26.7%	41	27.3%
Jet	22	18.0%	24	18.8%	26	19.3%	31	20.7%
Helicopter	14	11.5%	15	11.7%	16	11.9%	18	12.0%
Other	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Totals	122	100.0%	128	100.0%	135	100.0%	150	100.0%

Source: FAA Form 5010, *Airport Master Record*; SMPAD Records; Coffman Associates Analysis

GENERAL AVIATION OPERATIONS

General aviation (GA) operations are classified by the ATCT as either local or itinerant. A local operation is a take-off or landing performed by an aircraft that operates within sight of an airport, or which executes simulated approaches or touch-and-go operations at an airport. Itinerant operations are those performed by aircraft with a specific origin or destination away from an airport. Generally, local operations are characterized by training operations. Typically, itinerant operations increase with business and commercial use, since business aircraft are operated on a higher frequency.

Itinerant Operations

Table 2DD summarizes GA itinerant operations at MFE from 2000 through 2016. As shown, GA itinerant operations at MFE have not fluctuated significantly over this period, ranging from a high of 36,812 in 2011 to a low of 27,217 in 2009 and averaging approximately 32,200. GA Itinerant operations have decreased each year since the peak 2011 year, which has followed a national trend in decreasing operations in this category. National GA itinerant operations have been declining since at least 2000, but have taken a steeper decline since the beginning of the Great Recession and have yet to recover. However, the FAA forecasts a reversal over the course of the next 20 years. Through 2036, the FAA forecasts a CAGR of 0.3 percent for itinerant GA operations.

Four forecasts were examined for future itinerant GA operations. The first forecast considers maintaining MFE's market share constant at 0.2080 percent of national itinerant GA operations as forecast by the FAA, which yields 30,500 operations by 2036 at a CAGR of 0.3 percent. An increasing market share forecast considers the potential for MFE to reach its 16-year peak market share of 0.2534 percent by 2036, which results in 37,200 GA itinerant operations at a CAGR of 1.3 percent.

TABLE 2DD
General Aviation Itinerant Operations Forecast
McAllen International Airport

Year	MFE GA Itinerant Ops[1]	US GA Itinerant Ops[2] (millions)	Market Share Itinerant Ops	MFE Based Aircraft[3]	Itinerant Ops Per Based Aircraft
2000	33,583	22.84	0.1470%	83	405
2001	31,544	21.43	0.1472%	92	343
2002	31,475	21.45	0.1467%	114	276
2003	32,247	20.23	0.1594%	119	271
2004	33,564	20.01	0.1678%	104	323
2005	33,200	19.32	0.1719%	105	316
2006	31,539	18.74	0.1683%	107	295
2007	30,876	18.58	0.1662%	107	289
2008	29,850	17.49	0.1706%	106	282
2009	27,217	15.57	0.1748%	104	262
2010	32,750	14.86	0.2203%	104	315
2011	**36,812**	**14.53**	**0.2534%**	**109**	**338**
2012	34,665	14.52	0.2387%	109	318
2013	33,765	14.12	0.2392%	109	310
2014	33,751	13.98	0.2414%	109	310
2015	31,906	13.89	0.2298%	150	213
2016	28,928	13.90	0.2080%	122	237
CAGR (2000-2016)	-0.9%	-3.1%		2.4%	
Constant Market Share of U.S. GA Itinerant Ops					
2021	29,300	14.08	0.2080%	128	229
2026	29,700	14.27	0.2080%	135	220
2036	30,500	14.67	0.2080%	150	203
CAGR (2016-2036)	0.3%	0.3%		1.0%	
Increasing Market Share of U.S. GA Itinerant Ops – Selected Forecast					
2021	30,900	14.08	0.2194%	128	241
2026	32,900	14.27	0.2307%	135	244
2036	37,200	14.67	0.2534%	150	248
CAGR (2016-2036)	1.3%	0.3%		1.0%	
Constant Operations Per Based Aircraft					
2021	30,400	14.08	0.2159%	128	237
2026	32,000	14.27	0.2242%	135	237
2036	35,600	14.67	0.2426%	150	237
CAGR (2016-2036)	1.0%	0.3%		1.0%	
Historic Average Operations Per Based Aircraft					
2021	32,400	14.08	0.2194%	128	253
2026	36,300	14.27	0.2307%	135	269
2036	45,000	14.67	0.2534%	150	300
CAGR (2016-2036)	2.2%	0.3%		1.0%	
2017 FAA TAF					
2021	29,087	14.08	0.2065%	128	227
2026	29,092	14.27	0.2038%	135	215
2036	29,102	14.67	0.1983%	150	194
CAGR (2016-2036)	0.03%	0.3%		1.0%	

Boldface indicates peak year
[1] Historical data from ATCT records as reported to FAA.
[2] FAA Forecasts Fiscal Years 2017-2037
[3] FAA TAF; Airport Records
CAGR - Compound Annual Growth Rate
Source: Coffman Associates analysis

The next two projections consider the relationship between based aircraft and itinerant GA operations. In 2016, there were 237 itinerant GA operations per based aircraft. Maintaining this ratio produces a forecast resulting in 35,600 itinerant GA operations by 2036, at a CAGR of 1.0 percent. Since 2000, MFE has averaged 300 itinerant GA operations per based aircraft, so a fourth projection was prepared anticipating a return to this historic average by 2036. This projection results in 45,000 GA itinerant operations by 2036 at a CAGR of 2.2 percent.

The 2017 FAA TAF also presents the itinerant GA operations forecast, which is included in the table. The TAF forecasts itinerant GA operations to grow even slower than the national rate over the next 20 years, with an overall CAGR of 0.03 percent, which takes MFE to 29,102 by 2036.

With the FAA projecting GA itinerant operations to return to levels last seen in 2011, it's reasonable to consider MFE's market share returning to its peak year activity. Therefore, the increasing market share of national itinerant GA operations will be carried forward as the selected forecast. **Exhibit 2K** presents the itinerant GA operations forecasts.

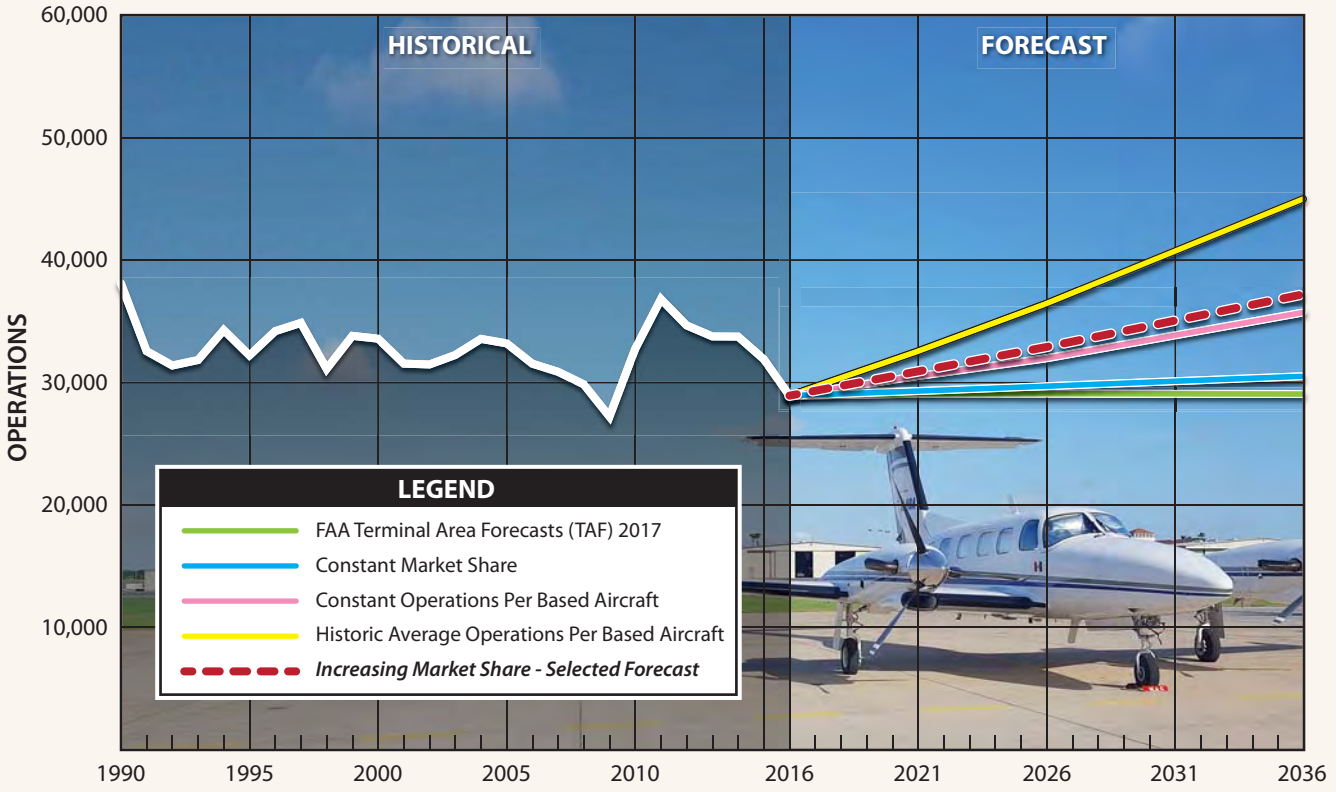
Local Operations

A similar methodology was utilized to forecast local GA operations. **Table 2EE** depicts the history of local operations at MFE and examines its historic market share of GA local operations at towered airports in the United States. Like GA itinerant operations, local GA operations have been on the decline both at MFE and nationwide, most significantly since 2002 through 2009. Since 2009, MFE has averaged approximately 8,600 annual GA local operations, with the lowest count occurring in 2015. GA local operations were up in 2016, reaching 9,587. The FAA's national projections estimate a modest 0.4 percent annual growth rate through 2036.

The first projection of local GA operations considers MFE's market share of national local GA operations as counted by the FAA. This forecast maintains MFE's 2016 market share at 0.0824 percent, resulting in 10,300 local GA operations by 2036 with a CAGR of 0.4 percent. The second forecast applies a constant number of local GA operations per based aircraft. This forecast results in 11,800 local GA operations by 2036 and a CAGR of 1.0 percent. The 2017 FAA TAF is also presented in the table, which forecasts local GA operations to grow to 9,960 by 2036, which results in a CAGR of 0.2 percent.

Despite a jump in local GA activity in 2016, significant growth in this category is not anticipated. Typically, unless there is an indication that a local flight school is set to ramp up activity, GA local operational growth can be expected to remain within recent historic ranges. Therefore, the constant market share projection will be carried forward as the selected forecast. This forecast maintains a market share slightly above the historic average of 0.0810 percent, resulting in modest growth over the next 20 years. **Exhibit 2K** presents the local GA operations forecasts.

ITINERANT GENERAL AVIATION OPERATIONS FORECASTS



LOCAL GENERAL AVIATION OPERATIONS FORECASTS

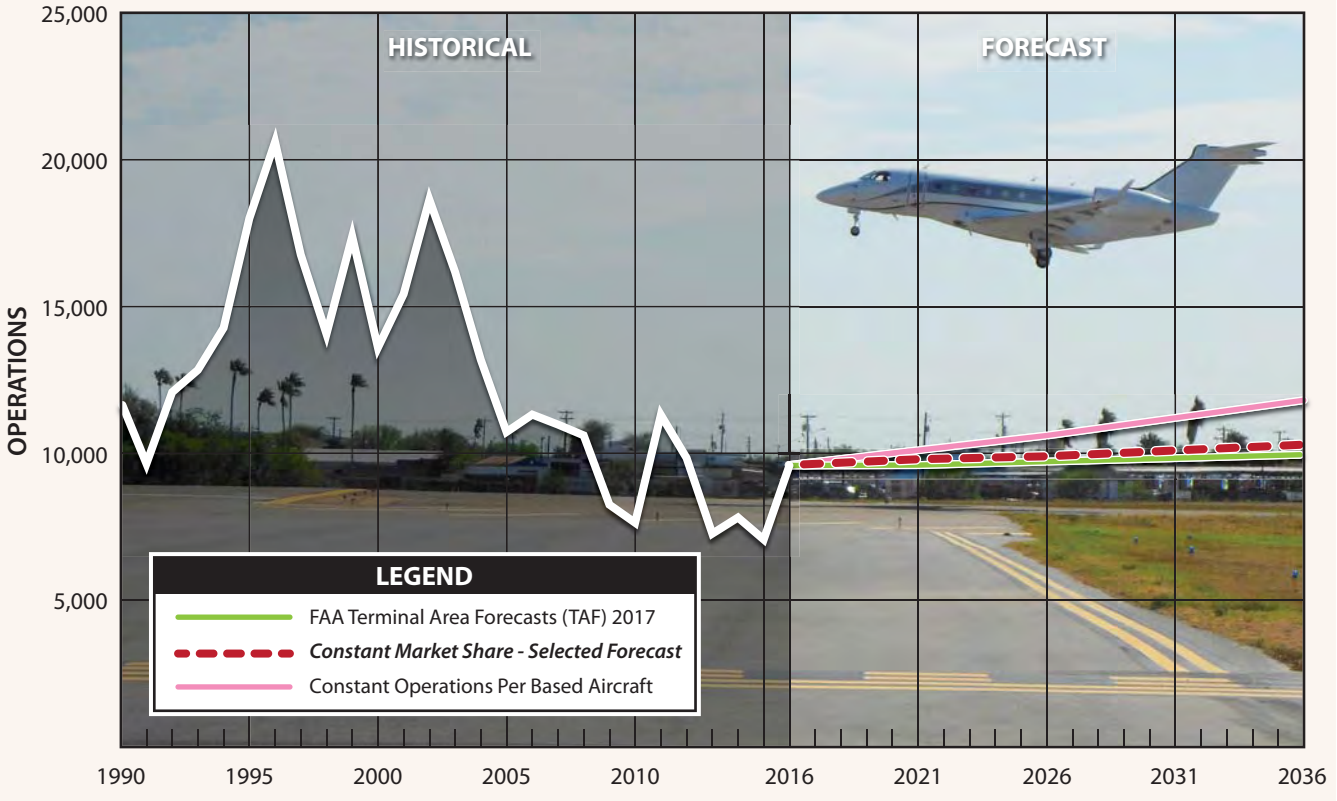


TABLE 2EE
General Aviation Local Operations Forecast
McAllen International Airport

Year	MFE GA Local Ops[1]	US GA Local Ops[2] (millions)	Market Share Local Ops	MFE Based Aircraft[3]	Local Ops Per Based Aircraft
2000	13,600	17.03	0.0799%	83	164
2001	15,423	16.19	0.0953%	92	168
2002	**18,638**	**16.17**	**0.1153%**	**114**	**163**
2003	16,177	15.29	0.1058%	119	136
2004	13,186	14.96	0.0881%	104	127
2005	10,728	14.85	0.0722%	105	102
2006	11,320	14.38	0.0787%	107	106
2007	10,980	14.56	0.0754%	107	103
2008	10,612	14.08	0.0754%	106	100
2009	8,253	12.45	0.0663%	104	79
2010	7,637	11.18	0.0683%	104	73
2011	11,310	11.44	0.0989%	109	104
2012	9,844	11.61	0.0848%	109	90
2013	7,266	11.69	0.0622%	109	67
2014	7,816	11.68	0.0669%	109	72
2015	7,067	11.69	0.0604%	150	47
2016	9,587	11.63	0.0824%	122	79
CAGR (2000-2016)	-2.2%	-2.4%		2.4%	
Constant Market Share of US GA Local Ops – Selected Forecast					
2021	9,800	11.83	0.0824%	128	77
2026	9,900	12.05	0.0824%	135	73
2036	10,300	12.50	0.0824%	150	69
CAGR (2016-2036)	0.4%	0.4%		1.0%	
Constant Operations Per Based Aircraft					
2021	10,100	11.83	0.0854%	128	79
2026	10,600	12.05	0.0880%	135	79
2036	11,800	12.50	0.0944%	150	79
CAGR (2016-2036)	1.0%	0.4%		1.0%	
2017 FAA TAF					
2021	9,600	11.83	0.0811%	128	75
2026	9,720	12.05	0.0807%	135	72
2036	9,960	12.50	0.0797%	150	66
CAGR (2016-2036)	0.2%	0.4%		1.0%	

Boldface indicates peak year.
[1] Historical data from ATCT records as reported to FAA.
[2] FAA Forecasts Fiscal Years 2017-2037
[3] Airport records and FAA TAF
CAGR - Compound Annual Growth Rate
Source: Coffman Associates analysis

MILITARY OPERATIONS FORECAST

Military operators routinely utilize MFE for various training operations and activities. **Table 2FF** presents a summary of military operations, both local and itinerant, for the past 16 years. Tower records indicate that a wide variety of military aircraft have utilized MFE in recent years, including primarily the Beechcraft King Air 90 and 200, BAe Systems Hawk, and the BAe T-45 Goshawk.

TABLE 2FF
Military Operations Forecasts
McAllen International Airport

Year	Military (Itinerant)	Military (Local)	Total Military
2000	5,694	407	6,101
2001	6,106	452	6,558
2002	6,233	504	6,737
2003	8,065	657	8,722
2004	6,059	248	6,307
2005	6,873	352	7,225
2006	7,138	388	7,526
2007	6,733	714	7,447
2008	5,154	382	5,536
2009	5,933	420	6,353
2010	4,704	1,174	5,878
2011	6,116	1,007	7,123
2012	5,420	263	5,683
2013	4,597	286	4,883
2014	5,746	448	6,194
2015	4,533	500	5,033
2016	7,253	832	8,085
Selected Forecast			
2021	7,200	800	8,000
2026	7,200	800	8,000
2036	7,200	800	8,000

Sources: Historical data from MFE ATCT records; Forecast – Coffman Associates analysis.

Military operations have stayed consistent in the past 10 years, averaging approximately 6,340 total operations. In 2016, military operations increased 60 percent over the previous year, reaching a 10-year peak of 8,085 operations. Developing a reliable forecast of military activity is inherently difficult, primarily because the military mission can change rapidly. Therefore, the Master Plan maintains similar operations levels experienced in 2016 of 7,200 itinerant military and 800 local military operations through 2036.

PEAKING CHARACTERISTICS

Many airport facility needs are related to the levels of activity during peak periods. The peak periods that will be used in developing facility requirements for this study are as follows:

- **Peak Month** – The calendar month when peak aircraft operations occur.
- **Design Day** – The average day in the peak month. This indicator is derived by dividing the peak month operations by the number of days in a month.

- **Busy Day** – The busy day of a typical week in the peak month. This peaking factor is used primarily to determine transient ramp parking requirements.
- **Design Hour** – The peak hour of the design day of the peak month.

It is important to note that only the peak month is an absolute peak within a given year. All other peak periods will be exceeded at various times during the year. However, they do represent reasonable planning standards that can be applied without overbuilding or being too restrictive.

SCHEDULED AIRLINE PEAKING CHARACTERISTICS

In general, airport capacity and facility needs related to specific activity types will typically consider the levels of activity during a peak or design period. Determination of peaking characteristics related to commercial activity is important for the planning and design of the passenger terminal building, as well as associated facilities and services. The analysis is commonly utilized as a basis for determining the appropriate size of the terminal building and the functional areas therein. Terminal building elements include hold rooms, security checkpoints, concessions, restrooms, baggage claim area, etc. The airline peaking characteristics also relate to aircraft gates and apron space.

Table 2GG summarizes the peak month enplanements from 2012 through 2016. The peak month for enplanements in 2016 was July with 9.9 percent of the year's enplanements. Looking at the 5-year history of monthly enplanement data, the peak month averaged 10.3 percent of annual enplanements. July was the peak month for each of the past five years.

TABLE 2GG
Peak Month Enplanements
McAllen International Airport

Year	Total	Monthly Average	Maximum Value	Peak Month	PM % of Year
2012	332,984	27,749	32,996	July	9.9%
2013	352,717	29,393	37,260	July	10.6%
2014	390,758	32,563	40,921	July	10.5%
2015	400,059	33,338	43,348	July	10.8%
2016	365,928	30,494	36,230	July	9.9%
Average Peak Month				**July**	**10.3%**

Source: Airport records.

Table 2HH outlines the peak baseline and forecast peaking characteristics for scheduled airline activity at MFE. Operationally, January was the peak month in 2016, with 9.2 percent of annual operations. From 2012 through 2016, the peak month averaged 9.4 percent of annual operations. The design day is based upon the average day of the peak month, as activity during the peak month tends to be distributed relatively evenly through any given week.

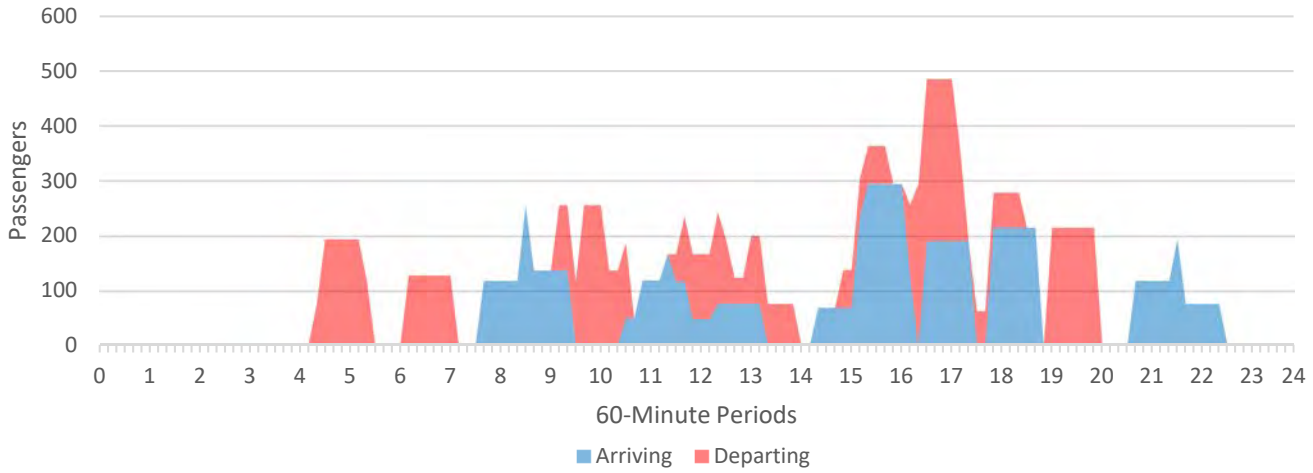
TABLE 2HH
Scheduled Airline Peaking Characteristics
McAllen International Airport

	2016	2021	2026	2036
Enplanements				
Annual	365,928	435,000	487,000	600,000
Peak Month	36,230	45,000	50,300	62,000
Design Day	1,170	1,450	1,620	2,000
Design Hour	240	290	320	380
Total Passengers				
Design Hour	480	580	640	760
Operations				
Annual	8,950	9,100	10,400	12,700
Peak Month	824	856	979	1,195
Design Day	27	28	32	39
Design Hour	6	6	6	8
Departures				
Design Day	14	14	16	20
Design Hour	3	3	3	4

Source: Coffman Associates analysis.

Figure 2C represents enplanements/deplanements during the rolling 60-minute periods of the design day during the peak month of 2016. The design hour during the design day begins at 4:40 p.m. (16:40) and ends at 5:39 p.m. (17:39). During this design hour, there are approximately 480 total passenger enplanements/deplanements, which represents approximately 41 percent of the design day total passengers. Design hour passenger levels are projected to increase slightly as enplanement/deplanement levels and airline operations increase over the 20-year period.

FIGURE 2C
Design Day Total Passengers (Departing and Arriving) - Rolling 60 Minute Periods
McAllen International Airport



Source: Coffman Associates analysis.

ITINERANT GENERAL AVIATION/ALL-CARGO/MILITARY/OTHER AIR TAXI PEAKING

The peak month for itinerant GA, all-cargo, military, and other air taxi operations at MFE averaged 9.3 percent of yearly operations since 2012. The design day was derived by dividing the peak month by the number of days in the month. Busy day and hourly operations were obtained from the FAA Operations Network (OPSNET). The busy day is derived based on the peak day during the peak month. For 2016, the busy day was 38.5 percent higher than the design day, which was applied to the forecast years.

Hourly data reported through the OPSNET system from 2016 was utilized to identify the design hour. The design hour was found to represent 15.2 percent of design day operations.

Itinerant GA/all-cargo/military/other air taxi peaking characteristics are summarized in **Table 2JJ**.

TABLE 2JJ
Itinerant GA/All-Cargo/Military/Other Air Taxi Peaking Characteristics
McAllen International Airport

	2016	2021	2026	2036
Annual	37,867	39,930	42,160	46,940
Peak Month	3,417	3,713	3,921	4,365
Design Day	112	122	129	144
Busy Day	155	169	179	199
Design Hour	17	19	20	22

Source: Coffman Associates analysis.

TOTAL OPERATIONS PEAKING

The peaking characteristics of total aircraft operations, which include local GA and military operations, are utilized in examining the operational capacity of the airfield. Similar methodologies were utilized to establish the various total operations peaking characteristics as were utilized for the itinerant GA/all-cargo/military/other air taxi peaking characteristics. The peak month for total operations in 2016 represented 9.2 percent of the year's operations, while the average over the past six years is 9.5 percent. Busy day operations in 2016 were 44.1 percent above the design day and design hour operations average 14.6 percent of design day operations. Total operations peaking characteristics are summarized in **Table 2KK**.

TABLE 2KK
Total Operations Peaking Characteristics
McAllen International Airport

	2016	2021	2026	2036
Annual	57,236	59,630	63,260	70,740
Peak Month	5,249	5,660	6,005	6,715
Design Day	173	186	197	221
Busy Day	249	268	284	318
Design Hour	25	27	29	32

Source: Coffman Associates analysis.

ANNUAL INSTRUMENT APPROACHES

An instrument approach, as defined by the FAA, is "an approach to an airport with the intent to land an aircraft in accordance with an Instrument Flight Rule (IFR) flight plan, when visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude." To qualify as an instrument approach, aircraft must land at an airport after following one of the published instrument approach procedures. Forecasts of annual instrument approaches (AIAs) provide guidance in determining an airport's requirements for navigational aid facilities. Practice or training approaches do not count as AIAs nor do instrument approaches that occur in visual conditions.

It is highly unusual for pilots to perform local operations when IFR conditions are in effect. AIAs may be expected to increase as transient operations and operations by more sophisticated aircraft (e.g., turboprops and business jets) increase through the planning period. For this reason, AIA projections consider a constant estimate of two percent of annual itinerant operations. The projections are presented in **Table 2LL**.

TABLE 2LL
Annual Instrument Approaches (AIAs)
McAllen International Airport

Year	AIAs	Itinerant Operations	Ratio
2016	940	46,817	2.00%
2021	980	49,030	2.00%
2026	1,050	52,560	2.00%
2036	1,190	59,640	2.00%

Source: Coffman Associates analysis

FORECAST COMPARISON TO THE TERMINAL AREA FORECAST

The FAA will review the forecasts presented in this Master Plan for consistency with the *Terminal Area Forecast*. The local FAA Airport District Office (ADO) or Regional Airports Division (RO) are responsible for forecast approvals. When reviewing a sponsor's forecast, the FAA must ensure that the forecast is based on reasonable planning assumptions, uses current data, and is developed using appropriate forecast methods. Forecasts of enplanements, operations, and based aircraft are considered consistent with the TAF if they differ by less than 10 percent in the five-year period and 15 percent in the 10-year forecast period. If the forecast is not consistent with the TAF, differences must be resolved if the forecast is to be used for FAA decision-making. **Table 2MM** presents the direct comparison of the master planning forecasts with the TAF published in January 2017.

The reason the FAA allows this differential is because the TAF forecasts are not meant to replace forecasts developed locally (i.e., in this Master Plan). While the TAF can provide a point of reference for comparison, their purpose is much broader in defining FAA national workload measures.

The Master Plan enplanement forecast shows a faster growth rate than the TAF and is ultimately 8.7 percent higher by 2036. Commercial operations are shown to be below the TAF in 2016, but are projected to grow at a slightly faster pace, resulting in the Master Plan forecast 5.0 percent higher by 2036.

The Master Plan total operations forecast reflects a 1.1 percent CAGR compared to the 0.4 percent CAGR projected by the TAF. This results in a difference of 16.7 percent by 2036. The based aircraft forecast is the only forecast that is outside of FAA tolerances due to the TAF reflecting a current count that is 19.7 percent higher than what is reported by the Airport currently. For this reason, the Master Plan forecast remains below the TAF projection through 2036 and reflects a 1.0 percent CAGR compared to the TAF CAGR of 1.2 percent.

TABLE 2MM
Master Plan Forecast Comparison to the FAA's McAllen International Airport Terminal Area Forecast[1]

	BASE YEAR	FORECAST			
	2016	2021	2026	2036	CAGR 2016-2036
Passenger Enplanements					
Master Plan Forecast	365,928	435,000	487,000	600,000	2.5%
FAA TAF – 2017	364,890	401,567	445,474	551,829	2.1%
% Difference	0.3%	8.3%	9.3%	8.7%	
Commercial Operations					
Master Plan Forecast	10,636	10,930	12,460	15,240	1.8%
FAA TAF – 2017	10,820	10,861	11,916	14,516	1.5%
% Difference	-1.7%	0.6%	4.6%	5.0%	
Total Operations					
Master Plan Forecast	57,236	59,630	63,260	70,740	1.1%
FAA TAF - 2017	56,135	56,585	57,765	60,615	0.4%
% Difference	2.0%	5.4%	9.5%	16.7%	
Based Aircraft					
Master Plan Forecast	122	128	135	150	1.0%
FAA TAF - 2017	152	159	173	193	1.2%
% Difference	-19.7%	-19.5%	-22.0%	-22.3%	

[1] The MFE-specific FAA TAF was prepared in January 2017.
KEY: CAGR – Compound annual growth rate
Source: Coffman Associates analysis

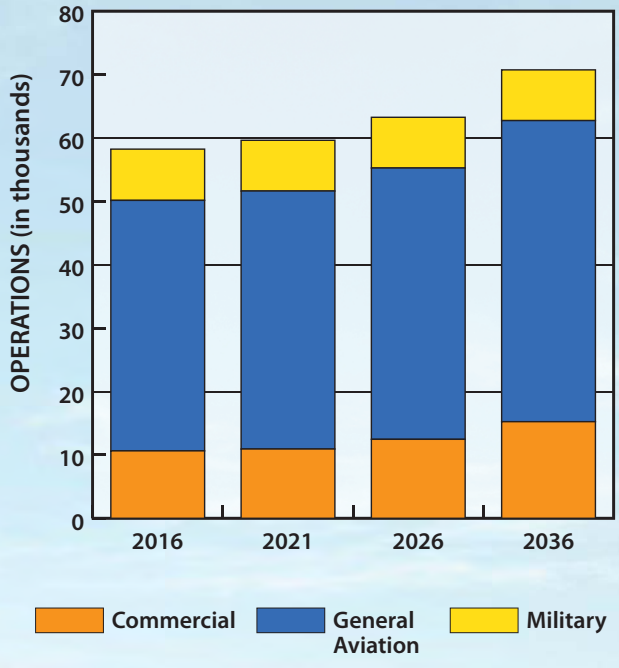
Exhibit 2L presents a summary of the Master Plan forecasts. Moderate growth is forecast for all activity demand indicators.

AIRCRAFT/AIRPORT/RUNWAY CLASSIFICATION

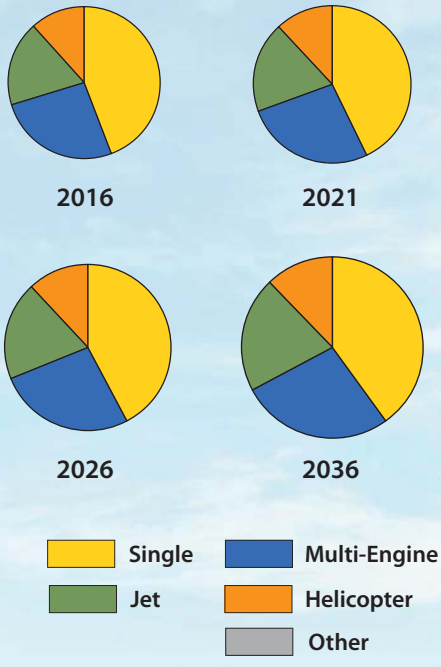
The FAA has established several aircraft classification systems that group aircraft types based on their performance (approach speed in landing configuration) and design characteristics (wingspan and landing gear configuration). These classification systems are used to determine the appropriate airport design standards for specific airport elements, such as runways, taxiways, taxilanes, and aprons.

	2016	2021	2026	2036	CAGR
Enplanements	**365,928**	**435,000**	**487,000**	**600,000**	**2.5%**
Air Cargo (tons)	**8,722**	**10,000**	**11,500**	**15,800**	**3.0%**
OPERATIONS					
Itinerant					
Airline	8,950	9,100	10,400	12,700	1.8%
Air Cargo	722	830	860	1,040	1.8%
Other Air Taxi	964	1,000	1,200	1,500	2.2%
Total Commercial	***10,636***	***10,930***	***12,460***	***15,240***	***1.8%***
General Aviation	28,928	30,900	32,900	37,200	1.3%
Military	7,253	7,200	7,200	7,200	0.0%
Itinerant Subtotal	***46,817***	***49,030***	***52,560***	***59,640***	***1.2%***
Local					
General Aviation	9,587	9,800	9,900	10,300	0.4%
Military	832	800	800	800	-0.2%
Local Subtotal	***10,419***	***10,600***	***10,700***	***11,100***	***0.3%***
TOTAL OPERATIONS	**57,236**	**59,630**	**63,260**	**70,740**	**1.1%**
BASED AIRCRAFT					
Single Engine Piston	54	55	57	60	0.5%
Multi-Engine Piston/Turbine	32	34	36	41	1.2%
Jet	22	24	26	31	1.7%
Helicopter	14	15	16	18	1.3%
Other	0	0	0	0	
TOTAL BASED AIRCRAFT	**122**	**128**	**135**	**150**	**2.1%**
ANNUAL INSTRUMENT APPROACHES	**940**	**980**	**1,050**	**1,190**	**2%**

OPERATIONS



BASED AIRCRAFT FLEET MIX



CAGR - compound annual growth rate

AIRCRAFT CLASSIFICATION

The selection of appropriate FAA design standards for the development and location of airport facilities is based primarily upon the characteristics of the aircraft which are currently using or are expected to use an airport. The critical design aircraft is used to define the design parameters for an airport. The design aircraft may be a single aircraft type or, more commonly, is a composite aircraft representing a collection of aircraft with similar characteristics. The critical design aircraft is defined by three parameters: Aircraft Approach Category (AAC), Airplane Design Group (ADG), and Taxiway Design Group (TDG). FAA AC 150/5300-13A, *Airport Design*, describes the following airplane classification systems, the parameters of which are presented on **Exhibit 2M**.

Aircraft Approach Category (AAC): A grouping of aircraft based on a reference landing speed (V_{REF}), if specified, or if V_{REF} is not specified, 1.3 times stall speed (V_{SO}) at the maximum certificated landing weight. V_{REF}, V_{SO}, and the maximum certificated landing weight are those values as established for the aircraft by the certification authority of the country of registry.

The AAC generally refers to the approach speed of an aircraft in landing configuration. The higher the approach speed, the more restrictive the applicable design standards. The AAC, depicted by a letter A through E, is the aircraft approach category and relates to aircraft approach speed (operational characteristic). The AAC generally applies to runways and runway-related facilities, such as runway width, runway safety area (RSA), runway object free area (ROFA), runway protection zone (RPZ), and separation standards.

Airplane Design Group (ADG): The ADG, depicted by a Roman numeral I through VI, is a classification of aircraft which relates to aircraft wingspan or tail height (physical characteristic). When the aircraft wingspan and tail height fall in different groups, the higher group is used. The ADG influences design standards for taxiway safety area (TSA), taxiway object free (TOFA), taxilane object free area, apron wingtip clearance, and various separation distances.

Taxiway Design Group (TDG): A classification of airplanes based on outer-to-outer Main Gear Width (MGW) and Cockpit to Main Gear (CMG) distance. The TDG relates to the undercarriage dimensions of the design aircraft. The taxiway design elements determined by the application of the TDG include the taxiway width, taxiway edge safety margin, taxiway shoulder width, taxiway fillet dimensions, and, in some cases, the separation distance between parallel taxiways/taxilanes. Other taxiway elements, such as the taxiway safety area (TSA), taxiway/taxilane object free area (TOFA), taxiway/taxilane separation to parallel taxiway/taxilanes or fixed or movable objects, and taxiway/taxilane wingtip clearances are determined solely based on the wingspan (ADG) of the design aircraft utilizing those surfaces. It is appropriate for taxiways to be planned and built to different TDG standards based on expected use.

Exhibit 2N presents the aircraft classification of the most common jet aircraft in operation today.

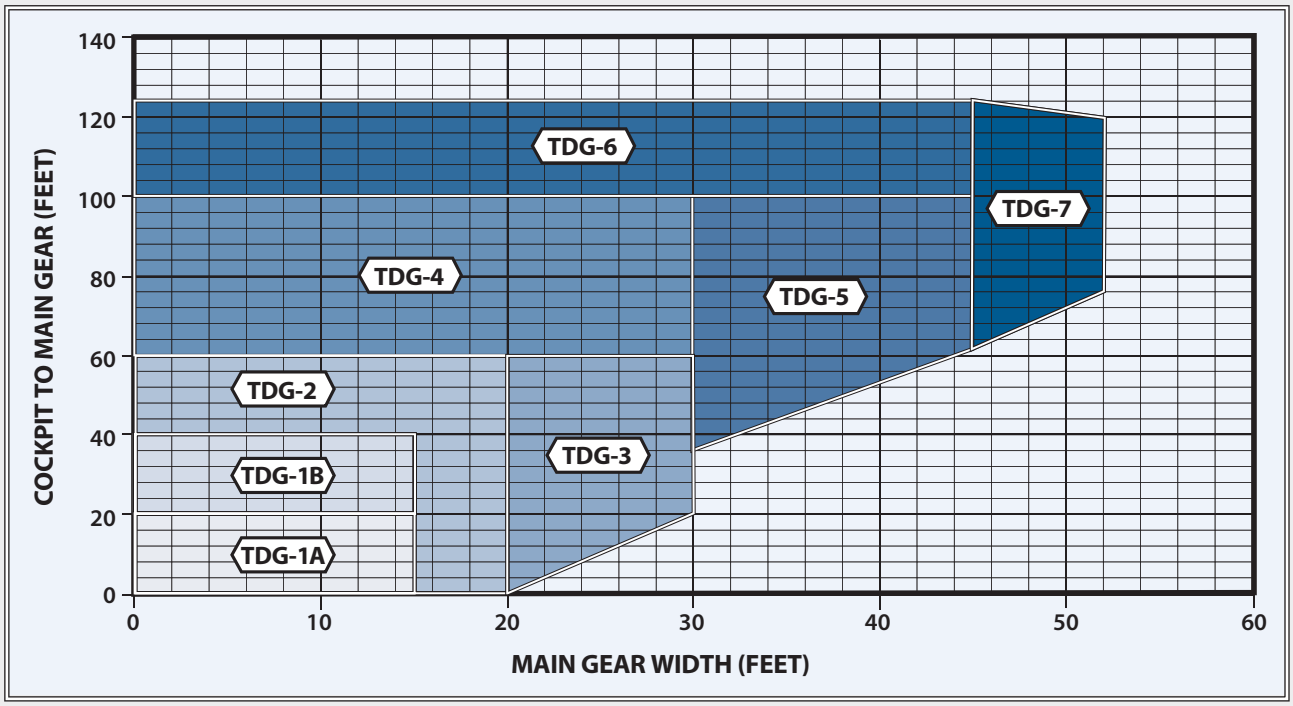
AIRCRAFT APPROACH CATEGORY (AAC)	
Category	**Approach Speed**
A	less than 91 knots
B	91 knots or more but less than 121 knots
C	121 knots or more but less than 141 knots
D	141 knots or more but less than 166 knots
E	166 knots or more

AIRPLANE DESIGN GROUP (ADG)		
Group #	**Tail Height (ft)**	**Wingspan (ft)**
I	<20	<49
II	20-<30	49-<79
III	30-<45	70-<118
IV	45-<60	118-<171
V	60-<66	171-<214
VI	66-<80	214-<262

VISIBILITY MINIMUMS	
RVR* (ft)	**Flight Visibility Category (statute miles)**
VIS	3-mile or greater visibility minimums
5,000	Not lower than 1-mile
4,000	Lower than 1-mile but not lower than ¾-mile
2,400	Lower than ¾-mile but not lower than ½-mile
1,600	Lower than ½-mile but not lower than ¼-mile
1,200	Lower than ¼-mile

***RVR**: Runway Visual Range

TAXIWAY DESIGN GROUP (TDG)



Source: FAA AC 150/5300-13A, Airport Design

A-I

- Beech Baron 55
- **Beech Bonanza**
- Cessna 150
- Cessna 172
- Cessna Citation Mustang
- Eclipse 500/550
- Piper Archer
- Piper Seneca

B-I

- Beech Baron 58
- Beech King Air A90/100
- Cessna 402
- **Cessna 421**
- Piper Navajo
- Piper Cheyenne
- Swearingen Metroliner
- Cessna Citation I (525)

B-II

- Super King Air 200
- Cessna 441
- DHC Twin Otter
- Super King Air 350
- Beech 1900
- Citation Excel (560), Sovereign (680)
- Falcon 50, 900, 2000
- **Citation Bravo (550)**
- Embraer 120

A-III, B-III

- DHC Dash 7
- **DHC Dash 8**
- DC-3
- **Global Express, Global 5000**
- Fairchild F-27
- ATR 72

C-I, D-I

- Beech 400
- **Lear 31, 35,** 45, 60
- Israeli Westwind

C-II, D-II

- **Cessna Citation X (750)**
- Gulfstream 100, 200,300
- Challenger 300/600
- ERJ-135, 140, 145
- CRJ-200/700
- Embraer Regional Jet
- Lockheed JetStar
- Hawker 800

C-III, D-III *less than 100,000 lbs.*

- ERJ-170
- CRJ 705, 900
- Falcon 7X
- **Gulfstream 500**, 550, 650
- Global Express, Global 5000
- Q-400

C-III, D-III *over 100,000 lbs.*

- ERJ-90
- Boeing Business Jet
- B-727
- **B-737**-300, **700,** 800
- MD-80, DC-9
- A319, A320

C-IV, D-IV

- **B-757**
- B-767
- C-130 Hercules
- DC-8-70
- MD-11

D-V

- **B-747-400**
- B-777
- B-787
- A-330, A-340

Note: Aircraft pictured is identified in bold type.

AIRPORT AND RUNWAY CLASSIFICATION

These classifications, along with the aircraft classifications defined previously, are used to determine the appropriate FAA design standards to which the airfield facilities are to be designed and built.

***Airport Reference Code (ARC)*:** An airport designation that signifies the airport's highest Runway Design Code (RDC), minus the third (visibility) component of the RDC. The ARC is used for planning and design only and does not limit the aircraft that may be able to operate safely on the airport. The current ALP for the Airport, which will be updated as part of this planning effort, identifies an ARC of D-IV for Runway 14-32 with the Boeing 767-400 as the critical design aircraft. Runway 18-36 is identified on the current ALP as an ARC A-I runway with no critical aircraft identified.

Runway Design Code (RDC): A code signifying the design standards to which the runway is to be built. The RDC is based upon planned development and has no operational component. The AAC, ADG, and runway visual range (RVR) are combined to form the RDC of a runway. The RDC provides the information needed to determine certain design standards that apply. The first component, depicted by a letter, is the AAC and relates to aircraft approach speed (operational characteristics). The second component, depicted by a Roman numeral, is the ADG and relates to either the aircraft wingspan or tail height (physical characteristics), whichever is most restrictive. The third component relates to the visibility minimums expressed by RVR values in feet of 1,200 (⅛-mile); 1,600 (¼-mile); 2,400 (½-mile); 4,000 (¾-mile); and 5,000 (1-mile). The RVR values approximate standard visibility minimums for instrument approaches to the runways. The third component should read "VIS" for runways designed for visual approach use only.

Approach Reference Code (APRC): A code signifying the current operational capabilities of a runway and associated parallel taxiway with regards to landing operations. Like the RDC, the APRC is composed of the same three components: the AAC, ADG, and RVR. The APRC describes the current operational capabilities of a runway under meteorological conditions where no special operating procedures are necessary, as opposed to the RDC which is based upon planned development with no operational component. The APRC for a runway is established based upon the minimum runway-to-taxiway centerline separation.

Based upon the current runway/taxiway centerline separation distance of 400 feet and available ½-mile visibility minimums to Runway 14, Runway 14-32's APRC is D/IV/2400 and D/V/2400. Runway 18-36 has a centerline separation distance of 200 feet and is a visual runway so its APRC is B/I(S)/VIS.

Departure Reference Code (DPRC): A code signifying the current operational capabilities of a runway and associated parallel taxiway with regards to take-off operations. The DPRC represents those aircraft that can take off from a runway while any aircraft is present on adjacent taxiways, under meteorological conditions with no special operating conditions. The DPRC is like the APRC, but is composed of two components: ACC and ADG. A runway may have more than one DPRC depending on the parallel taxiway separation distance.

Runway 14-32 has a DPRC of D/IV/V based upon its runway/taxiway centerline separation distance of 400 feet. Runway 18-36 has a DPRC of B/I(S) based upon its runway/taxiway centerline separation distance of 200 feet.

CRITICAL DESIGN AIRCRAFT

The selection of appropriate FAA design standards for the development and location of airport facilities is based primarily upon the characteristics of the aircraft which are currently using or are expected to use an airport. The critical design aircraft is used to define the design parameters for an airport. The design aircraft may be a single aircraft or a composite aircraft representing a collection of aircraft classified by the three parameters: AAC, ADG, and TDG. In the case of an airport with multiple runways, a design aircraft is selected for each runway.

The first consideration is the safe operation of aircraft likely to use an airport. Any operation of an aircraft that exceeds design criteria of an airport may result in either an unsafe operation or a lesser safety margin; however, it is not the usual practice to base the airport design on an aircraft that uses the airport infrequently.

The critical design aircraft is defined as the most demanding aircraft type, or grouping of aircraft with similar characteristics, that make regular use of the airport. Regular use is 500 annual operations, excluding touch-and-go operations. Planning for future aircraft use is of importance since the design standards are used to plan separation distances between facilities. These future standards must be considered now to ensure that short term development does not preclude the reasonable long-range potential needs of the airport. Therefore, if the critical design aircraft is anticipated to change within the next five years, that aircraft (or family of aircraft) should be used as the current critical design aircraft.

AIRPORT CRITICAL DESIGN AIRCRAFT

The FAA maintains the Traffic Flow Management System Count (TFMSC) database which documents aircraft operations at most NPIAS airports. Information is added to the TFMSC database when pilots file flight plans and/or when flights are detected by the National Airspace System, usually via radar. The database includes documentation of commercial traffic (air carrier and air taxi), general aviation, and military aircraft. Due to factors such as incomplete flight plans and limited radar coverage, TFMSC data does not account for all aircraft activity at an airport by a given aircraft type. Most VFR and some non-enroute IFR traffic is excluded. Therefore, it is likely that there are more operations at an airport than are captured by this methodology. TFMSC data is available for activity at MFE and was utilized in this analysis.

Current Critical Design Aircraft

Runway 14-32

MFE experiences frequent activity by commercial airlines and air cargo operators, military, and business aircraft. The largest commercial aircraft currently in use at MFE is the Boeing 757-200 series (ARC C-IV), utilized by Allegiant Air and UPS. The remainder of the commercial airline fleet consists of the Boeing 737-700/800/900 series aircraft (ARC C-III), the Airbus A319/320 (ARC C-III), the MD-80 series (C/D-III), numerous regional jets including the CRJ 900 (C-III), EMB 175 (C-III), ERJ 145 (C-II), and the ATR 42 turboprop aircraft (B-III).

Exhibit 2P presents the TFMSC operational mix at the Airport for turbine operations from 2007 through 2016. Over the ten-year period, this data identifies that the five most frequent operating aircraft at MFE were the King Air series of turboprop aircraft, the MD-80 series, the Embraer regional jets (ERJ 135/140/145), the Boeing 737 series, and the Bombardier regional jets (CRJ 100/200/700). MFE has averaged 6,367 annual operations by turbine aircraft in AAC C and D. AAC D from 2009 to 2011 exceeded 500 annual operations, but dropped to a low of 85 total operations in 2014. Over the past two years, AAC D operations have increased rapidly to 457 in 2016, largely due to the increased usage of the Boeing 737-800/900. As discussed previously, the TFMSC data is not representative of all operations at an airport, and due to the marginal difference between the data and the threshold, an assumption can be made that the AAC D group of aircraft are conducting at or above 500 annual operations annually. **Therefore, the Master Plan will consider AAC D as the current critical design AAC.**

From 2007 through 2016, MFE averaged 3,282 annual operations by aircraft in ADGs III and IV since 2007. The Airport has had very minimal operations by aircraft within ADGs V and VI over the past ten years. ADG IV, based largely on the Boeing 757-200, has averaged 967 annual operations at MFE since 2012. **Therefore, the Master Plan will consider ADG IV as the current critical design ADG.**

The current critical design aircraft for Runway 14-32 is best described as ARC D-IV based upon the Boeing 737-800/900 and the Boeing 757-200 aircraft.

Runway 18-36

Based upon the current runway design, weight bearing capacity, and length, Runway 18-36 is only capable of accommodating the smallest aircraft in the general aviation fleet that weigh less than 12,500 pounds, such as the Cessna 172 (A-I). **Therefore, the current critical design aircraft for Runway 18-36 is best described as ARC A-I (small airplane exclusive) based upon the Cessna 172.**

Future Critical Design Aircraft

Runway 14-32

The Master Plan forecast anticipates some fleet mix changes for the scheduled airline operators over time. The older MD-80 series is being phased out of the commercial fleet, with operators transitioning to more modern aircraft such as the Boeing 737 series and Airbus A319/320, both of which are ARC C-III aircraft. The 50-seat RJs are also being phased out and will eventually be replaced by the 70-90 seat CRJ-700 (ARC C-II) and 900 series (ARC C-III) and ERJ-170/175 series (ARC C-III).

Business jet operations and charter activity is largely driven by small to mid-sized aircraft in the ARC B/C-I/II categories that include the Cessna Citation jet family (ARC B-I/II), the Falcon family (ARC B-II), the Learjet family (C-I/II), and the Gulfstream family (C/D-II/III). The air cargo fleet is projected to transition its fleet to include increased operations by aircraft with maximum load capacities of over 100,000 pounds, which includes aircraft such as the Boeing 767-300 freighter (ARC C-IV).

Very few aircraft are classified within AAC E, which consists primarily of military aircraft such as the F-16. ADG V/VI aircraft include widebody airliners such as the Boeing 747, 777, and 787, and Airbus A330, A340, A350, and A380, none of which are anticipated to operate at MFE on a frequent basis over the next 20 years.

As a result, operations within the ARC D-IV category are anticipated to continue to grow over the forecast period and will maintain on a level at or above 500 annual operations. **Therefore, the ultimate critical design aircraft for Runway 14-32 is best described as ARC D-IV based upon the Boeing 737-800/900 and the Boeing 767-300 freighter aircraft.**

Runway 18-36

Runway 18-36 is planned to be closed in the future based upon the analysis from the previous Master Plan and per planned projects depicted on the Airport's current ALP. **Therefore, until Runway 18-36 is closed, it should continue to be maintained to meet the needs of its current critical design aircraft, which falls within ARC A-I (small airplane exclusive) represented by the Cessna 172.**

RUNWAY DESIGN CODE

Each runway is assigned an RDC. The RDC relates to specific FAA design standards that should be met in relation to each runway. The RDC takes into consideration the AAC, ADG, and the RVR. In most cases, the critical design aircraft will also be the RDC for the primary runway.

ARC	Aircraft Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
A-I	Cessna Citation Mustang	0	5	34	73	89	111	84	91	99	64
	Eclipse 400/500	0	16	70	166	194	105	154	229	146	128
	Piper Malibu/Meridian	0	280	236	111	137	157	92	213	169	100
	Total	**0**	**301**	**340**	**350**	**420**	**373**	**330**	**533**	**414**	**292**
A-II	Cessna 425	90	120	95	77	188	128	19	32	14	11
	DHC-6 Twin Otter	0	0	0	1	0	0	15	32	28	23
	Pilatus PC-12	0	108	237	551	330	331	362	494	891	1,022
	Total	**90**	**228**	**332**	**629**	**518**	**459**	**396**	**558**	**933**	**1,056**
A-III	De Haviland Dash 7/8-300	2	0	1	0	2,257	1,043	4	4	0	0
	Total	**2**	**0**	**1**	**0**	**2,257**	**1,043**	**4**	**4**	**0**	**0**
B-I	Aero Commander 690 A/B	5	1	1	1	0	0	1	0	0	0
	Beech Airliner	12	6	12	16	0	0	0	2	1	0
	Cessna Citation I/SP	196	193	140	247	237	251	232	136	165	88
	Cessna CJ1	220	146	157	227	284	456	466	333	383	358
	Dassault Falcon/Mystère 10	41	30	31	27	53	23	32	4	2	1
	Embraer Phenom 100	0	0	35	26	515	612	654	432	296	347
	Fairchild Swearingen	49	68	75	52	39	40	45	68	50	46
	Hawker 400/MU-300	22	21	37	92	122	119	153	118	100	63
	Honda Jet	0	0	0	0	0	0	0	0	0	15
	King Air 100	6	17	10	10	14	27	31	3	2	6
	Mitsubishi MU-2	87	57	59	81	40	53	55	61	185	119
	N American Rockwell Sabre 40/60	43	30	26	65	63	27	4	11	16	9
	Piaggio P180 Avanti	15	6	11	27	32	21	6	6	2	2
	Piper Cheyenne	282	200	268	399	434	416	188	133	127	93
	Raytheon Premier I	35	28	16	28	11	12	59	66	95	82
	Raytheon Texan II	1	0	2	0	1	1	11	34	203	497
	Swearingen Merlin 2/4	115	72	39	60	64	169	131	218	197	179
	Hawker 1000	3	0	4	0	12	16	4	6	6	5
	TBM-7/850	13	25	23	95	139	108	99	359	241	122
	Total	**1,145**	**900**	**946**	**1,453**	**2,060**	**2,351**	**2,171**	**1,990**	**2,071**	**2,032**
B-II	Aero Commander 680/1000	150	169	132	184	100	87	68	53	37	44
	Bae-3100 Jetsream	275	333	286	290	189	301	151	147	106	108
	Beech 1900	7	14	13	4	0	2	0	6	4	4
	CASA Aviocar	2	7	4	3	7	4	1	1	1	0
	Cessna 441 Conquest	21	19	15	5	0	6	12	16	15	8
	Cessna Caravan	0	31	34	213	311	75	35	22	38	35
	Cessna Citation Bravo/SP	451	348	415	315	399	480	450	604	582	534
	Cessna Citation Excel/XLS	375	383	379	476	410	497	660	564	710	675
	Cessna Citation III/VI/VII	308	208	158	182	132	104	62	69	99	71

ARC	Aircraft Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
B-II	Cessna Citation Sovereign/Latitude	37	23	28	37	41	16	50	65	78	78
	Cessna Citation V/Encore/Ultra	789	636	472	361	272	276	338	271	293	190
	Cessna CJ2, CJ3, CJ4	33	119	127	128	121	132	209	283	223	299
	Dassault Falcon 20/50	694	333	265	486	407	483	394	365	309	214
	Dassault Falcon 2000	27	21	16	16	42	18	29	43	24	43
	Dassault Falcon 900	36	25	46	27	15	23	16	28	24	23
	Dornier 328	9	12	54	90	52	60	66	77	65	65
	Embraer 120	8	4	0	0	0	0	6	18	12	36
	Embraer Bandeirante	16	6	3	0	6	2	0	4	2	14
	Embraer Legacy 500	0	0	0	0	0	0	0	0	0	7
	Embraer Phenom 300	0	0	0	0	6	6	16	53	82	88
	Gulfstream I	0	0	0	5	0	1	0	0	0	0
	Jetstream 31	0	0	0	1	1	0	1	0	0	0
	King Air 90/200/300/350	3,515	3,565	4,354	4,409	4,468	3,851	3,207	3,635	2,914	3,061
	Saab 340	0	0	4	0	2	2	0	0	0	0
	Shorts 330/360	30	22	20	6	8	3	12	8	8	18
	Total	**6,783**	**6,278**	**6,825**	**7,238**	**6,989**	**6,429**	**5,783**	**6,332**	**5,626**	**5,615**
B-III	CASA CN-235	0	0	0	0	0	0	0	0	11	26
	De Haviland Dash 8-100/200	2	0	1	0	1	0	0	0	0	0
	Total	**2**	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**11**	**26**
C-I	AV-8B Harrier	0	0	0	0	0	2	0	0	0	0
	BAE HS 125-1/2/3/125/400/600	195	171	196	408	590	496	465	264	180	228
	Bae Systems Hawk	32	27	782	966	1,348	1,246	1,160	876	793	1,122
	Beechjet 400	330	225	42	123	112	109	226	251	203	125
	IAI 1124/1125 Westwind	126	74	78	63	57	113	103	70	31	54
	Learjet 20 Series	363	149	199	152	71	65	47	56	17	5
	Learjet 30 Series	502	188	224	187	306	469	263	266	246	208
	Learjet 40/45/60	372	533	468	626	624	670	702	694	662	516
	Learjet 55	22	25	36	15	16	20	16	33	13	15
	North American Rockwell Sabre 75	1	2	0	0	0	0	0	0	5	1
	T-45 Goshawk	1,302	811	450	22	30	13	22	39	26	5
	Total	**3,245**	**2,205**	**2,475**	**2,562**	**3,154**	**3,203**	**3,004**	**2,549**	**2,176**	**2,279**
C-II	1125 Westwind	8	15	10	10	5	6	6	4	4	33
	A-6 Intruder	1	0	0	0	0	0	0	0	0	0
	Beech Starship	0	6	0	0	0	0	0	0	0	0
	Bombardier CRJ 100/200/700	1,412	253	1,216	1,581	1,182	409	1,270	928	863	98
	Cessna Citation X	52	65	31	32	44	47	78	54	34	41
	Challenger 300/600	62	63	58	133	93	122	144	162	103	140
	Embraer ERJ 135/140/145/Legacy	3,173	2,089	2,417	2,030	702	3,090	4,315	4,910	2,609	881
	Fairchild A-10	0	0	1	1	0	0	0	0	0	0

Source: FAA database **ARC** - Airport Reference Code

ARC	Aircraft Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
C-II	Gulfstream 300	7	6	6	5	7	7	17	12	8	9
	Hawker 800/4000	3	1	4	5	18	23	12	9	15	4
	IAI 1126 Galaxy	40	62	33	31	47	35	24	21	21	14
	Learjet 70 Series	0	0	0	0	0	0	0	0	0	41
	Gulfstream 200/400	41	41	20	40	53	58	49	48	41	35
	Gulfstream G-150	10	6	22	18	11	11	12	6	6	11
	Total	**4,809**	**2,607**	**3,818**	**3,886**	**2,162**	**3,808**	**5,927**	**6,154**	**3,704**	**1,307**
C-III	Airbus A319/320 Series	0	4	0	2	0	144	280	1,384	668	1,034
	ATR 42/45/72	2	1	6	7	8	4	63	223	503	627
	Boeing 727	25	5	10	8	6	4	8	4	12	100
	Boeing 737 (100-700 Series)	3,343	2,885	2,110	1,729	1,045	281	39	28	204	608
	Bombardier CRJ 900	0	0	0	165	182	6	0	1	950	1,677
	Bombardier Global 5000	4	8	5	4	0	0	4	1	6	6
	Dassault Falcon 7X	0	0	0	5	0	0	2	3	4	17
	Embraer 170/190 Series	0	0	0	0	0	0	20	16	891	1,494
	McDonnell Douglas DC-9/MD-80's	3,412	3,414	3,602	3,446	3,083	3,014	3,467	2,305	3,077	1,921
	P-3 Orion	2	3	2	2	1	1	2	2	1	2
	Total	**6,788**	**6,320**	**5,735**	**5,368**	**4,325**	**3,454**	**3,885**	**3,967**	**6,316**	**7,486**
C-IV	Airbus A300/310 Series	0	0	0	0	1	0	0	0	6	0
	Boeing 757 200 Series	10	6	0	2	204	904	893	983	974	949
	Boeing 767 Series	0	0	0	0	0	0	2	0	0	0
	C-130 Hercules	8	10	5	0	2	8	8	61	11	10
	C-17 Globemaster	0	10	0	0	0	0	0	12	4	6
	Total	**18**	**26**	**5**	**2**	**207**	**912**	**903**	**1,056**	**995**	**965**
C-V	Airbus A350/360	0	3	0	0	0	0	0	0	0	0
	Total	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
C-VI	C-5 Galaxy	0	4	0	0	0	0	0	0	2	0
	Total	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**
D-I	F/A-18 Hornet	1	0	0	0	0	1	2	0	0	0
	F-15 Eagle	1	0	1	1	0	0	0	1	0	0
	T-38 Talon	0	0	0	1	1	1	0	0	1	2
	Total	**2**	**0**	**1**	**2**	**1**	**2**	**2**	**1**	**1**	**2**
D-III	Boeing 737-800/900	180	425	582	523	632	363	118	8	148	396
	Gulfstream G550/650	4	9	5	10	20	33	27	22	19	13
	Total	**184**	**434**	**587**	**533**	**652**	**396**	**145**	**30**	**167**	**409**
D-IV	Boeing 757 300 Series	3	2	0	0	0	0	2	0	0	0
	McDonnell Douglas DC-8 Series	2	0	0	0	0	0	0	0	0	0
	Total	**5**	**2**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**
E-I	F-16 Falcon	0	0	1	0	2	0	1	0	2	0
	Total	**0**	**0**	**1**	**0**	**2**	**0**	**1**	**0**	**2**	**0**

AIRPORT REFERENCE CODE (ARC) SUMMARY

ARC	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
A-I	0	301	340	350	420	373	330	533	414	292
A-II	90	228	332	629	518	459	396	558	933	1,056
A-III	2	0	1	0	2,257	1,043	4	4	0	0
B-I	1,145	900	946	1,453	2,060	2,351	2,171	1,990	2,071	2,032
B-II	6,783	6,278	6,825	7,238	6,989	6,429	5,783	6,332	5,626	5,615
B-III	2	0	1	0	1	0	0	0	11	26
C-I	3,245	2,205	2,475	2,562	3,154	3,203	3,004	2,549	2,176	2,279
C-II	4,809	2,607	3,818	3,886	2,162	3,808	5,927	6,154	3,704	1,307
C-III	6,788	6,320	5,735	5,368	4,325	3,454	3,885	3,967	6,316	7,486
C-IV	18	26	5	2	207	912	903	1,056	995	965
C-V	0	3	0	0	0	0	0	0	0	0
C-VI	0	4	0	0	0	0	0	0	2	0
D-I	2	0	1	2	1	2	2	1	1	2
D-III	184	434	587	533	652	396	145	30	167	409
D-IV	5	2	0	0	0	0	2	0	0	0
E-I	0	0	1	0	2	0	1	0	2	0
TOTAL	23,073	19,308	21,067	22,023	22,748	22,430	22,553	23,174	22,418	21,469

APPROACH CATEGORY (AC)

AC	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
A	92	529	673	979	3,195	1,875	730	1,095	1,347	1,348
B	7,930	7,178	7,772	8,691	9,050	8,780	7,954	8,322	7,708	7,673
C	14,860	11,165	12,033	11,818	9,848	11,377	13,719	13,726	13,193	12,037
D	191	436	588	535	653	398	149	31	168	411
E	0	0	1	0	2	0	1	0	2	0
TOTAL	23,073	19,308	21,067	22,023	22,748	22,430	22,553	23,174	22,418	21,469

DESIGN GROUP (DG)

DG	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
I	4,392	3,406	3,763	4,367	5,637	5,929	5,508	5,073	4,664	4,605
II	11,682	9,113	10,975	11,753	9,669	10,696	12,106	13,044	10,263	7,978
III	6,976	6,754	6,324	5,901	7,235	4,893	4,034	4,001	6,494	7,921
IV	23	28	5	2	207	912	905	1,056	995	965
V	0	3	0	0	0	0	0	0	0	0
VI	0	4	0	0	0	0	0	0	2	0
TOTAL	23,073	19,308	21,067	22,023	22,748	22,430	22,553	23,174	22,418	21,469

Runway 14-32 RDC

Runway 14-32 is the primary runway and is designed to accommodate the critical design aircraft. This runway is 7,120 feet long and 150 feet wide and is equipped with a CAT-I instrument approach providing for visibility minimums as low as ½-mile. **Therefore, the current and ultimate RDC for Runway 14-32 is D-IV-2400**.

Runway 18-36 RDC

Runway 18-36 is 2,638 feet long and 60 feet wide with a weight bearing capacity of 12,500 pounds and is a visual runway. The existing and ultimate critical design aircraft is reflective of small aircraft exclusively, represented by the Cessna 172. Previous plans have included closing Runway 18-36 in the future. **For the purposes of this Master Plan, an existing and ultimate RDC of A-I(S)-VIS will be identified for Runway 18-36 until the time that the runway is closed.**

SUMMARY

This chapter has outlined the various activity levels by demand indicators that might reasonably be anticipated over the planning period. MFE provides an important and convenient air passenger link to the national airspace system for Rio Grande Valley residents and businesses. Despite strong regional competition for air travelers, MFE has grown its regional market share of enplanements, maintained a strong market share of regional cargo handled, and maintained healthy general aviation operations levels. The Rio Grande Valley has been and is projected to continue to be one of the fastest growing regions of Texas and the country, which is anticipated to attract expanded airline service, cargo, and general aviation activities. Passenger enplanements are forecast to grow from 365,928 in 2016 to 600,000 by 2036. Air cargo tons handled are forecast to grow from 8,722 tons handled in 2016 to 15,800 by 2036. Total airport operations are forecasted to grow from 57,236 in 2016 to 70,740 by 2036.

The current critical design aircraft for MFE is within ARC D-IV, represented by a combination of the Boeing 737-800/900 and the Boeing 757-200. The aircraft fleet mix at MFE will transition over the coming years, but significant changes that would put MFE into another ARC category are not anticipated. The ultimate critical design aircraft will also be within ARC D-IV, represented by a combination of the Boeing 737-800/900 and the Boeing 767-300 freighter.

The next step in the planning process is to assess the capabilities of the existing facilities to determine what upgrades may be necessary to meet future demands. The range of forecasts developed here will be taken forward in the next chapter as planning horizon activity levels that will serve as milestones or activity benchmarks in evaluating facility requirements.

McAllen International Airport

Chapter 3

Demand/Capacity and Facility Requirements

CHAPTER THREE

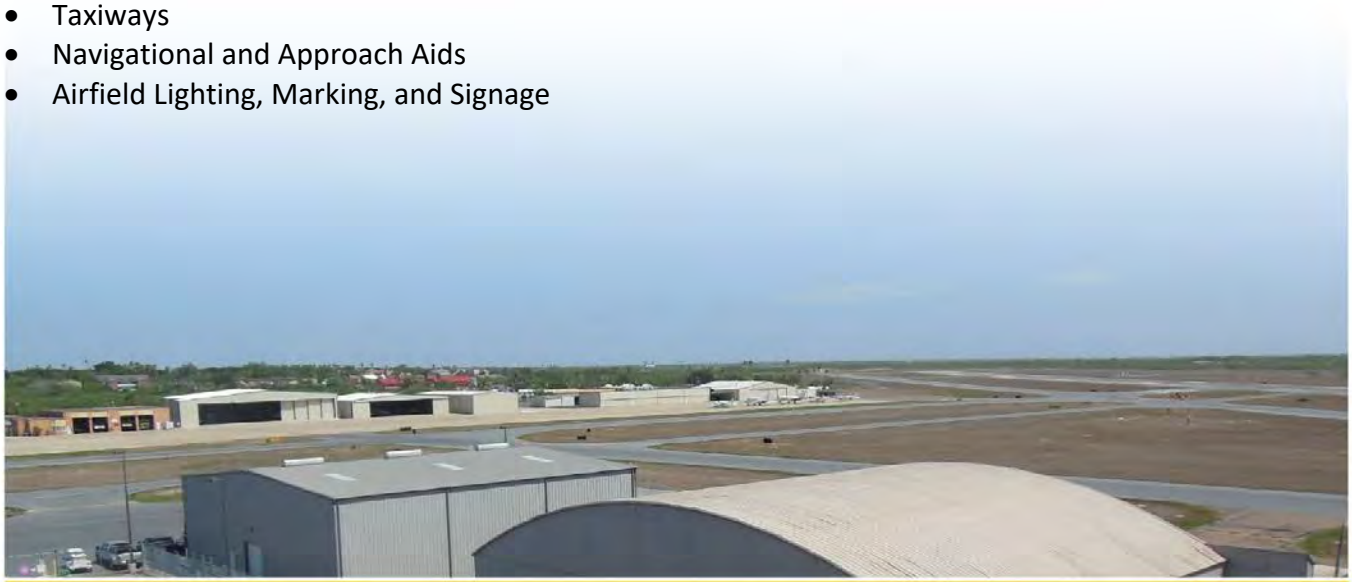
Demand/Capacity and Facility Requirements

Proper airport planning requires the translation of forecast aviation demand into the specific types and quantities of facilities that can adequately serve the identified demand. This chapter will analyze the existing capacities of McAllen International Airport (MFE or Airport) facilities. The existing capacities will then be compared to the forecast activity levels prepared in Chapter Two to determine where facility deficiencies currently exist or may be expected to materialize in the future. This chapter will present the following elements:

- Planning Horizon Activity Levels
- Airfield Capacity and Delay
- Airport Physical Planning Criteria
- Airfield and Landside Facility Requirements

As indicated previously in Chapter One, MFE's facilities include both airfield and landside components. Airfield facilities include those that are related to the arrival, departure, and ground movement of aircraft. The components include:

- Runways
- Taxiways
- Navigational and Approach Aids
- Airfield Lighting, Marking, and Signage



Landside facilities are needed for the interface between air and ground transportation modes. The elements analyzed include:

- Passenger Terminal
- Air Cargo Facilities
- General Aviation Terminal Services
- Aircraft Hangars
- Aircraft Parking Aprons
- Airport Support Facilities

The objective of this effort is to identify, in general terms, the adequacy of the existing airport facilities and outline what new facilities may be needed and when they may be needed to accommodate forecast demands. Having established these facility requirements, alternatives for providing the facilities will be evaluated to determine the most cost-effective and efficient means for implementation.

The facility requirements at MFE were evaluated using guidance contained in several Federal Aviation Administration (FAA) publications, including the following:

- Advisory Circular (AC) 150/5300-13A, *Airport Design*
- AC 150/5060-5, *Airport Capacity and Delay*
- AC 150/5325-4B (and Draft 4C), *Runway Length Requirements for Airport Design*
- Federal Aviation Regulation (FAR) Part 77, *Objects Affecting Navigable Airspace*
- FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)*
- Airport Cooperative Research Program (ACRP) Report 25, *Airport Passenger Terminal Planning and Design*

PLANNING HORIZONS

An updated set of aviation demand forecasts for MFE has been established. These activity forecasts include annual enplanements, operations, based aircraft, operational fleet mix, and operational peaking characteristics. With this information, specific components of the airfield and landside system can be evaluated to determine their capacity to accommodate future demand.

Cost-effective, efficient, and orderly development of an airport should rely more upon actual demand at an airport than on a time-based forecast figure. In order to develop a Master Plan that is demand-based rather than time-based, a series of planning horizon milestones have been established for MFE that takes into consideration the reasonable range of aviation demand projections. The planning horizons for the Master Plan are the short term (years 1-5), intermediate term (years 6-10), and long term (years 11-20).

It is important to consider that the actual activity at the Airport will not follow a straight line, as tends to be presented in forecast projections. More commonly, aviation activity will be higher or lower than what the annualized forecast portrays. By planning according to activity milestones, the resultant plan can

accommodate unexpected shifts or changes in the area's aviation demand by allowing airport management the flexibility to make decisions and develop facilities according to need generated by actual demand levels, not based solely on dates in time. The demand-based schedule provides flexibility in development, as development schedules can be slowed or expedited according to demand at any given time over the planning period. The resultant plan provides airport management with a financially responsible and needs-based program. **Table 3A** presents the short, intermediate, and long term planning horizon milestones for each aircraft activity level forecasted in Chapter Two.

TABLE 3A
Planning Horizon Activity Summary
McAllen International Airport

	Base Year (2016)	Short Term (1-5 years)	Intermediate Term (6-10 years)	Long Term (11-20 years)
BASED AIRCRAFT				
Single Engine Piston	54	55	57	60
Multi-Engine Piston/Turbine	32	34	36	41
Jet	22	24	26	31
Helicopter	14	15	16	18
Total Based Aircraft	122	128	135	150
ANNUAL AIRCRAFT OPERATIONS				
Itinerant	46,817	49,030	52,560	59,640
Local	10,419	10,600	10,700	11,100
Total Operations	57,236	59,630	63,260	70,740
ENPLANEMENTS & CARGO				
Enplanements	365,928	435,000	487,000	600,000
Air Cargo (tons)	8,722	10,000	11,500	15,800
PEAKING CHARACTERISTICS				
Enplanements				
Peak Month	36,230	45,000	50,300	62,000
Design Day	1,170	1,450	1,620	2,000
Design Hour	240	290	320	380
Operations				
Peak Month	5,249	5,660	6,005	6,715
Design Day	173	186	197	221
Busy Day	249	268	284	318
Design Hour	25	27	29	32

Source: Coffman Associates analysis

AIRFIELD CAPACITY AND DELAY

Airfield capacity is measured in a variety of different ways. The **hourly capacity** of a runway measures the maximum number of aircraft operations that can take place in an hour. The **annual service volume** (ASV) is an annual level of service that may be used to define airfield capacity needs and is a reasonable estimate of the maximum level of aircraft operations that can be accommodated in a year without incurring significant delay factors. **Aircraft delay** is the total delay incurred by aircraft using the airfield during a given timeframe. The Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5060-

5, *Airport Capacity and Delay*, provides a methodology for examining the operational capacity of an airfield for planning purposes.

FACTORS AFFECTING ANNUAL SERVICE VOLUME

This analysis takes into account specific factors about the airfield, such as airfield layout, weather conditions, aircraft mix, and operations in order to calculate the Airport's ASV. These factors are depicted in **Exhibit 3A**. The following describes the input factors as they relate to MFE.

- **Runway Configuration –** The existing runway configuration consists of a primary and crosswind runway supported by full-length parallel taxiways. Primary Runway 14-32 is 7,120 feet long and 150 feet wide. Crosswind Runway 18-36 is 2,638 feet long and 60 feet wide.

- **Runway Use –** Runway use in capacity conditions will be controlled by wind and/or airspace conditions. The direction of takeoffs and landings are generally determined by the direction of the wind. It is generally safest for aircraft to take off and land into the wind, in order to avoid crosswind (wind that is blowing perpendicular to the travel of the aircraft) or tailwind components. According to the Airport Traffic Control Tower (ATCT) controllers, Runway 14 is used most often at 70 percent of the time and Runway 32 is used at 29 percent of the time. Runway 18-36 is used only approximately one percent of the time. Due to its limited use by exclusively small aircraft, Runway 18-36 does not factor into the airfield capacity analysis. As a result, the capacity analysis considers that MFE operates essentially as a single-runway airfield.

  The availability of instrument approaches is also considered. While each end of Runway 14-32 provides instrument approach capability, Runway 14 is primarily utilized in instrument weather conditions since it is equipped with a Category I instrument landing system (ILS), which provides visibility minimums down to ½-mile. Runway 32 is also equipped with an ILS that provides visibility minimums down to ¾-mile. Runway 18-36 is not equipped with instrument approach systems and therefore can only be utilized during visual weather conditions.

- **Exit Taxiways –** Exit taxiways impact airfield capacity as the number and location of exits directly determine the occupancy time of an aircraft on the runway. The airfield capacity analysis gives credit to taxiway exits located within the prescribed range from a runway's threshold. This range is based upon the mix index of the aircraft that use the runways. Only exit taxiways located between 2,000 and 4,000 feet from the landing threshold count in the capacity determination. The exits must be at least 750 feet apart to count as separate exits. Under these criteria, Runway 14 is credited with one exit taxiway, and Runway 32 is also credited with one exit taxiway.

- **Weather Conditions –** Weather conditions can have a significant impact on airfield capacity. Airfield capacity is usually highest in clear weather, when flight visibility is at its best. Airfield capacity is diminished as weather conditions deteriorate and cloud ceilings and visibility are reduced. As weather conditions deteriorate, the spacing of aircraft must increase to provide allowable margins of safety and air traffic vectoring. The increased distance between aircraft reduces the number of

AIRFIELD LAYOUT

Runway Configuration

Runway Use

Number of Exits

WEATHER CONDITIONS

VMC (VFR)

Visual Meteorological Conditions

IMC (IFR)

Instrument Meteorological Conditions

PVC

Poor Visibility Conditions

AIRCRAFT MIX

Category A & B Aircraft

Category C Aircraft

Category D Aircraft

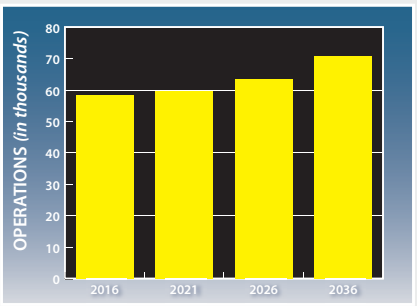
OPERATIONS

Arrivals

Departures

Touch-and-Go Operations

Total Annual Operations



aircraft which can operate at the airport during any given period, thus reducing overall airfield capacity.

According to meteorological data collected from the automated surface observation system (ASOS), the Airport reported visual flight rule (VFR) conditions a large majority of the time, with 93.7 percent of total time. VFR conditions exist whenever the cloud ceiling is greater than or equal to 1,000 feet above ground level (AGL) and visibility is greater than three statute miles. Instrument flight rule (IFR) conditions are defined when cloud ceilings are between 500 and 1,000 feet AGL or visibility is between one and three miles. According to the weather observations, IFR conditions accounted for 4.5 percent of total time. Poor visibility conditions (PVC) apply for cloud ceilings below 500 feet and visibility minimums below one mile. PVC constituted 1.9 percent of total time over the 10-year timeframe. **Table 3B** summarizes the weather conditions experienced at the Airport from 2007 through 2016.

TABLE 3B
Weather Conditions
McAllen International Airport

Condition	Cloud Ceiling	Visibility	Percent by Time
VFR	≥ 1,000' AGL	> 3 statute miles	93.7%
IFR	≥ 500' AGL and < 1000' AGL	1-3 statute miles	4.5%
PVC	< 500' AGL	< 1 statute mile	1.9%

VFR - Visual Flight Rules
IFR - Instrument Flight Rules
PVC - Poor Visibility Conditions
AGL - Above Ground Level

Source: National Oceanic and Atmospheric Administration (NOAA) - National Climatic Data Center. Airport observations from 2007-2016.

- **Aircraft Mix –** The aircraft mix for the capacity analysis is defined in terms of four aircraft classes. Classes A and B consist of small and medium-sized propeller-driven aircraft and some smaller business jets, all weighing 12,500 pounds or less. These aircraft are associated primarily with general aviation activity, but do include some air taxi, air cargo, and commuter aircraft. Class C consists of aircraft weighing between 12,500 pounds and 300,000 pounds. These aircraft include most business jets and some turboprop aircraft. Class D consists of large aircraft weighing more than 300,000 pounds. These aircraft are associated with major airline and air cargo activities and include the Boeing 767 and the Boeing 757, which are classified as such not by weight, but by the wake turbulence generated. The Boeing 757 is the only Class D aircraft operating at MFE on a regular basis currently; however, the air cargo fleet is anticipated to include operations by the Boeing 767 on a more frequent basis over the planning period.

  A description of the classifications and the percentage mix for each planning horizon is presented in **Table 3C**. During VFR weather conditions, the vast majority of operations, approximately 72 to 61 percent, are conducted by aircraft within Classes A & B over the course of the planning period. Class C & D aircraft conduct a combined 28 to 39 percent of operations during VFR conditions over the

planning period. During IFR/PVC conditions, operations by Class A & B aircraft are reduced by approximately 20 percent as many of these GA aircraft may not be equipped to operate in IFR conditions or GA pilots may choose not to fly in these conditions. Class C and D percentages range from 48 to 60 percent combined over the planning period during IFR/PVC conditions. In both the VFR and IFR/PVC conditions, the percentage of Class C aircraft operations at the Airport is expected to increase through the planning period with the growth of commercial and business/corporate operations.

TABLE 3C
Aircraft Operational Mix - Capacity Analysis
McAllen International Airport

Aircraft Classification	Base Year (2016)	Short Term (1-5 Years)	Intermediate Term (6-10 Years)	Long Term (11-20 Years)
Visual Flight Rules (VFR)				
Classes A & B	72%	70%	67%	61%
Class C	26%	29%	32%	38%
Class D	2%	1%	1%	1%
Instrument Flight Rules (IFR)/Poor Visibility Conditions (PVC)				
Classes A & B	52%	49%	46%	40%
Class C	46%	49%	52%	58%
Class D	2%	2%	2%	2%

Class A - Small single engine aircraft with gross weights of 12,500 pounds or less
Class B - Small multi-engine aircraft with gross weights of 12,500 pounds or less
Class C - Large aircraft with gross weights over 12,500 pounds up to 300,000 pounds
Class D - Large aircraft with gross weights over 300,000 pounds

Source: Coffman Associates analysis

- **Percent Arrivals vs. Departures –** The aircraft arrival/departure split is typically 50/50 in the design hour. At MFE, traffic information indicated no major deviation from this pattern.

- **Touch-And-Go Activity –** A touch-and-go operation involves an aircraft making a landing and then an immediate takeoff without coming to a full stop or exiting the runway. As previously discussed in Chapter Two, these operations are normally associated with general aviation training activity and classified as a local operation. A high percentage of touch-and-go traffic normally results in a higher operational capacity because one landing and one takeoff occurs within a shorter time than individual operations. Touch-and-go operations at MFE account for approximately 18 percent of total annual operations. This ratio is expected to decrease to 16 percent by the long term as itinerant operations are projected to grow at a faster pace.

- **Peak Period Operations –** Typical operations activity is important in the calculation of an airport's ASV as "peak demand" levels occur sporadically. The peak periods used in the capacity analysis are representative of normal operational activity and can be exceeded at various times throughout the year. For the airfield capacity analysis, average daily operations and average peak hour operations during the peak month, as calculated in the previous chapter and detailed earlier in this chapter, are utilized.

CALCULATION OF ANNUAL SERVICE VOLUME

The preceding information was used in conjunction with the airfield capacity methodology developed by the FAA to determine airfield capacity for MFE.

Hourly Runway Capacity

The first step in determining ASV involves the computation of the hourly capacity of the runway configuration. The percentage use of the runway, the amount of touch-and-go activity, and the number and locations of runway exits are the important factors in determining hourly capacity.

Based upon these factors, the current and future hourly capacities for MFE were determined. As the operational mix of aircraft at the airport changes to include a higher percentage of large aircraft weighing over 12,500 pounds, the hourly capacity of the system declines slightly. This is a result of the additional spacing and time required by larger aircraft in the traffic pattern and on the runway. As indicated in **Table 3C**, the percentage of Class C aircraft is projected to increase in each planning horizon activity milestone.

The current and future weighted hourly capacities are presented in **Table 3D**. Weighted hourly capacity is the measure of the maximum number of aircraft operations that can be accommodated on the airfield in a typical hour. It is a composite of estimated hourly capacities for different airfield operating configurations adjusted to reflect the percentage of time in an average year that the airfield operates under each specific configuration. The current weighted hourly capacity on the airfield is 60 operations; likewise, the capacity is expected to decline slightly to 57 operations by the long term horizon.

TABLE 3D
Airfield Capacity Summary
McAllen International Airport

	Base Year (2016)	Short Term (1-5 Years)	Intermediate Term (6-10 Years)	Long Term (11-20 Years)	Long Term – Parallel Runway
Operational Demand					
Annual	57,236	59,630	63,260	70,740	70,740
Capacity					
Annual Service Volume	138,000	132,000	129,000	127,000	211,000
Percent Capacity	41.5%	45.2%	49.0%	55.7%	33.5%
Weighted Hourly Capacity	60	60	59	57	95

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

Annual Service Volume

The ASV is determined by the following equation:

Annual Service Volume = C x D x H
C = weighted hourly capacity
D = ratio of annual demand to the average daily demand during the peak month
H = ratio of average daily demand to the design hour demand during the peak month

The current ASV for the airfield has been estimated at 138,000 operations. The increasing percentage of larger Class C aircraft over the planning period will attribute to a decline in ASV, lowering it to a level of approximately 127,000 operations by the end of the planning period. With 2016 operations at 57,236, the airport is currently at 41.5 percent of its ASV. Long range annual operations are forecast to reach 70,740, which would equate to 55.7 percent of the Airport's ASV.

MFE's current Airport Layout Plan (ALP) depicts the construction of a parallel runway in the future. This runway is planned to serve as a back-up to existing Runway 14-32 in the event that it is closed for maintenance/rehabilitation, allowing the Airport to continue its commercial service, GA, and military operations unimpeded. Should a parallel runway be constructed at MFE, airfield capacity can be expected to increase up to 211,000 ASV in a long term scenario with a weighted hourly capacity of 95 operations.

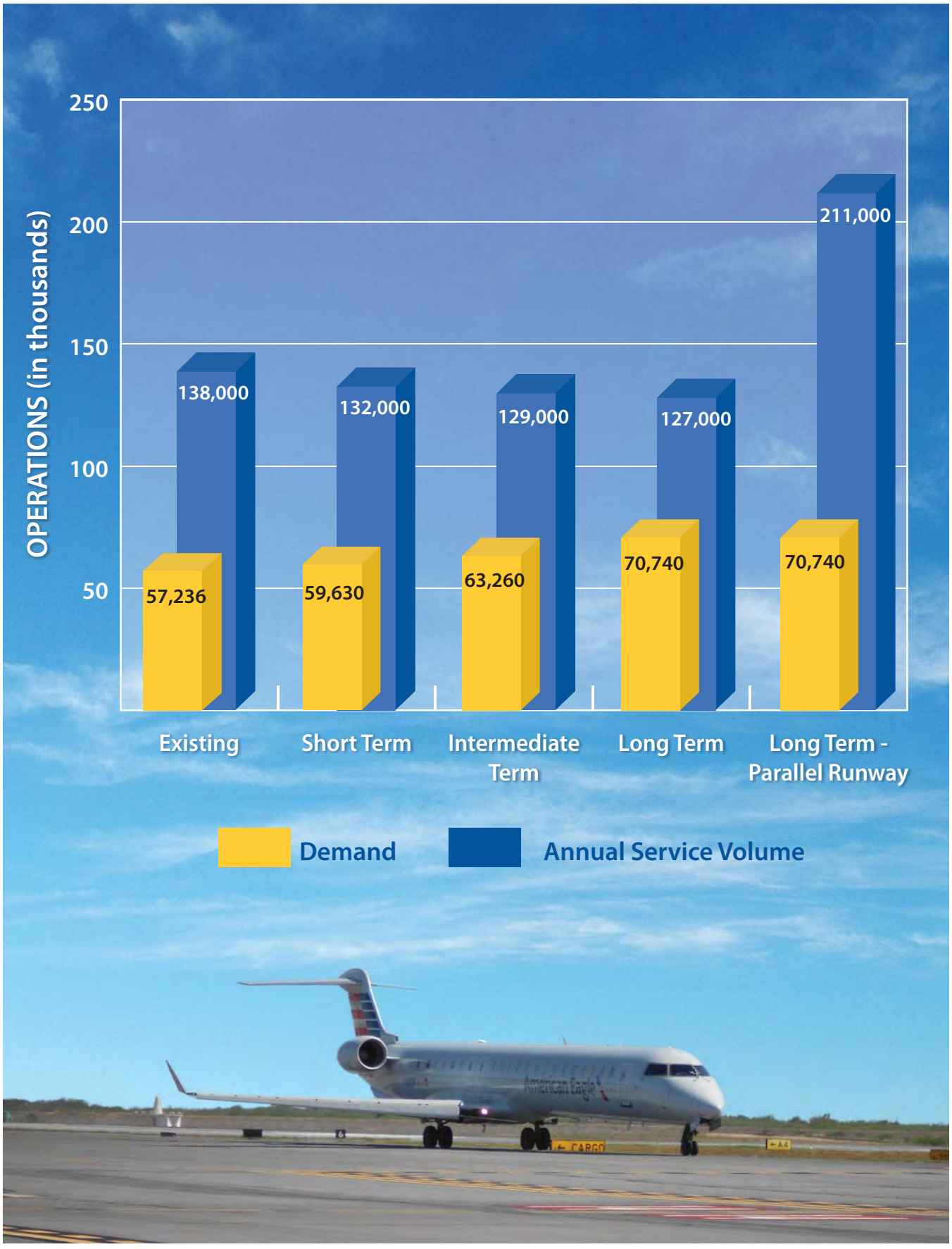
Table 3D and **Exhibit 3B** summarize and compare the Airport's ASV and projected annual operations over the short, intermediate, and long range planning horizons along with a long range parallel runway planning scenario.

AIRCRAFT DELAY

The effect that the anticipated ratio of demand to capacity will have on users of MFE can be measured in terms of delay. As the number of annual aircraft operations approaches the airfield's capacity, increasing operational delays begin to occur. Delays occur to arriving and departing aircraft in all weather conditions. Arriving aircraft delays result in aircraft holding outside the airport traffic pattern area. Departing aircraft delays result in aircraft holding at the runway end until they can safely takeoff.

Aircraft delay can vary depending on different operational activities at an airport. At airports where large air carrier aircraft dominate, delay can be greater given the amount of time these aircraft require in the traffic pattern and on approach to land. For airports that accommodate primarily small general aviation aircraft, experienced delay is typically less since these aircraft are more maneuverable and require less time in the airport traffic pattern.

Table 3E summarizes the potential aircraft delay for MFE. Estimates of delay provide insight into the impacts that steady increases in aircraft operations have on the airfield and signify the Airport's ability to accommodate projected annual aircraft operations. The delay per operation represents an average delay per aircraft. It should be noted that delays of five to ten times the average could be experienced by individual aircraft during peak periods. As an airport's percent capacity increases toward the ASV,


OPERATIONS (in thousands)
250
200
150
100
50
138,000
132,000
129,000
127,000
211,000
57,236
59,630
63,260
70,740
70,740
Existing
Short Term
Intermediate Term
Long Term
Long Term - Parallel Runway
Demand
Annual Service Volume

delay increases exponentially. Furthermore, complexities in the airspace system that surrounds an airport can also factor into additional delay experienced at the facility.

TABLE 3E
Airfield Delay Summary
McAllen International Airport

	Base Year (2016)	Short Term (1-5 years)	Intermediate Term (6-10 years)	Long Term (11-20 years)	Long Term – Parallel Runway
Percent Capacity	41.5%	45.2%	49.0%	55.7%	33.5%
Delay					
Per Operation (Minutes)	0.28	0.30	0.35	0.41	0.20
Total Annual (Hours)	267	298	369	483	236

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

Current annual delay is estimated at 0.28 minutes per aircraft operation or 267 annual hours. Analysis of delay factors for the long term planning horizon indicates that annual delays can be expected to reach 0.41 minutes per aircraft operation, or 483 annual hours. The addition of a parallel runway in a long term scenario would reduce delay to 0.20 minutes per aircraft operation or 236 annual hours.

CAPACITY ANALYSIS CONCLUSION

Exhibit 3B compares ASV to existing and forecast operational levels at MFE. The 2016 operations level equated to 41.5 percent of the airfield's ASV. By the long term planning horizon, total annual operations are expected to represent 55.7 percent of ASV. A parallel runway long term scenario would increase MFE's airfield capacity resulting in operations representing 33.5 percent of ASV.

FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems*, indicates that improvements for airfield capacity purposes should be considered when operations reach 60 to 75 percent of the ASV. This is an approximate level to begin the detailed planning of capacity improvements. When 80 percent of the ASV is reached, capacity improvement projects should become higher priority capital improvements. According to this analysis, operations levels at MFE are not anticipated to reach these percentages in the next 20 years. However, to ensure the airfield has the capability to continue to serve uninterrupted commercial, GA, and military operations, previous planning has recommended the construction of a parallel runway. This study carries forward that recommendation so that it can be considered and evaluated based upon current conditions and potential future use of the Airport.

Actual implementation of capacity improvements may be deferred until such time that the improvement is considered timely and cost-beneficial. An example of a capacity improvement could include relatively minor improvements such as additional taxiway exits to more substantial improvements such as a parallel runway. While additional taxiway exits can improve capacity, they generally do not significantly reduce delay. The Master Plan will further evaluate the potential for a parallel runway and its associated airfield requirements in the following sections.

AIRFIELD FACILITY REQUIREMENTS

Airfield facilities include those facilities related to the arrival, departure, and ground movement of aircraft. The adequacy of existing airfield facilities at MFE has been analyzed from many perspectives, including:

- Runways
- Safety Area Design Standards
- Runway Separation Standards
- Taxiways
- Navigational and Approach Aids
- Airfield Lighting, Marking, and Signage

Airfield facility requirements are based primarily upon the Runway Design Code (RDC) for the Airport. Analysis in Chapter Two identified the Boeing 737-800/900 and the Boeing 757-200 as the current critical design aircraft resulting in an existing RDC of D-IV-2400. The ultimate critical design aircraft include the Boeing 737-800/900 and the Boeing 767-300 freighter resulting in an ultimate RDC of D-IV-2400. Since the RDC does not change from the existing and ultimate condition, the same design standards will apply throughout the planning period. Furthermore, the evaluation of a future parallel runway will apply the same RDC standards since its purpose is to provide a redundant level of service.

RUNWAYS

Runway conditions such as orientation, length, width, and pavement strength at MFE were analyzed. From this information, requirements for runway improvements were determined for the Airport.

Runway Orientation

For the operational safety and efficiency of an airport, it is desirable for the primary runway to be oriented as close as possible to the direction of the prevailing wind. This reduces the impact of wind components perpendicular to the direction of travel of an aircraft that is landing or taking off. Runway 14-32 at MFE is orientated in a northwest/southeast manner. Runway 18-36 is oriented in a north/south manner.

FAA AC 150/5300-13A, *Airport Design,* recommends that a crosswind runway be made available when the primary runway orientation provides for less than 95 percent wind coverage for specific crosswind components. The 95 percent wind coverage is based on the crosswind component not exceeding 10.5 knots (12 mph) for Runway Design Code (RDC) A-I and B-I; 13 knots (15 mph) for RDC A-II and B-II; and 16 knots (18 mph) for RDC A-III, B-III, C-I through C-III, and D-I through D-III.

Weather data specific to the Airport was obtained from the National Oceanic Atmospheric Administration (NOAA) National Climatic Data Center. This data was collected from the on-field ASOS over a continuous period from 2007 to 2016. A total of 111,252 observations of wind direction and other data points were made. Of the total number of observations, 12,100 were made in IFR conditions. As previously detailed, IFR conditions exist when the visibility is below three miles or the cloud ceilings are below 1,000 feet.

Exhibit 3C presents both the all-weather and IFR wind rose for the Airport. A wind rose is a graphic tool that gives a succinct view of how wind speed and direction are historically distributed at a particular location. The table at the top of each wind rose indicates the percent of wind coverage for the runway and specific wind intensity. In all-weather conditions, Runway 14-32 provides 97.24 percent wind coverage for 10.5 knot crosswinds, 98.75 percent coverage at 13 knots, 99.69 percent at 16 knots, and 99.93 percent at 20 knots. Under IFR conditions, the crosswind component coverages for the runway system are similar to the all-weather conditions and include 96.52 percent wind coverage for 10.5 knot crosswinds, 98.00 percent coverage at 13 knots, 99.20 percent at 16 knots, and 99.75 percent at 20 knots.

Based upon this analysis, a crosswind runway at MFE is not necessary to support predominant winds as set forth by FAA standards. According to ATCT controllers, Runway 18-36 is used for approximately one percent of operations. Previous planning has included the closure of Runway 18-36 due to its limited use and utility. This Master Plan will further consider the closure of Runway 18-36 while maintaining the existing orientation of Runway 14-32.

Runway Length

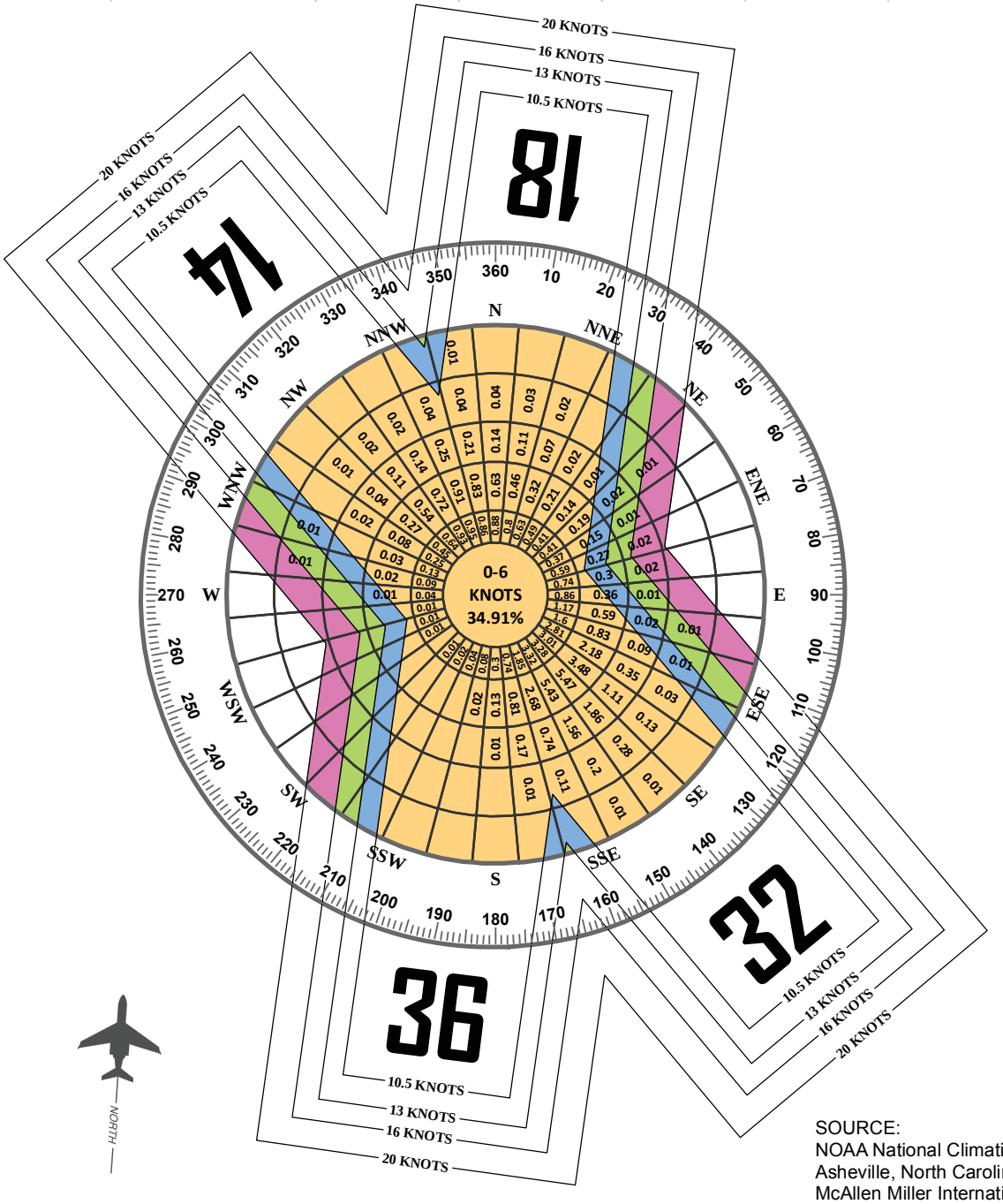
FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*, provides guidance for determining runway length needs. A draft revision to this AC is currently available (150/5325-4C) and the FAA is utilizing the draft revision in most cases when evaluating runway length needs for airports.

The determination of runway length requirements for MFE is based on five primary factors:

- Mean maximum temperature of the hottest month
- Airport elevation
- Runway gradient
- Critical aircraft type expected to use the runway
- Stage length of the longest nonstop destination (specific to larger aircraft)

Aircraft performance declines as elevations, temperature, and runway gradient factors increase. For MFE, the mean maximum daily temperature of the hottest month is 98.1 degrees Fahrenheit (F), which occurs in August. The Airport's elevation is 107 feet above mean sea level (MSL). The runway elevation difference is approximately six feet for Runway 14-32, which equates to a 0.1 percent gradient change. The gradient of the runway conforms to FAA design standards.

ALL WEATHER WIND COVERAGE				
Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 14-32	97.24%	98.75%	99.69%	99.93%
Runway 18-36	83.83%	92.36%	98.01%	99.72%
All Runways	98.96%	99.67%	99.93%	99.99%



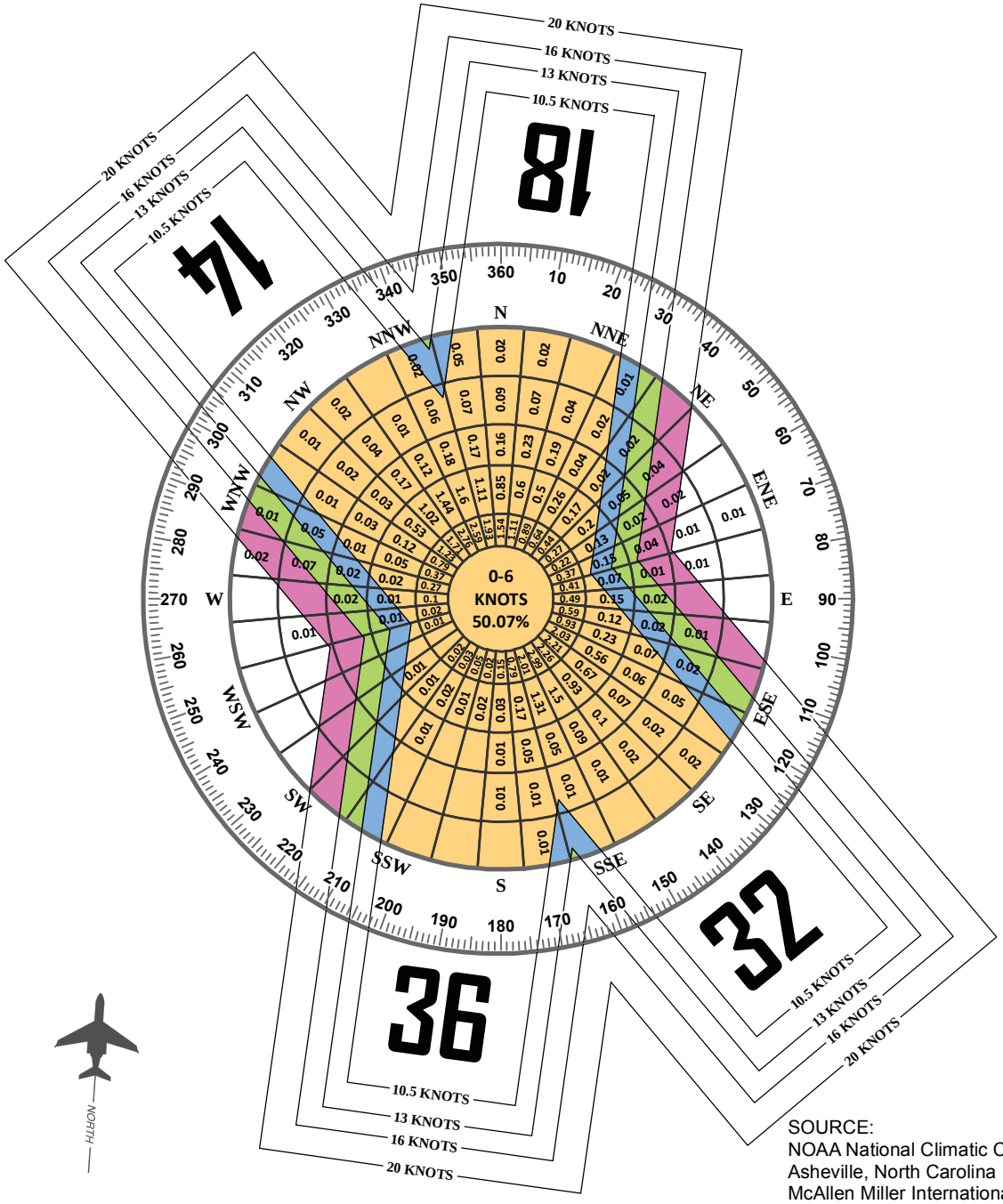
Magnetic Declination
04° 13' 00" East (April 2017)
Annual Rate of Change
00° 07' 00" West (April 2017)

SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
McAllen Miller International Airport
McAllen, TX

OBSERVATIONS:
111,252 All Weather Observations
Jan. 1, 2007 - Dec, 31 2016

IFR WIND COVERAGE

Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 14-32	96.52%	98.00%	99.20%	99.75%
Runway 18-36	95.10%	97.72%	99.13%	99.59%
All Runways	99.06%	99.55%	99.82%	99.96%



SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
McAllen Miller International Airport
McAllen, TX

OBSERVATIONS:
12,100 IFR Observations
Jan. 1, 2007 - Dec, 31 2016

Magnetic Declination
04° 13' 00" East (April 2017)
Annual Rate of Change
00° 07' 00" West (April 2017)

Airplanes operate on a wide variety of available runway lengths. Many factors will govern the suitability of those runway lengths for aircraft, such as elevation, temperature, wind, aircraft weight, wing flap settings, runway condition (wet or dry), runway gradient, vicinity airspace obstructions, and any special operating procedures. Airport operators can pursue policies that can maximize the suitability of the runway length. Policies such as area zoning and height and hazard restrictions can protect an airport's runway length. Airport ownership (fee simple or easement) of land leading to the runway ends can reduce the possibility of natural growth or man-made obstructions. Planning of runways should include an evaluation of aircraft types expected to use the airport or a particular runway now and in the future. Future plans should be realistic and supported by the FAA approved forecasts and should be based on the critical design aircraft (or family of aircraft).

General Aviation Aircraft

The majority of operations at MFE are conducted using smaller GA aircraft weighing less than 12,500 pounds. Following guidance from AC 150/5325-4B, to accommodate 100 percent of these small aircraft, a runway length of 3,800 feet is recommended. For small aircraft with 10 or more passenger seats, 4,400 feet of runway length is recommended.

For aircraft weighing more than 12,500 pounds but less than 60,000 pounds, including most small to mid-sized business jet aircraft, runway length requirements have also been calculated. These calculations take into consideration the runway gradient and landing length requirements for contaminated runways (wet). Business jets tend to need greater runway length when landing on a wet surface because of their increased approach speeds. AC 150/5325-4B stipulates that runway length determination for business jets consider a grouping of airplanes with similar operating characteristics. The AC provides two separate "family groupings of airplanes," each based upon their representative percentage of aircraft in the national fleet. The first grouping is those business jets that make up 75 percent of the national fleet, and the second group is those making up 100 percent of the national fleet. **Table 3F** presents a partial list of common aircraft in each aircraft grouping. A third group considers business jets weighing more than 60,000 pounds. Runway length determination for these aircraft must be based on the performance characteristics of the individual aircraft.

TABLE 3F
Business Jet Categories for Runway Length Determination

75 percent of the national fleet	MTOW (lbs.)	75-100 percent of the national fleet	MTOW (lbs.)	Greater than 60,000 pounds	MTOW (lbs.)
Lear 35	20,350	Lear 55	21,500	Gulfstream II	65,500
Lear 45	20,500	Lear 60	23,500	Gulfstream IV	73,200
Cessna 550	14,100	Hawker 800XP	28,000	Gulfstream V	90,500
Cessna 560XL	20,000	Hawker 1000	31,000	Global Express	98,000
Cessna 650 (VII)	22,000	Cessna 650 (III/IV)	22,000		
IAI Westwind	23,500	Cessna 750 (X)	36,100		
Beechjet 400	15,800	Challenger 604	47,600		
Falcon 50	18,500	IAI Astra	23,500		

MTOW: Maximum Take-Off Weight

Source: FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*

Table 3G presents the results of the runway length analysis for business jets developed following the guidance provided in AC 150/5325-4B. To accommodate 75 percent of the business jet fleet at 60 percent useful load, a runway length of 5,600 feet is recommended. This length is derived from a raw length of 4,800 feet that is adjusted, as recommended, for runway gradient and consideration of landing length needs on a contaminated runway (wet and slippery). To accommodate 100 percent of the business jet fleet at 60 percent useful load, a runway length of 6,900 feet is recommended.

Utilization of the 90 percent category for runway length determination is generally not considered by the FAA unless there is a demonstrated need at an airport. This could be documented activity by a business jet operator that flies out frequently with heavy loads. To accommodate 75 percent of the business jet fleet at 90 percent useful load, a runway length of 8,500 feet is recommended. To accommodate 100 percent of business jets at 90 percent useful load, a runway length of 11,200 feet is recommended.

TABLE 3G
Runway Length Requirements
McAllen International Airport

Airport Elevation	107 feet above mean sea level
Average High Monthly Temp.	98.1 degrees F (August)
Runway Gradient	6' Runway 14-32

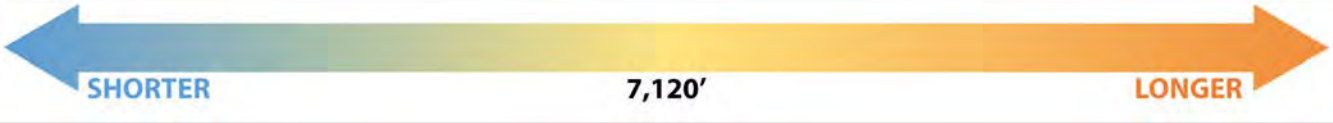
Fleet Mix Category	Raw Runway Length from FAA AC	Runway Length with Gradient Adjustment (+60')	Wet Surface Landing Length for Jets (+15%)	Final Runway Length
100% of small airplanes	3,800’	N/A	N/A	3,800’
100% of small airplanes (10+ seats)	4,400’	N/A	N/A	4,400’
75% of fleet at 60% useful load	4,800’	4,860’	5,589’	5,600’
100% of fleet at 60% useful load	5,900’	5,960’	6,854’	6,900’
75% of fleet at 90% useful load	7,300’	7,360’	8,464’	8,500’
100% of fleet at 90% useful load	9,700’	9,760’	11,224’	11,200’

Source: FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*

Another method to determine runway length requirements for jet aircraft at MFE is to examine aircraft flight planning manuals under conditions specific to the Airport. Several aircraft were analyzed for takeoff length required with a design temperature of 98.1 degrees F at a field elevation of 107 feet MSL. **Table 3H** provides a detailed runway takeoff length analysis for the most common business jet and turboprop aircraft in the national fleet. This data was obtained from Ultranav software which computes operational parameters for specific aircraft based on flight manual data. The analysis includes the maximum takeoff weight (MTOW) allowable and the percent useful load from 60 percent to 100 percent. The figures are shaded from blue to orange based upon their proximity to the current length of Runway 14-32 (7,120 feet), with darker orange figures exceeding the current runway length. This analysis shows that Runway 14-32 is capable of accommodating all but two aircraft at 90 percent useful load and six aircraft at 100 percent useful load. The average takeoff length needed for all business jets analyzed at 100 percent useful load is 5,900 feet.

TABLE 3H
Business Aircraft Takeoff Length Requirements
McAllen International Airport

Aircraft Name	MTOW lbs.	Takeoff Length Requirements (feet)				
		Useful Load				
		60%	70%	80%	90%	100%
King Air C90B	10,100	2,680	2,880	3,090	3,309	3,539
Citation CJ3	13,870	2,894	3,100	3,331	3,575	3,848
King Air 200 GT	12,500	3,395	3,503	3,615	3,733	3,856
Citation I/SP	11,850	2,892	3,140	3,403	3,681	3,976
Citation (525A) CJ2	12,375	3,263	3,530	3,812	4,088	4,368
King Air 350	15,000	3,474	3,615	3,778	4,042	4,368
Citation Mustang	8,645	2,901	3,198	3,528	3,962	4,376
Citation Encore	16,630	3,112	3,427	3,755	4,101	4,510
Citation Encore Plus	16,830	3,134	3,461	3,793	4,154	4,549
Citation 560 XL	20,000	3,521	3,804	4,086	4,441	4,829
Citation Bravo	14,800	3,626	3,902	4,204	4,555	4,943
Beechjet 400A	16,300	4,026	4,332	4,650	4,983	5,358
Citation (525) CJ1	10,600	3,626	4,110	4,604	5,094	5,603
Premier 1A	12,500	3,945	4,372	4,864	5,359	5,839
Gulfstream G350	70,900	4,200	4,563	4,964	5,410	5,885
Hawker 900 XP	28,000	4,391	4,608	4,995	5,449	5,938
Hawker 4000	39,500	4,321	4,693	5,091	5,526	6,078
Lear 31A	17,000	3,883	4,209	4,568	4,963	6,079
Gulfstream IIB	69,700	4,358	4,814	5,285	5,770	6,268
Global 5000	92,500	4,350	4,834	5,342	5,873	6,427
Gulfstream G150	26,100	5,003	5,270	5,512	6,023	6,560
Gulfstream G450	74,600	4,500	4,946	5,447	5,982	6,573
Gulfstream IV/SP	74,600	4,575	5,039	5,528	6,052	6,614
Falcon 7X	70,000	4,421	4,909	5,437	6,016	6,633
Citation X	35,700	4,661	5,087	5,583	6,109	6,656
Gulfstream G100	24,650	4,906	5,436	6,008	6,575	7,138
Global XRS	98,000	4,749	5,316	5,913	6,539	7,410
Gulfstream G550	91,000	4,629	5,294	5,952	6,669	7,439
Lear 60	23,500	5,187	5,707	6,288	6,802	7,450
Challenger 601	45,100	4,970	5,530	6,160	6,840	7,630
Hawker 800	27,400	5,453	6,078	6,816	7,655	7,999
Gulfstream G200	35,450	5,484	6,153	6,894	7,996	8,592
Average Takeoff Length		**4,200**	**4,500**	**5,000**	**5,500**	**5,900**



Runway length calculation assumptions: 107' MSL field elevation; 98° F ambient temperature; 0.1% runway grade.
MTOW - Maximum Takeoff Weight
Source: Ultranav software

Table 3J presents the runway length required for landing under three operational categories: Title 14 Code of Federal Regulations (CFR) Part 25, CFR Part 135, and CFR Part 91k. CFR Part 25 operations are those conducted by individuals or companies which own their aircraft. CFR Part 91k includes operations in fractional ownership which utilize their own aircraft under direction of pilots specifically assigned to said aircraft. CFR Part 135 applies to all for-hire charter operations, including most fractional ownership operations. The landing length analysis shows an average landing length of 5,500 feet for aircraft oper-

ating under CFR Part 91k during wet runway conditions and an average of 7,300 feet for aircraft operating under Part 135 during wet runway conditions. Certain aircraft, such as several Gulfstream and Cessna Citation series aircraft, require over 9,000 feet of runway length for landing when operating at maximum landing weight under Part 135 during wet runway conditions.

TABLE 3J
Business Aircraft Landing Length Requirements
McAllen International Airport

		Landing Length Requirements (feet)					
		CFR Part 25		CFR Part 91K		CFR Part 135	
Aircraft Name	MLW lbs.	Dry	Wet	Dry	Wet	Dry	Wet
King Air 200 GT	12,500	1,204	N/A	1,505	N/A	2,007	N/A
King Air C90B	9,600	1,245	N/A	1,556	N/A	2,075	N/A
King Air 350	15,000	2,854	N/A	3,568	N/A	4,757	N/A
Citation I/SP	11,350	2,404	2,765	3,005	3,456	4,007	4,608
Westwind II	19,000	2,410	2,770	3,013	3,463	4,017	4,617
Westwind I	19,000	2,490	2,860	3,113	3,575	4,150	4,767
Global 5000	78,600	2,677	3,078	3,346	3,848	4,462	5,130
Global XRS	78,600	2,677	3,078	3,346	3,848	4,462	5,130
Falcon 7X	62,400	2,926	3,365	3,658	4,206	4,877	5,608
Citation Mustang	8,000	2,528	3,543	3,160	4,429	4,213	5,905
Gulfstream IV/SP	66,000	3,185	3,663	3,981	4,579	5,308	6,105
Gulfstream G350	66,000	3,266	3,756	4,083	4,695	5,443	6,260
Hawker 4000	33,500	3,251	3,769	4,064	4,711	5,418	6,282
Hawker 800 (Non-T/R)	23,350	2,950	3,800	3,688	4,750	4,917	6,333
Hawker 900 XP	23,350	2,659	3,924	3,324	4,905	4,432	6,540
Citation (525) CJ1	9,800	2,913	3,942	3,641	4,928	4,855	6,570
Challenger 601	36,000	3,327	3,993	4,159	4,991	5,545	6,655
Gulfstream G200	30,000	3,558	4,091	4,448	5,114	5,930	6,818
Citation CJ3	12,750	3,063	4,173	3,829	5,216	5,105	6,955
Lear 31A	16,000	3,031	4,243	3,789	5,304	5,052	7,072
Premier 1A	11,600	3,387	4,353	4,234	5,441	5,645	7,255
Lear 35A	15,300	3,264	4,570	4,080	5,713	5,440	7,617
Gulfstream G150	21,700	3,126	4,596	3,908	5,745	5,210	7,660
Citation Encore	15,200	3,075	4,623	3,844	5,779	5,125	7,705
Citation Encore Plus	15,200	3,076	4,682	3,845	5,853	5,127	7,803
Citation (525A) CJ2	11,500	3,236	4,696	4,045	5,870	5,393	7,827
Lear 60	19,500	3,620	4,890	4,525	6,113	6,033	8,150
Gulfstream G550	75,300	2,778	5,052	3,473	6,315	4,630	8,420
Citation X	31,800	3,863	5,508	4,829	6,885	6,438	9,180
Beechjet 400A	15,700	3,734	5,522	4,668	6,903	6,223	9,203
Citation 560 XL	18,700	3,470	5,524	4,338	6,905	5,783	9,207
Citation Bravo	13,500	3,608	5,563	4,510	6,954	6,013	9,272
Gulfstream G450	66,000	3,266	5,635	4,083	7,044	5,443	9,392
Citation III	19,000	4,142	5,952	5,178	7,440	6,903	9,920
Gulfstream G100	20,700	3,164	5,974	3,955	7,468	5,273	9,957
Gulfstream IIB	58,500	3,182	6,099	3,978	7,624	5,303	10,165
Average Landing Length		**3,100**	**4,400**	**3,900**	**5,500**	**5,200**	**7,300**

Runway length calculation assumptions: 107' MSL field elevation; 98° F ambient temperature; 0.1% runway grade.
MLW – Maximum Landing Weight
N/A – Not Applicable
Source: *Ultranav software*

As previously noted, the FAA will typically only support runway length planning to the 60 percent useful load factor unless it can be demonstrated that business jets are frequently operating fully loaded (90 percent). Most business aircraft are capable of taking off on the primary runway at MFE at or above 90 percent useful load. For landing situations, the analysis shows that several aircraft, when operating under Part 135 rules and wet runway conditions, require additional runway length. In addition, three aircraft require additional runway length when landing under Part 91k rules and wet runway conditions; however, these include out of production models including the Gulfstream IIB and the Citation III. Newer generation business aircraft tend to operate more efficiently, requiring shorter runway lengths.

Commercial Aircraft

Runway length needs for commercial service aircraft must factor the local operating conditions described above and the load carried. The aircraft load is dependent upon the payload of passengers and/or cargo, plus the amount of fuel it has on board. For departures, the amount of fuel varies depending upon the length of non-stop flight or trip length.

The current MFE commercial (airline and air cargo) fleet mix includes regional jets and narrow body aircraft that include the new generation of the Boeing 737 (700/800/900), the Airbus A319/320, and the Boeing 757-200. An analysis in Chapter Two considered the potential introduction of enhanced commercial activity at MFE in the future, including the utilization of larger commercial service aircraft. **Table 3K** presents the runway length needs for various commercial jet aircraft utilizing each aircraft's operating manual and adjusting for the mean maximum temperature of 98.1 degrees F.

This analysis shows that all of these aircraft are capable of operating at 60 percent useful load on the current runway length. At 70 and 80 percent useful loads, the Boeing 737-900 and the Boeing 767-300 freighter require additional runway length. At 90 and 100 percent useful loads, several aircraft require additional runway length to operate at MTOW. The average length needs are 6,400 feet at 80 percent useful load, 7,200 feet at 90 percent useful load, and 8,100 feet at 100 percent useful load. According to this analysis, the Boeing 767-300 freighter, which is forecast to operate at MFE more frequently in the future, is the most demanding aircraft, needing up to 11,500 feet at 100 percent useful load.

Runway Length Summary

Many factors are considered when determining appropriate runway length for safe and efficient operations of aircraft at MFE. The Airport should strive to accommodate commercial service aircraft and business jets to the greatest extent possible as demand would dictate. Runway 14-32 is currently 7,120 feet long and can accommodate a large majority of business jets and commercial aircraft currently operating at MFE, especially with shorter trip lengths and during cool to warm temperatures. The analysis shows that during hot days and at useful loads of 90 percent or greater, more aircraft are subject to weight restrictions. The furthest non-stop commercial destination is Los Angeles (LAX), at 1,145 nautical miles (nm), which is conducted with Airbus A319 equipment. The A319 and the A320 both can operate on the current runway length at 100 percent useful load. The current critical design aircraft, Boeing 737-

800/900 is weight restricted during hot days; however, these aircraft typically do not operate at 100 percent useful load as their haul lengths are less than 500 nm so full loads of fuel are not needed. The Boeing 757-200 is utilized for flights to Las Vegas (LAS), at 1,050 nm, which is only approximately 27 percent of the aircraft's maximum range, so it also does not typically operate at 100 percent useful load. The ultimate critical design aircraft, the Boeing 767-300 freighter, which are utilized by air cargo operators such as UPS, also requires additional runway length during hot days and at higher useful loads. Its maximum range is 3,225 nm, which is well beyond the haul to UPS' primary hub in Louisville at 958 nm; however, it is possible that it could operate to different destinations and at higher useful loads.

TABLE 3K
Commercial Aircraft Takeoff Length Requirements
McAllen International Airport

Aircraft Name	MTOW lbs.	Takeoff Length Requirements (feet)				
		Useful Load				
		60%	70%	80%	90%	100%
Airbus A319	145,505	4,000	4,200	4,400	4,600	4,900
Embraer ERJ-170	79,344	3,800	4,200	4,500	5,300	5,600
Airbus A320	157,630	4,400	4,700	5,300	5,800	6,100
Bombardier CRJ-700	75,000	4,500	4,800	5,300	6,100	6,200
Boeing 767-200	315,000	4,700	5,100	5,600	6,100	6,600
Bombardier CRJ-900	82,500	5,300	5,800	6,200	6,700	7,300
DC-9-15f	90,700	5,300	5,700	6,400	7,000	7,700
Embraer ERJ-190	110,892	4,800	5,500	6,600	7,600	8,400
Boeing 757-200	240,000	5,500	5,800	6,400	7,100	8,400
Embraer ERJ-145	48,502	4,500	5,200	6,500	7,300	8,400
Boeing 757-300	255,000	5,500	6,100	6,800	7,600	8,500
Boeing 737-800	174,200	5,500	6,100	6,700	7,400	8,700
MD-83	160,000	5,400	5,800	6,800	7,600	9,100
Boeing 727-200	172,000	5,500	6,400	7,100	8,600	9,400
Boeing 737-900	174,200	6,400	7,200	8,600	9,300	10,500
Boeing 737-700	154,500	5,300	6,100	7,000	8,600	10,700
Boeing 767-300F	412,000	6,100	6,800	7,800	9,400	11,500
Average Takeoff Length		**5,100**	**5,600**	**6,400**	**7,200**	**8,100**

Runway length calculation assumptions: 107' MSL field elevation; 98° F ambient temperature; 0.1% runway grade.
MTOW - Maximum Takeoff Weight
Source: Aircraft Planning Manuals adjusted for maximum ambient temperature of 98° F.

Justification for any runway extension to meet the needs of commercial or business jets would require regular use on the order of 500 annual itinerant operations. This is the minimum threshold required to obtain FAA grant funding assistance. The existing length of Runway 14-32 does not fully provide for all jet activity, especially during hot weather conditions and when jet aircraft are carrying full useful loads. The current MFE ALP includes a Runway 14-32 extension to 10,331 feet to accommodate the needs of larger aircraft. The ALP also plans a future parallel runway at a length of 8,000 feet. **Analysis in the**

next chapter will examine potential runway extensions that could be achieved at MFE to better accommodate the needs of larger aircraft during the 20-year planning period of this Master Plan. The runway length analysis will evaluate extension scenarios on the existing runway and examine a preferred length on the potential parallel runway to best meet the planned mix of aircraft.

Runway 18-36 is ultimately planned to be closed and therefore should be maintained at its current length until it is decommissioned.

Runway Width

Runway width design standards are primarily based on the critical aircraft, but can also be influenced by the visibility minimums of published instrument approach procedures. For Runway 14-32, RDC D-IV design criteria stipulate a runway width of 150 feet. The current width of Runway 14-32 is 150 feet. It is recommended that the current width on Runway 14-32 be maintained in the future.

Similar to the existing runway, the width of a potential parallel runway would need to be based on the planned critical aircraft. Ultimate planning for a potential parallel runway should consider up to RDC D-IV standards necessitating a runway width of 150 feet. These considerations will be further explored in the next chapter.

Runway Pavement Strength

An important feature of airfield pavement is its ability to withstand repeated use by aircraft. The FAA reports the pavement strength for Runway 14-32 at 90,000 pounds single wheel loading (SWL), 190,000 pounds dual wheel loading (DWL), and 280,000 pounds double tandem wheel loading (DTWL). These strength ratings refer to the configuration of the aircraft landing gear. For example, SWL indicates an aircraft with a single wheel on each landing gear.

The strength rating of a runway does not preclude aircraft weighing more than the published strength rating from using the runway. The strength is based on design parameters which support a high volume of aircraft at or below the published weight, allowing the pavement to survive its intended useful life. Aircraft weighing more than the published weight could damage the runway in severe conditions, but more likely will simply reduce the life cycle of the pavement.

All federally obligated airports must remain open to the public, and it is typically up to the pilot of the aircraft to determine if a runway can support their aircraft safely. An airport sponsor cannot restrict an aircraft from using the runway simply because its weight exceeds the published strength rating. On the other hand, an airport sponsor has an obligation to properly maintain the runway and protect the useful life of the runway, typically for 20 years.

According to the FAA publication, *Airport/Facility Directory*, "Runway strength rating is not intended as a maximum allowable weight or as an operating limitation. Many airport pavements are capable of

supporting limited operations with gross weights in excess of the published figures." The directory goes on to say that those aircraft exceeding the pavement strength should contact the airport sponsor for permission to operate at the airport.

The strength rating of a runway can change over time. Regular usage by heavier aircraft can decrease the strength rating, while periodic runway resurfacing or other maintenance methods can increase the strength rating. The current runway strength is adequate to accommodate the aircraft that currently operate at the Airport and most that are forecast to utilize the Airport in the future. The current ALP calls for an ultimate pavement design strength of 450,000 pounds DTWL for the existing runway and 280,000 pounds DTWL for the proposed parallel runway. These strength levels are needed to accommodate regular operations by aircraft, such as the Boeing 767-300 freighter, which has a maximum take-off weight of 412,000 pounds. As such, future consideration should be given to increasing the pavement strength of Runway 14-32 and planning the future parallel runway to accommodate these heavier aircraft.

SAFETY AREA DESIGN STANDARDS

The FAA has established several imaginary surfaces to protect aircraft operational areas and keep them free from obstructions. These include the runway safety area (RSA), runway object free area (ROFA), runway obstacle free zone (ROFZ), and runway protection zone (RPZ).

The entire RSA, ROFA, and ROFZ must be under the direct ownership of the airport sponsor to ensure these areas remain free of obstacles and can be readily accessed by maintenance and emergency personnel. RPZs should also be under airport ownership. An alternative to outright ownership of the RPZ is the purchase of avigation easements (acquiring control of designated airspace within the RPZ) or having sufficient land use control measures in places which ensure the RPZ remains free of incompatible development. The various airport safety areas are presented on **Exhibit 3D**.

Dimensional standards for the various safety areas associated with the runway are a function of the type of aircraft using or expected to use the runway as well as the instrument approach capability. As previously identified, the current critical design aircraft is classified as D-IV. The future design aircraft should remain in D-IV. **Table 3L** presents the FAA design standards as they apply to Runway 14-32 at MFE both now and in the future and Runway 18-36. The potential for a future parallel runway will also be examined during this Master Plan.

TABLE 3L
Runway Design Standards
McAllen International Airport

	Existing/Ultimate Runway 14-32 & Potential Parallel Runway	Runway 18-36
Runway Design Code	D-IV	A-I (Small Airplane Exclusive)
Visibility Minimums	½-mile (Rwy 14) / ¾-mile (Rwy 32)	Visual
RUNWAY DESIGN		
Runway Width	150	60
RUNWAY PROTECTION		
Runway Safety Area (RSA) Width Length Beyond Departure End Length Prior to Threshold	 500 1,000 600	 120 240 240
Runway Object Free Area (ROFA) Width Length Beyond Departure End Length Prior to Threshold	 800 1,000 600	 250 240 240
Runway Obstacle Free Zone (ROFZ) Width Length Beyond End	 400 200	 250 200
Precision Obstacle Free Zone (POFZ) Width Length	 800 200	 N/A N/A
Approach Runway Protection Zone (RPZ) Length Inner Width Outer Width	 2,500 / 1,700 1,000 / 1,000 1,750 / 1,510	 1,000 250 450
Departure Runway Protection Zone (RPZ) Length Inner Width Outer Width	 1,700 / 1,700 500 / 500 1,010 / 1,010	 1,000 250 450
RUNWAY SEPARATION		
Runway Centerline to: Holding Position Parallel Taxiway Aircraft Parking Area	 251[a] 400 500	 125 150 125

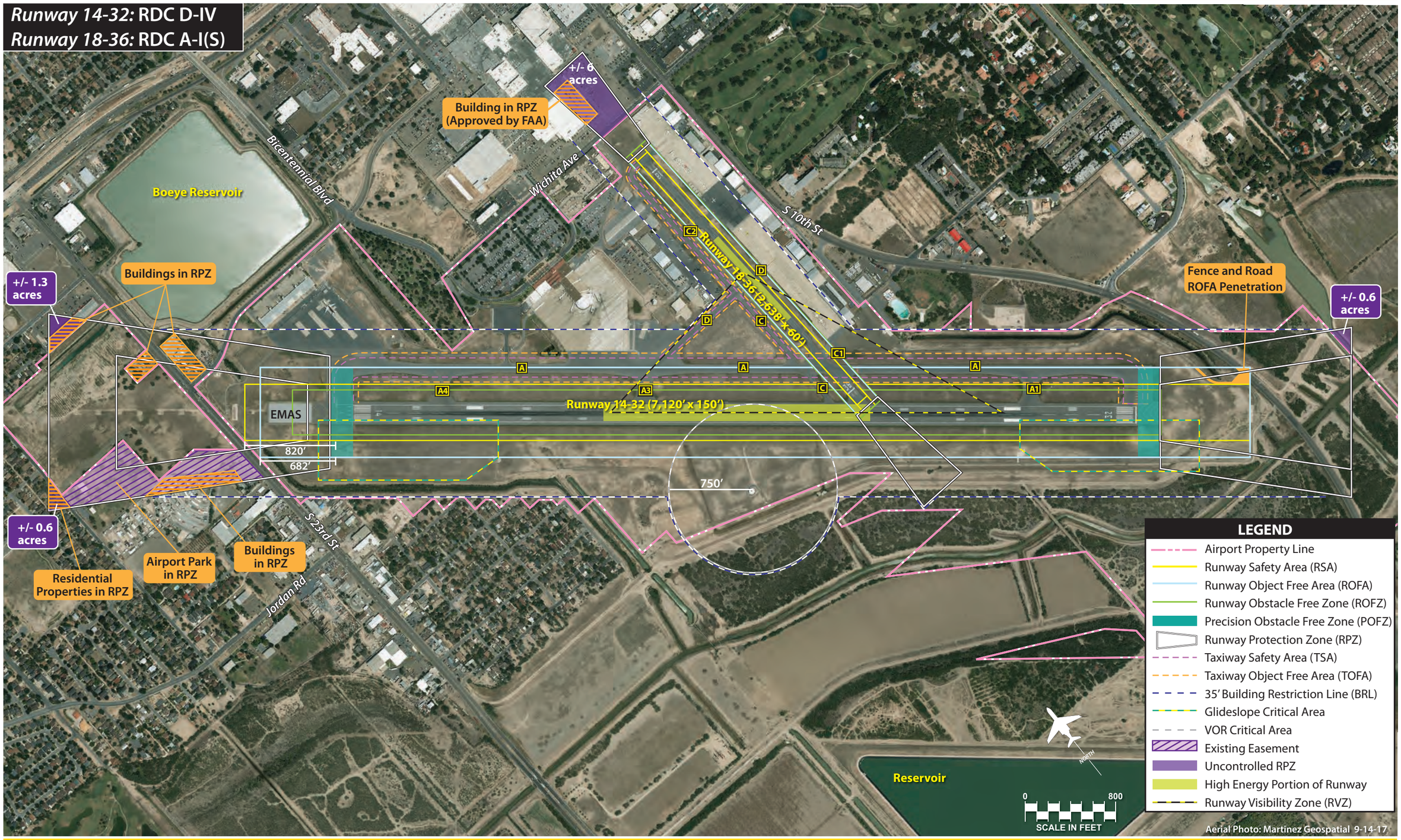
[a] This distance is increased one foot for each 100 feet above sea level.
Note: All dimensions in feet
N/A – Not applicable

Source: FAA AC 150/5300-13A, Change 1, Airport Design

Runway Safety Area

The RSA is defined in FAA AC 150/5300-13A, *Airport Design,* as a "surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of undershoot, overshoot, or

Runway 14-32: RDC D-IV
Runway 18-36: RDC A-I(S)



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excursion from the runway." The RSA is centered on the runway and dimensioned in accordance to the approach speed of the critical design aircraft using the runway. The FAA requires the RSA to be cleared and graded, drained by grading or storm sewers, capable of accommodating the design aircraft and fire and rescue vehicles, and free of obstacles not fixed by navigational purpose, such as runway edge lights or approach lights.

The FAA has placed a higher significance on maintaining adequate RSA at all airports. Under Order 5200.8, effective October 1, 1999, the FAA established the *Runway Safety Area Program.* The Order states, "The objective of the Runway Safety Area Program is that all RSAs at federally-obligated airports…shall conform to the standards contained in Advisory Circular 150/5300-13, *Airport Design*, to the extent practicable." Each Regional Airports Division of the FAA is obligated to collect and maintain data on the RSA for each runway at the airport and perform airport inspections.

For RDC D-IV design, the FAA calls for the RSA to be 500 feet wide and extend 1,000 feet beyond the runway ends. Only 600 feet of RSA is needed prior to the landing threshold on each runway end under RDC D-IV standards. Based upon these dimensions, the RSA for Runway 14-32 would extend over S. 23rd Street and the Airport's perimeter security fencing to the northwest of the Runway 14 threshold. Fencing and public roadways are generally considered obstructions to an RSA. To remedy the situation, the Airport has installed an Engineered Material Arresting System (EMAS) consisting of high energy absorbing materials of selected strength, which will reliably and predictably crush under the weight of an aircraft. EMAS is typically installed at airports, such as MFE, that cannot reasonably provide the full standard RSA. The EMAS bed at MFE is centered on the runway centerline beginning 200 feet beyond the end of the runway and has a length of 380 feet and a width of 170 feet. The EMAS bed provides a level of safety that is considered generally equivalent to a full RSA constructed to FAA design standards. As a result, the RSA extends 820 feet beyond the end of Runway 14 so that the fencing and S. 23rd Street are no longer considered obstructions. At the Runway 32 end, the RSA extends the full 1,000 feet beyond the end of the runway and includes no known obstructions.

The Runway 18-36 RSA is 120 feet wide and extends 240 feet beyond the end of the runway. The RSA at the south end of Runway 18-36 extends over the Runway 14-32 RSA, resulting in an RSA overlap condition. The FAA recommends RSA overlaps be avoided since work in the overlapping area can affect both runways. However, future plans include the closure of Runway 18-36, which will eliminate the RSA overlap. In the meantime, no action is recommended to address the RSA overlap condition. There are no other known RSA obstructions or non-standard RSA conditions associated with Runway 18-36.

Runway Object Free Area

The ROFA is "a two-dimensional ground area, surrounding runways, taxiways, and taxilanes, which is clear of objects except for objects whose location is fixed by function (i.e., airfield lighting)." The ROFA does not have to be graded and level like the RSA; instead, the primary requirement for the ROFA is that no object in the ROFA penetrates the lateral elevation of the RSA. The ROFA is centered on the runway, extending out in accordance to the critical design aircraft utilizing the runway.

For RDC D-IV design, the FAA calls for the ROFA to be 800 feet wide, extending 1,000 feet beyond each runway end. Similar to the RSA, only 600 feet is needed prior to the landing threshold. Runway 14-32 currently has a non-standard ROFA. On the Runway 14 end, due to the installation of the EMAS, the ROFA extends for only 682 feet beyond the runway end so that it does not extend over the Airport's perimeter fence and S. 23rd Street, which would be obstructions. On the Runway 32 end, the standard ROFA is obstructed by the perimeter service road, perimeter fencing, and S. 10th Street. To eliminate these obstructions, the ROFA extends only 314 feet beyond the end of the runway. The Alternatives analysis will consider corrective measures to provide a full standard ROFA for Runway 14-32.

RDC A-I(S) design standards call for the ROFA to be 250 feet wide and extend 240 feet beyond the end of the runway. There are no known obstructions to the ROFA.

Obstacle Free Zone

The ROFZ is an imaginary volume of airspace which precludes object penetrations, including taxiing and parked aircraft. The only allowance for ROFZ obstructions is navigational aids mounted on frangible bases which are fixed in their location by function, such as airfield signs. The ROFZ is established to ensure the safety of aircraft operations. If the ROFZ is obstructed, an airport's approaches could be removed or approach minimums could be increased.

The FAA's criterion for runways utilized by aircraft weighing more than 12,500 pounds requires a clear ROFZ to extend 200 feet beyond the runway ends and be 400 feet wide (200 feet on either side of the runway centerline). The ROFZ standards are met on Runway 14-32. The proposed parallel runway should also be designed to accommodate a 400-foot ROFZ width.

The applicable ROFZ dimensions for Runway 18-36, which serves small aircraft exclusively, including aircraft with approach speeds of 50 knots or more, is 250 feet wide and extending 200 feet beyond the runway end. The ROFZ standards are met on Runway 18-36.

A precision obstacle free zone (POFZ) is further defined for runway ends with a precision approach, such as the ILS approach to Runway 14. The POFZ is 800 feet wide, centered on the runway, and extends from the runway's displaced threshold to a distance of 200 feet. The POFZ is in effect when the following conditions are met:

a) The runway supports a vertically guided approach.
b) Reported ceiling is below 250 feet or visibility is less than ¾-mile.
c) An aircraft is on final approach within two miles of the runway threshold.

When the POFZ is in effect, a wing of an aircraft holding on a taxiway may penetrate the POFZ; however, neither the fuselage nor the tail may infringe on the POFZ. POFZ standards currently apply to Runway 14 as it is the only runway that allows for a vertically guided approach with instrument approach minimums below 250 feet or visibility minimums below ¾-mile.

Runway Protection Zone

The RPZ is a trapezoidal area centered on the runway, beginning 200 feet beyond the runway end. The RPZ has been established by the FAA to provide an area clear of obstructions and incompatible land uses, to enhance the protection of people and property on the ground. The RPZ is comprised of the central portion of the RPZ and the controlled activity area. The central portion of the RPZ extends from the beginning to the end of the RPZ, is centered on the runway, and is the width of the ROFA. The controlled activity area is any remaining portions of the RPZ. The dimensions of the RPZ vary per the visibility minimums serving the runway and the type of aircraft (design aircraft) operating on the runway.

While the RPZ is intended to be clear of incompatible objects or land uses, some uses are permitted with conditions and other land uses are prohibited. According to AC 150/5300-13A, the following land uses are permissible within the RPZ:

- Farming that meets the minimum buffer requirements,
- Irrigation channels as long as they do not attract birds,
- Airport service roads, as long as they are not public roads and are directly controlled by the airport operator,
- Underground facilities, as long as they meet other design criteria, such as RSA requirements, as applicable, and
- Unstaffed navigational aids (NAVAIDs) and facilities, such as required for airport facilities that are fixed by function in regard to the RPZ.

Any other land uses considered within RPZ land owned by the airport sponsor must be evaluated and approved by the FAA Office of Airports. The FAA has published *Interim Guidance on Land Uses within a Runway Protection Zone* (9.27.2012), which identifies several potential land uses that must be evaluated and approved prior to implementation. The specific land uses requiring FAA evaluation and approval include:

- Buildings and structures (Examples include, but are not limited to: residences, schools, churches, hospitals or other medical care facilities, commercial/industrial buildings, etc.)
- Recreational land use (Examples include, but are not limited to: golf courses, sports fields, amusement parks, other places of public assembly, etc.)
- Transportation facilities. Examples include, but are not limited to:
  - Rail facilities - light or heavy, passenger or freight
  - Public roads/highways
  - Vehicular parking facilities
- Fuel storage facilities (above and below ground)
- Hazardous material storage (above and below ground)
- Wastewater treatment facilities
- Above-ground utility infrastructure (i.e., electrical substations), including any type of solar panel installations.

The *Interim Guidance on Land within a Runway Protection Zone* states, "RPZ land use compatibility also is often complicated by ownership considerations. Airport owner control over the RPZ land is emphasized to achieve the desired protection of people and property on the ground. Although the FAA recognizes that in certain situations the airport sponsor may not fully control land within the RPZ, the FAA expects airport sponsors to take all possible measures to protect against and remove or mitigate incompatible land uses."

Currently, the RPZ review standards are applicable to any new or modified RPZ. The following actions or events could alter the size of an RPZ, potentially introducing an incompatibility:

- An airfield project (e.g., runway extension, runway shift),
- A change in the critical design aircraft that increases the RPZ dimensions,
- A new or revised instrument approach procedure that increases the size of the RPZ, and/or
- A local development proposal in the RPZ (either new or reconfigured).

Since the interim guidance only addresses a new or modified RPZ, existing incompatibilities are generally (but not always) grandfathered under certain circumstances. While it is still necessary for the airport sponsor to take all reasonable actions to meet the RPZ design standard, FAA funding priority for certain actions, such as relocating existing roads in the RPZ, will be determined on a case-by-case basis.

RPZs have been further designated as approach and departure RPZs. The approach RPZ is a function of the Aircraft Approach Category (AAC) and approach visibility minimums associated with the approach runway end. The departure RPZ is a function of the AAC and departure procedures associated with the runway. For a particular runway end, the more stringent RPZ requirements (usually associated with the approach RPZ) will govern the property interests and clearing requirements that the airport sponsor should pursue.

The RPZs associated with both runways are depicted on **Exhibit 3D** and described in **Table 3M**.

As shown in the table, approximately 18.36 acres (approximately 8.3 percent) of the RPZs associated with both runways are uncontrolled by the Airport. Whenever possible, the Airport should maintain positive control over the RPZs through fee simple acquisition; however, avigation easements can be pursued if fee simple acquisition is not feasible. Several incompatible land uses are located within the Runway 14 approach/departure RPZs (commercial buildings, residential properties, and a public park) and the Runway 18 RPZ (La Plaza Shopping Mall). Public roadways (S. 23rd Street and S. 10th Street) also pass through the Runway 14 and 32 RPZs; however, as previously stated, since this is an existing condition, the roadways are grandfathered if no other alterations to the runway are made. According to the current ALP, the FAA has previously approved the La Plaza Shopping Mall variance within the Runway 18 RPZ. The alternatives analysis will explore possible actions to ensure sponsor control over each RPZ and the removal/relocation of incompatible land uses within each. Since consideration of an extension to Runway 14-32 will be included in the alternatives analysis, possible rerouting of S. 23rd Street and S. 10th Street will also be considered to allow for a potential runway extension and to remove the public roads from the ultimate RPZs.

TABLE 3M
Runway Protection Zones (RPZ) Summary
McAllen International Airport

RPZ	Acres	Airport Owned/ Easement-Controlled Acres	Uncontrolled Acres	Notes/Incompatibilities
Runway 14 – Approach	78.914	74.754	4.16	Uncontrolled acres include the S. 23rd Street ROW and the outer corners. Incompatibilities include several commercial buildings, Airport Park, and residential properties.
Runway 14 – Departure	29.465	27.865	1.60	
Runway 32 – Approach	48.978	48.378	0.60	Uncontrolled acres include the San Juan Canal and undeveloped land. S. 10th Street is within Airport property.
Runway 32 – Departure	29.465	29.465	0.00	
Runway 18 – Approach	8.035	2.035	6.00	The approach and departure RPZ overlap. Includes a portion of the La Plaza Shopping Mall. This variance was approved by the FAA as part of a previous ALP Update. Wichita Avenue also passes through the RPZ.
Runway 18 – Departure	8.035	2.035	6.00	
Runway 36 – Approach	8.035	8.035	0.00	The approach and departure RPZ overlap. There are no incompatible land uses within this RPZ.
Runway 36 – Departure	8.035	8.035	0.00	
Totals	**218.962**	**200.602**	**18.36**	The Airport has ownership/easement control over 91.6% of its RPZs.

ROW | Right-of-way
Source: Coffman Associates analysis.

The proposed parallel runway should be planned for up to RDC D-IV aircraft served by a runway with not lower than ¾-mile visibility minimums. The corresponding RPZ has a dimension of 500-foot inner width, 700-foot outer width, extending 1,000 feet. Ultimate planning on the parallel runway should incorporate larger RPZs associated with lower than one mile visibility minimum approaches. Further examination of the RPZs associated with each runway end will be undertaken later in this study. The potential for instrument approach procedures and their effects on RPZ dimensions will also be considered.

RUNWAY SEPARATION STANDARDS

There are several other standards related to separation distances from runways. Each of these is designed to enhance the safety of the airfield.

Runway/Taxiway Separation

The design standard for the separation between runways and parallel taxiways is a function of the critical design aircraft and the instrument approach visibility minimum. The separation standard for RDC D-IV with lower than ¾-mile visibility minimums is 400 feet from the runway centerline to the parallel taxiway centerline. Parallel Taxiway A is 400 feet from Runway 14-32; therefore, the current location of the taxiway meets the design standard. The separation standard for RDC A-I(S) under visual conditions is

150 feet from the runway centerline to the parallel taxiway centerline. Taxiway C is 200 feet from the Runway 18-36 centerline so the existing condition exceeds the design standard.
Regarding a potential parallel runway in the future, any proposed parallel taxiway development should be at least 400 feet from the runway centerline in order to meet RDC D-IV standards.

Holding Position Separation

Holding position markings are placed on taxiways leading to runways. When instructed, pilots are to stop short of the holding position marking line. For Runway 14-32, holding position marking lines are situated at least 250 feet from the runway centerline. Runway 18-36 holding position markings are situated at distances ranging from 106 feet to 125 feet or greater.

According to FAA AC 150/5300-13A, Change 1, *Airport Design*, the holding position marking line location may need to be increased based on an airport's elevation and the RDC of the runway. For RDC D-IV, the holding position marking line should be increased one foot for every 100 feet above sea level. With MFE's elevation at 107 feet MSL, the holding position lines for Runway 14-32 should be increased to at least 251 feet from the runway centerline in order to meet RDC D-IV standards. Holding position markings associated with Runway 18-36 should be at least 125 feet from the runway centerline to meet RDC A-I(S) design standards. The holding position marking west of the intersection of Runway 18-36 and Taxiway A is located at a separation distance of approximately 106 feet (**Figure 3A**). It is recommended that this position be relocated to 125 feet to meet the design standard.

The holding position markings associated with a proposed parallel runway should be planned at least 251 feet from the runway centerline in order to meet RDC D-IV standards.

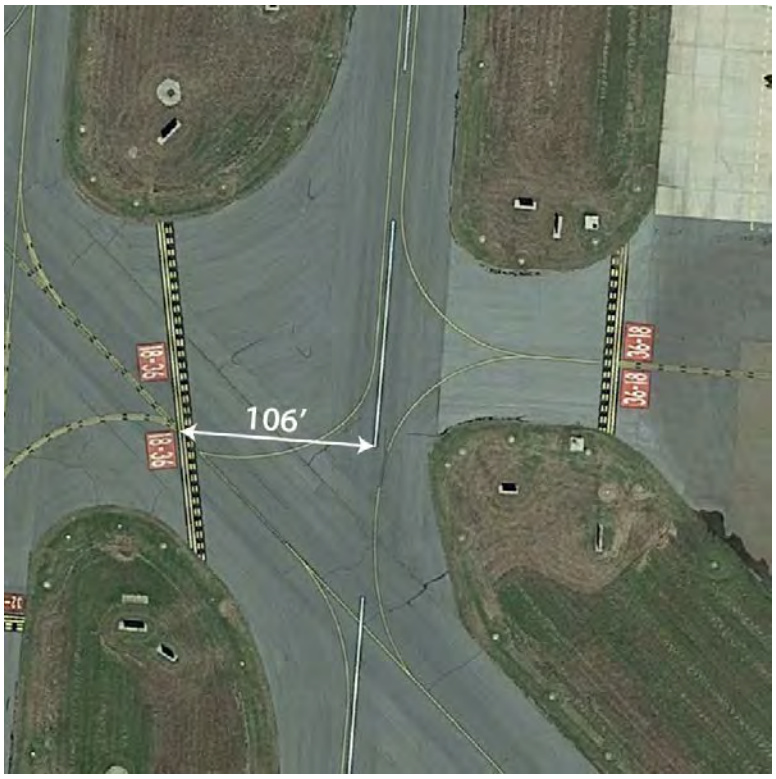


FIGURE 3A
Non-standard Holding Position Separation

Aircraft Parking Area Separation

Aircraft parking areas should be at least 500 feet from the Runway 14-32 centerline and 125 feet from the Runway 18-36 centerline. Currently, all aircraft parking areas exceed this standard.

Aircraft parking separation associated with a potential parallel runway would need to consider at least 500 feet of separation in order to meet RDC D-IV standards.

Parallel Runway Separation

FAA criteria requires a parallel runway be separated from an existing runway by at least 700 feet in order for aircraft to conduct simultaneous takeoffs and landings under VFR conditions and up to 4,300 feet for simultaneous precision instrument approaches. Analysis in the following chapter will present parallel runway development options that attempt to adhere to the safety design standards previously outlined.

Runway Visibility Zone (RVZ)

The RVZ is an area formed by imaginary lines connecting the line of sight points of intersecting runways. The purpose of the RVZ is to facilitate coordination among aircraft and between aircraft and vehicles that are operating on active runways. Having a clear line of sight allows departing and arriving aircraft to verify the location and actions of other aircraft and vehicles on the ground that could create a conflict. Within the RVZ, any point five feet above the runway centerline must be mutually visible with any other point five feet above the centerline of the crossing runway. The RVZ at MFE is depicted on **Exhibit 3D**. Currently, there are no known obstructions to the line of sight within the RVZ.

Building Restriction Line (BRL)

The BRL identifies suitable building area locations on the airport. The BRL encompasses the RPZs, the ROFA, navigational aid critical areas, areas required for terminal instrument procedures, and other areas necessary for meeting airport line-of-sight criteria, such as the RVZ.

Two primary factors contribute to the determination of the BRL: type of runway (utility or other-than utility) and the capability of the instrument approaches. Runway 14-32 is considered a "precision instrument" runway with a CAT-I ILS with visibility minimums down to ½-mile. Runway 18-36 is considered a "visual only utility runway" as it is intended to be used by small aircraft weighing up to 12,500 pounds and is not equipped with instrument approach procedures.

The BRL is the product of the CFR Part 77 transitional surface clearance requirements. These requirements stipulate that no object be located in the primary surface, defined as being 250 feet wide for utility runways having only visual approaches, and 1,000 feet wide for precision instrument runways. From the

primary surface, the transitional surface extends outward at a slope of one vertical foot to every seven horizontal feet.

For Runway 14-32, the 35-foot BRL is set at 745 feet from the runway centerline. For Runway 18-36, the 35-foot BRL is set at 370 feet from the runway centerline. As shown on **Exhibit 3D**, the BRL is also adjusted to coincide with the RPZs, RVZ, and the VOR critical area. Several buildings to the west of Runway 18-36 are within the 35-foot BRL boundary; however, these buildings range in height from 12.7 feet to 18.7 feet above ground level (AGL). They do not, therefore, penetrate the CFR Part 77 transitional surface.

TAXIWAYS

The design standards associated with taxiways are determined by the Taxiway Design Group (TDG) or the Airplane Design Group (ADG) of the critical design aircraft. As determined previously, the applicable ADG for Runway 14-32 is currently ADG IV. Ultimate planning should also conform to ADG IV for the runway. The applicable ADG for Runway 18-36 is ADG I. **Table 3N** presents the various taxiway design standards related to ADG I and IV.

TABLE 3N
Taxiway Dimensions and Standards
McAllen International Airport

STANDARDS BASED ON WINGSPAN	***ADG I***	***ADG IV***	
Taxiway Protection			
Taxiway Safety Area width	49	171	
Taxiway Object Free Area width	89	259	
Taxilane Object Free Area width	79	225	
Taxiway Separation			
Taxiway Centerline to:			
Fixed or Movable Object	44.5	129.5	
Parallel Taxiway/Taxilane	70	215	
Taxilane Centerline to:			
Fixed or Movable Object	39.5	112.5	
Parallel Taxilane	64	198	
Wingtip Clearance			
Taxiway Wingtip Clearance	20	44	
Taxilane Wingtip Clearance	15	27	
STANDARDS BASED ON TDG	***TDG 1A***	***TDG 4***	***TDG 5***
Taxiway Width Standard	25	50	75
Taxiway Edge Safety Margin	5	10	10
Taxiway Shoulder Width	10	20	30

All dimensions in feet.
ADG: Airplane Design Group
TDG: Taxiway Design Group

Source: FAA AC 150/5300-13A, Change 1, *Airport Design*

The table also shows those taxiway design standards related to TDG. The TDG standards are based on the Main Gear Width (MGW) and Cockpit to Main Gear (CMG) distance of the critical design aircraft expected to use those taxiways. Different taxiway and taxilane pavements can and should be planned to the most appropriate TDG design standards based on usage.

The current taxiway design for Runway 14-32 should be TDG 4, based upon the Boeing 757-200. As such, the taxiways on the airfield directly related to the runway system should be at least 50 feet wide. Ultimate planning should accommodate TDG 5, based upon the ultimate design aircraft, the Boeing 767-300 freighter. TDG 5 standards require taxiway widths of at least 75 feet. Taxiway A meets the 75 feet wide standard; however, it is not currently equipped with paved shoulders. Paved taxiway shoulders protect against soil erosion and are required for taxiways accommodating ADG IV and higher aircraft. Consideration should be given to adding up to 30-foot wide paved taxiway shoulders to Taxiway A and its associated connectors.

The current taxiway design for Runway 18-36 should be TDG 1A, based upon the small aircraft it serves. Taxiway C, which serves Runway 18-36, is 40 feet wide, exceeding the design standard of 25 feet. Taxiway D, which connects Taxiway A and Taxiway C, is 50 feet wide, which meets the TDG 4 standard.

While many of the taxiway widths exceed the current and projected design needs on the airfield, they could be maintained unless financial constraints dictate. As such, the widths should remain until such time as rehabilitation is needed and financial resources to support such are not available. FAA grant availability can only be provided if the project meets eligibility thresholds as determined by the FAA.

Taxiway Design Considerations

FAA AC 150/5300-13A, Change 1, *Airport Design*, provides guidance on recommended taxiway and taxilane layouts to enhance safety by avoiding runway incursions. A runway incursion is defined as "any occurrence at an airport involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and takeoff of aircraft."

The taxiway system at MFE generally provides for the efficient movement of aircraft; however, AC 150/5300-13A, Change 1, *Airport Design*, provides recommendations for taxiway design. The following is a list of the taxiway design guidelines and the basic rationale behind each recommendation.

1. **Taxi Method**: Taxiways are designed for "cockpit over centerline" taxiing with pavement being sufficiently wide to allow a certain amount of wander. On turns, sufficient pavement should be provided to maintain the edge safety margin from the landing gear. When constructing new taxiways, upgrading existing intersections should be undertaken to eliminate "judgmental oversteering," which is where the pilot must intentionally steer the cockpit outside the marked centerline in order to assure the aircraft remains on the taxiway pavement.

2. **Steering Angle**: Taxiways should be designed such that the nose gear steering angle is no more than 50 degrees, the generally accepted value to prevent excessive tire scrubbing.

3. **Three-Node Concept**: To maintain pilot situational awareness, taxiway intersections should provide a pilot a maximum of three choices of travel. Ideally, these are right and left angle turns and a continuation straight ahead.

4. **Intersection Angles**: Turns should be designed to 90 degrees wherever possible. For acute angle intersections, standard angles of 30, 45, 60, 120, 135, and 150 degrees are preferred.

5. **Runway Incursions**: Taxiways should be designed to reduce the probability of runway incursions.
   - *Increase Pilot Situational Awareness*: A pilot who knows where he/she is on the airport is less likely to enter a runway improperly. Complexity leads to confusion. Keep taxiway systems simple using the "three node" concept.
   - *Avoid Wide Expanses of Pavement*: Wide pavements require placement of signs far from a pilot's eye. This is especially critical at runway entrance points. Where a wide expanse of pavement is necessary, avoid direct access to a runway.
   - *Limit Runway Crossings*: The taxiway layout can reduce the opportunity for human error. The benefits are twofold – through simple reduction in the number of occurrences, and through a reduction in air traffic controller workload.
   - *Avoid "High Energy" Intersections*: These are intersections in the middle third of runways. By limiting runway crossings to the first and last thirds of the runway, the portion of the runway where a pilot can least maneuver to avoid a collision is kept clear.
   - *Increase Visibility*: Right-angle intersections, both between taxiways and runways, provide the best visibility. Acute angle runway exits provide for greater efficiency in runway usage, but should not be used as runway entrance or crossing points. A right-angle turn at the end of a parallel taxiway is a clear indication of approaching a runway.
   - *Avoid "Dual Purpose" Pavements*: Runways used as taxiways and taxiways used as runways can lead to confusion. A runway should always be clearly identified as a runway and only a runway.
   - *Indirect Access*: Do not design taxiways to lead directly from an apron to a runway. Such configurations can lead to confusion when a pilot typically expects to encounter a parallel taxiway.
   - *Hot Spots*: Confusing intersections near runways are more likely to contribute to runway incursions. These intersections must be redesigned when the associated runway is subject to reconstruction or rehabilitation. Other "hot spots" should be corrected as soon as practicable.

6. **Runway/Taxiway Intersections**:
   - *Right-Angle*: Right-angle intersections are the standard for all runway/taxiway intersections, except where there is a need for a high-speed exit. Right-angle taxiways provide the best visual perspective to a pilot approaching an intersection with the runway to observe aircraft in both the left and right directions. They also provide optimal orientation of the runway holding position signs so they are visible to pilots.
   - *Acute Angle*: Acute angles should not be larger than 45 degrees from the runway centerline. A 30-degree taxiway layout should be reserved for high-speed exits. The use of multiple intersecting taxiways with acute angles creates pilot confusion and improper positioning of taxiway signage.
   - *Large Expanses of Pavement*: Taxiways must never coincide with the intersection of two runways. Taxiway configurations with multiple taxiway and runway intersections in a single area

create large expanses of pavement, making it difficult to provide proper signage, marking, and lighting.

7. **Taxiway/Runway/Apron Incursion Prevention**: Apron locations that allow direct access into a runway should be avoided. Increase pilot situational awareness by designing taxiways in such a manner that forces pilots to consciously make turns. Taxiways originating from aprons and forming a straight line across runways at mid-span should be avoided.
   - *Wide Throat Taxiways*: Wide throat taxiway entrances should be avoided. Such large expanses of pavement may cause pilot confusion and makes lighting and marking more difficult.
   - *Direct Access from Apron to a Runway*: Avoid taxiway connectors that cross over a parallel taxiway and directly onto a runway. Consider a staggered taxiway layout that forces pilots to make a conscious decision to turn.
   - *Apron to Parallel Taxiway End*: Avoid direct connection from an apron to a parallel taxiway at the end of a runway.

FAA AC 150/5300-13A, Change 1, *Airport Design*, states that "existing taxiway geometry should be improved whenever feasible, with emphasis on designated "hot spots." To the extent practicable, the removal of existing pavement may be necessary to correct confusing layouts. The FAA has not identified any existing "hot spots" at the Airport.

For the most part, the taxiway system at MFE meets the recommended design and geometry standards set forth by the FAA. There are certain non-standard conditions that include:

- Taxiway A at the Runway 14 threshold provides direct access from the air cargo apron to the runway (**Figure 3B**).
- Taxiway A3 provides direct access to Runway 14-32 from the terminal apron (**Figure 3B**).
- Taxiways C1, C2, and D provide direct access to Runway 18-36 from the general aviation apron (**Figure 3C**).
- Approximately 150 feet of the north end of Runway 18-36 is marked as an aligned taxiway (the taxiway centerline coincides with the runway centerline) (**Figure 3C**). Aligned taxiways are prohibited by the FAA.
- Taxiway D intersects with Runway 18-36 in the high energy area.

FIGURE 3B
Runway 14-32 Direct Access Points

FIGURE 3C
Runway 18-36 Direct Access Points and Aligned Taxiway

In the alternatives chapter, potential solutions to these non-standard conditions will be presented. Analysis in the next chapter will also consider improvements which could be implemented on the airfield to minimize runway incursion potential, improve efficiency, and conform to FAA standards for taxiway design. Any future taxiways planned with the proposed parallel runway will also take into consideration the taxiway design standards previously discussed.

Taxilane Design Considerations

Taxilanes are distinguished from taxiways in that they do not provide access to or from the runway system directly. Taxilanes typically provide access to hangar areas. As a result, taxilanes can be planned to varying design standards depending on the type of aircraft utilizing the taxilane. For example, a taxilane leading to a T-hangar area only needs to be designed to accommodate those aircraft typically accessing the T-hangar.

NAVIGATIONAL AND APPROACH AIDS

Navigational aids are devices that provide pilots with guidance and position information when utilizing the runway system. Electronic and visual guidance to arriving aircraft enhance the safety and capacity of the airfield. Such facilities are vital to the success of an airport and provide additional safety to passengers using the air transportation system. While instrument approach aids are especially helpful during poor weather, they are often used by pilots conducting flight training and operating larger aircraft when visibility is good. MFE employs the following navigational and approach aids.

Instrument Approach Aids

Instrument approaches are categorized as either precision or non-precision. Precision instrument approach aids provide an exact course alignment and vertical descent path for an aircraft on final approach to a runway, while non-precision instrument approach aids provide only course alignment information.

In the past, most existing precision instrument approaches in the United States have been the ILS; however, with advances in global positioning system (GPS) technology, it can now be used to provide both vertical and lateral navigation for pilots under certain conditions.

MFE currently has straight-in instrument approach capabilities to each end of Runway 14-32. These include the ILS or localizer (LOC) approach to Runways 14 and 32, area navigation (RNAV) GPS approaches serving Runways 14 and 32, and a very high omnidirectional range (VOR) approaches to Runways 14 and 32. The ILS and RNAV GPS approaches to Runway 14 provide for the lowest minimums with ½-mile visibility and 200-foot cloud ceilings. The ILS and RNAV GPS approach serving Runway 32 allow for ¾-mile visibility minimums and 200-foot cloud ceilings.

Runway 14 is equipped with a medium intensity approach lighting system with runway alignment indicator lights (MALSR). This approach lighting system enhances safety at the Airport, especially during inclement weather or nighttime activity. The MALSR, in conjunction with the localizer antenna and glide slope antenna, provides approach minimums on Runway 14 down to 200-foot cloud ceilings and ½-mile visibility minimums.

A potential parallel runway should be planned for precision approach procedures with minimums down to ½-mile. As such, both ends of the parallel runway should include MALSR systems. Runway 32 should also be planned for ½-mile visibility minimums including a MALSR system.

Visual Approach Aids

In most instances, the landing phase of any flight must be conducted in visual conditions. To provide pilots with visual guidance information during landings to the runway, electronic visual approach aids are commonly provided at airports. Currently, Runway 32 is equipped with a two-box visual approach slope indicator (VASI) system and Runway 18 is equipped with a two-light precision approach path indicator (PAPI) system that is out of service indefinitely. VASI systems are now considered obsolete by the FAA. It is recommended that the Airport consider installing four-light PAPI-4 systems for Runways 14 and 32.

Runway end identification lights (REILs) are flashing lights located at the runway threshold end that facilitate rapid identification of the runway end at night and during poor visibility conditions. REILs provide pilots with the ability to identify the runway thresholds and distinguish the runway end lighting from other lighting on the airport and in the approach areas. The FAA indicates that REILs should be considered for all lighted runway ends not planned for a more sophisticated approach lighting system. Currently, REILs are installed on Runway 32. The REIL system is planned to be replaced ultimately by a MALSR on Runway 32. Runway 14 is equipped with a more sophisticated approach lighting system (MALSR) so REILs are not necessary.

Weather Reporting Aids

MFE has a lighted windcone and segmented circle, as well as additional supplemental windcones near the touchdown points of Runways 14 and 32. Windcones provide information to pilots regarding wind speed and direction. The segmented circle consists of a system of visual indicators designed to provide traffic pattern information to pilots. These should be maintained throughout the planning period.

The Airport is equipped with an ASOS which provides weather observations 24 hours per day. The system updates weather observations every minute, continuously reporting significant weather changes as they occur. This information is then transmitted at regular intervals (usually once per hour). Aircraft in the vicinity can receive this information if they have their radio tuned to the Airport's ATIS frequency (128.5 MHz). This system should be maintained through the planning period.

Communication Facilities

MFE has an operational ATCT located on the north side of Runway 14-32. The ATCT is staffed from 6:00 a.m. to 12:00 a.m. daily. The ATCT enhances safety at the Airport and should be maintained through the planning period. Considerations for the ATCT include modernization projects, including the addition of an elevator and power backup generators. Currently, without power generators, if power is lost to the Airport, the ATCT and the navigational aids would also be shut down.

AIRFIELD LIGHTING, MARKING, AND SIGNAGE

There are several lighting and pavement marking aids serving pilots using MFE. These aids assist pilots in locating the Airport and runway at night or in poor visibility conditions. They also assist in the ground movement of aircraft.

Airport Identification Lighting

The location of the airport at night is universally indicated by a rotating beacon. For civil airports, a rotating beacon projects two beams of light, one white and one green, 180 degrees apart. The existing beacon located adjacent to the rental car parking lot, northeast of the terminal building, should be maintained through the planning period.

Runway and Taxiway Lighting

Runway lighting provides the pilot with positive identification of the runway and its alignment. Runway 14-32 is served by high intensity runway lighting (HIRL). This system should be maintained through the planning period as it complements the runway's instrument approach capabilities during poor visibility conditions.

Medium intensity taxiway lighting (MITL) is provided on all taxiways serving the airfield system. This system is vital for safe and efficient ground movements and should be maintained in the future. Future planning should also consider MITL on future taxiways that directly support the runway system at the Airport. At a minimum, planning should also consider edge reflectors on more remote taxiways and taxilanes serving landside development areas.

Over time, the Airport should consider removing the incandescent airfield signage and runway and taxiway edge lighting systems, and replacing them with light emitting diode (LED) technology. LEDs have many advantages, including lower energy consumption, longer lifetime, tougher construction, reduced size, greater reliability, and faster switching. While a substantial initial investment is required upfront, the energy savings and reduced maintenance costs will outweigh any additional costs in the long run.

Pavement Markings

Runway markings are typically designed to the type of instrument approach available on the runway. FAA AC 150/5340-1K, *Standards for Airport Markings*, provides guidance necessary to design airport markings.

Runway 14-32 is served by precision markings. This aids in accommodating the ILS approach to both runway ends. Runway 18-36 has basic markings. All runway markings should be maintained through the long term planning period. The proposed parallel runway could be served with at least non-precision markings.

Airfield Signs

Airfield identification signs assist pilots in identifying their location on the airfield and directing them to their desired location. Lighted signs are installed on the runway and taxiway system on the airfield. The signage system includes runway and taxiway designations, holding positions, routing/directional, distance remaining, and runway exits. All these signs should be maintained throughout the planning period.

A summary of the airfield facilities at MFE discussed in the above section is presented on **Exhibit 3E**.

PASSENGER TERMINAL COMPLEX REQUIREMENTS

PREVIOUS TERMINAL STUDIES

The original two-level terminal structure was built in 1993 with approximately 105,000 square feet. An *Airport Terminal Capacity Study* was undertaken for MFE in 2009 due to significant passenger enplanement growth experienced during the years 2005, 2006, and 2007. The purpose of the study was to make a comprehensive capacity analysis of the passenger terminal and to develop recommendations for its optimization and expansion. The study concluded that passenger enplanements would grow at a rate

of five percent annually from 2007 to 2012, and then at an annual rate of 2.3 percent thereafter reaching 681,358 total enplanements by 2022. To accommodate this projected growth, recommended expansions or modifications included the security screening checkpoint, restrooms, concourse (including gates and holdroom spaces) (Phase I – additional 38,800 sf and three new gates; Phase II – additional 20,710 sf and two new gates; Phase III – additional 34,650 sf and eight new gates), concessions, baggage handling and screening facilities, and airport administrative offices. A terminal remodeling/expansion project was completed in 2015 bringing the facility to its current size, including the addition of one new gate and an expansion of the concourse area.

TERMINAL REQUIREMENTS

The following resources were consulted to identify existing and future terminal building needs:

- Airport Cooperative Research Program (ACRP), Report 25, *Airport Passenger Terminal Planning and Design, Volume 1: Guidebook*.
- ACRP, Project Number 07-04, *Spreadsheet Models for Terminal Planning and Design*.
- FAA Advisory Circular (AC) 150/5360-13, *Planning and Design Guidelines for Airport Terminal Facilities*.
- International Air Transport Association (IATA), *Airport Development Reference Manual*.

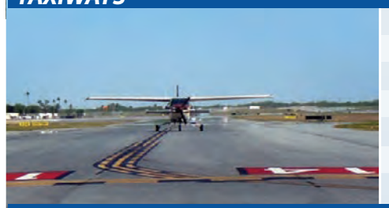
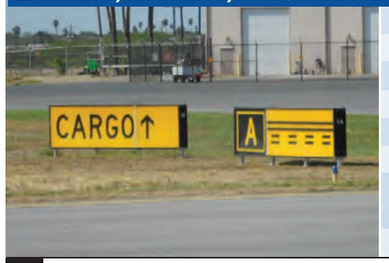
Components of the passenger terminal complex include aircraft gate positions, departures processing, arrivals processing, concourse facilities, as well as public spaces. This section identifies the functional components of the terminal building and offers required space needed for projected passenger demand levels for each component.

Many aspects of passenger terminal design are based upon peaking periods of commercial activity as determined by the flight schedules for MFE. The average peak day data from the forecast chapter was utilized as the basis for this analysis.

Exhibit 3F presents a summary of the terminal building space needs by functional area and by gross terminal area.

Aircraft Gates

Several methods were utilized to determine aircraft gate requirements for MFE. The first is the Gate Demand model from ACRP Report 25. This model utilizes two different approaches. The first approach uses the current ratio of annual passengers per gate, adjusted for forecast changes in fleet mix and annual load factors. This methodology assumes that the pattern of gate utilization will remain relatively stable over the 20-year forecast period. The changes in passengers per gate are due to changes in enplanements per departure (due to forecast increases in seating capacity and load factors), as opposed to increasing or decreasing the number of departures per gate. The second ACRP method considers increases in the number of departures per gate.

	AVAILABLE	SHORT TERM	LONG TERM
RUNWAYS	**RUNWAY 14-32**		
	RDC D-IV-2400	RDC D-IV-2400	RDC D-IV-2400
	7,120' x 150'	Maintain	Examine potential extension alternatives
	90,000 lbs. SWL/190,000 lbs. DWL/280,000 lbs. DTWL	Maintain	Strengthen up to 412,000 lbs. DTWL
	Standard RSA w/EMAS; ROFA obstructed by perimeter road, perimeter fence, and S 10th St.; Standard ROFZ	Mitigate ROFA obstructions	Maintain
	RPZs: 96.6% Owned/Easement; RWY 14 RPZ includes incompatibilities incompatibilities including residential	Mitigate RPZ incompatibilities	Maintain
	POTENTIAL PARALLEL RUNWAY		
			RDC D-IV-4000
			Examine potential length of at least 8,000 feet
			Strengthen up to 412,000 lbs. DTWL
	RUNWAY 18-36		
	RDC A-I(S)-VIS	Close Runway	
	2,638' x 60'	Close Runway	
	12,500 lbs. SWL	Close Runway	
	Standard ROFA; ROFZ; RSA overlaps Runway 14-32 RSA	Close Runway	
	RPZs: 56.3% Owned	Close Runway	
TAXIWAYS			
	TDG-4	TDG-4	TDG-5
	All taxiways at least 50' wide; most 75' wide	Maintain	All taxiways serving primary and potential parallel runway to 75' wide
	Runway 14-32/Taxiway A Separation - 400'	Maintain	Potential parallel runway/taxiway separation at least 400'
	Taxiway A provides two direct access points to Runway 14-32	Mitigate direct access points	Maintain corrected condition
	Taxiways C1, C2, and D provide direct access points to Runway 18-36	Close Runway 18-36	
	Taxiway D intersects with Runway 18-36 in High Energy area	Close Runway 18-36	
	Runway 18 end has an aligned taxiway	Close Runway 18-36	
NAVIGATIONAL AND APPROACH AIDS			
	ILS or LOC - Runway 14, 32	Maintain	Maintain
	RNAV (GPS) - Runways 14, 32	Maintain	Potential parallel runway ILS
	VOR - Runway 14, 32	Maintain	Maintain
	ASOS	Maintain	Maintain
	ATCT	Maintain	Maintain
	Lighted Windcones	Maintain	Add to both ends of potential parallel runway
	VASI-2 - Runway 32; PAPI-2 - Runway 18 (out of service)	Upgrade VASI-2 to PAPI-4: PAPI-4 (14)	PAPI-4 - Potential parallel runway
	MALSR - Runway 14	Maintain	MALSR - Potential parallel runway
	REILs - Runway 32	Maintain	Replace Runway 32 REIL with MALSR
LIGHTING, MARKING, AND SIGNAGE			
	Rotating Beacon	Maintain	Maintain
	Precision Markings - Runway 14-32	Maintain	Precision Markings - Potential parallel runway
	Basic Markings - Runway 18-36	Close Runway	
	HIRL - Runway 14-32	Consider gradual replacement with LED technology	LED HIRL - Potential parallel runway
	MIRL - Runway 18-36	Close Runway	
	Runway 14-32 - Holding position markings 250' from runway centerline	Holding position markings 251' from Runway 14-32	Holding position markings 251' from potential parallel runway
	Runway 18-36 - One non-standard holding position marking	Ensure all holding position markings are 125' from runway centerline until the runway is closed	
	Lighted airfield location, directional, and distance remaining signage	Consider gradual replacement with LED technology	Maintain and expand to potential parallel runway

KEY

ASOS - Automated Surface Observation System
ATCT - Airport Traffic Control Tower
DTWL - Dual Tandem Wheel Loading
DWL - Dual Wheel Loading
GPS - Global Positioning System
HIRL - High Intensity Runway Lights
ILS - Instrument Landing System
LED - Light Emitting Diode
LOC - Localizer
MALSR - Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights
MIRL - Medium Intensity Runway Lights
PAPI - Precision Approach Path Indicator
RDC - Runway Design Code
REIL - Runway End Identifier Lights
RNAV - Area Navigation
ROFA - Runway Object Free Area
ROFZ - Runway Obstacle Free Zone
RPZ - Runway Protection Zone
RSA - Runway Safety Area
SWL - Single Wheel Loading
TDG - Taxiway Design Group
VASI - Visual Approach Slope Indicator
VOR - Very High Frequency Omnidirectional Range

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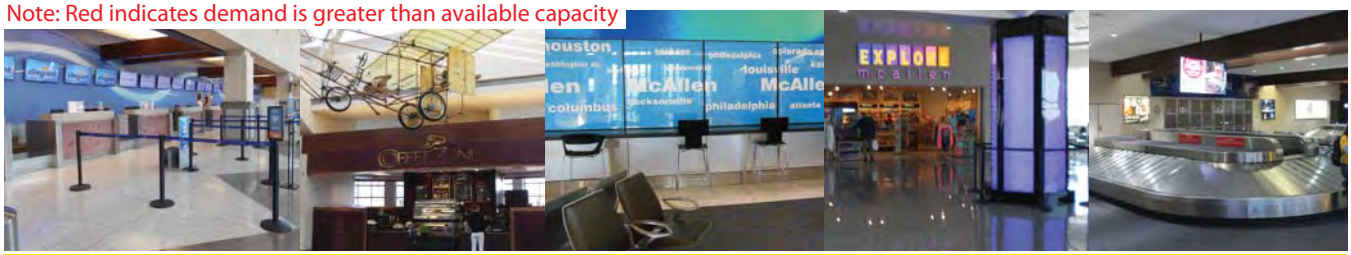
	Unit	Available	Short Term	Intermediate Term	Long Term
Enplanements		365,928	435,000	487,000	600,000
DEPARTURE PROCESSING					
Ticket Counters					
Counter Frontage	lf	110	50	55	65
Airline Ticketing	sf	1,206	500	550	650
Ticketing Queuing	sf	936	1,369	1,385	1,417
Airline Offices	sf	3,292	1,500	1,650	1,950
Agent Positions	#	22	10	11	13
Kiosk Positions	#	7	9	10	12
Outbound Baggage	sf	9,726	5,200	5,800	6,800
EDS Automated Machines	#	3	3	3	4
Security					
Security Stations	#	2	2	2	3
Security Queuing	sf	1,151	1,000	1,250	1,500
Security Screening	sf	3,662	2,500	3,125	3,750
TSA Office Space	sf	3,700	1,400	1,400	2,100
Walk-thru Metal Detectors (WTMD)	#	1	2	2	3
Whole Body Imagers (WBI)	#	1	2	2	3
Bag X-Ray Machines	#	2	4	5	6
CONCOURSE FACILITIES					
Passenger Holdrooms					
Gates	#	6	6	7	9
Gate Check-In	sf	2,261	1,752	2,044	2,628
Holdroom	sf	7,973	12,840	14,980	19,260
Concourse Circulation	sf	10,778	10,900	12,800	16,400
ARRIVALS PROCESSING					
Inbound Baggage	sf	4,820	3,111	3,477	4,209
Baggage Claim Display Frontage	lf	250	148	163	194
Baggage Service Office	sf	431	340	380	460
Baggage Claim Lobby	sf	5,351	5,860	6,470	7,680
Federal Inspection Services (FIS)	sf	6,488	252	294	417
PUBLIC SPACES					
Greeting Lobby/Circulation	sf	37,845	24,740	27,300	32,420
Restrooms	sf	4,265	3,770	4,160	4,940
Concessions	sf	3,460	4,350	4,870	6,000
Concessions Seating	sf	2,816	1,310	1,460	1,800
Rental Car Counter Frontage	lf	63	58	64	76
Rental Car Counter & Office Space	sf	1,320	870	960	1,140
Rental Car Queuing	sf	616	460	510	610
ADDITIONAL OFFICE SPACES					
MFE Offices/Conference Room	sf	3,532	2,900	3,200	3,800
Unclassified Office Space/Storage	sf	16,855	11,220	12,380	14,700
FUNCTIONAL AREA TOTAL	**sf**	**132,484**	**98,144**	**110,445**	**134,631**
Building Systems/Support					
HVAC/Mechanical/Server Room	sf	15,692	10,796	12,149	14,809
TOTAL TERMINAL	**sf**	**148,176**	**108,940**	**122,594**	**149,440**
% Capacity			***73.5%***	***82.7%***	***100.9%***

Note: Red indicates demand is greater than available capacity



The two methods are then averaged to arrive at the aircraft gate forecast. In the short term, six gates are estimated to be needed. In the intermediate term, seven gates are required and, in the long term, nine gates are required.

FAA AC 150/5360-13, *Planning and Design Guidelines for Airport Terminal Facilities* was also consulted. The AC provides three methodologies: one based on the peak hour utilization rate, the second utilizes the daily departure for a daily utilization rate, and the third considers an annual utilization rate. Each of these was found to be consistent with the ACRP methodology.

Terminal Apron Requirements

There are four primary considerations that govern efficient aircraft apron design: the movement and physical characteristics of the aircraft to be served; the maneuvering, staging, and location of ground servicing equipment and underground utilities; the dimensional relationships of parked aircraft; and the safety, security, and operational practices related to apron control. The optimal apron design will depend upon available space, aircraft mix, and terminal configuration.

The main terminal area apron provides approximately 74,000 square yards of pavement. If the enplanements grow as forecasted, then additional gates and terminal apron area may be required. The size of the additional apron will need to be able to accommodate the aircraft type intended to use it, and additional circulation apron will be necessary.

Terminal Building Requirements

The requirements for the passenger terminal building begin with a demand/capacity analysis of the existing facilities that identifies the current capacity of key processing areas for comparison to the passenger demand at the MFE. The purpose of the analysis is to quantify and qualify the ability of the existing terminal facilities to satisfy the current demand of the traveling public at the Airport.

A spreadsheet model based on industry standards and calibrated for the MFE based upon observations of passenger activities and terminal operations and design was used in this analysis. The model utilizes the standard queuing theory which can be defined as: passengers arriving minus passengers processed equals passengers in queue. The evaluation of individual processing elements is based on industry standards and formulas.

The model considers the level of service standards established by the International Air Transport Association (IATA). Level of service (LOS) defines the comfort and quality of the passenger experience. Some are related to crowding in queuing areas, while others define the amount of time a passenger must wait for processing. **Table 3P** outlines the basic level of service standards, while **Exhibit 3F** outlines space requirements for each functional element of the passenger terminal building.

In general, LOS C is a typical design goal for most airports. LOS B would be a preferred goal if the budget allows. LOS A is generally too expensive to achieve, and thus prohibitive to implement. For purposes of this analysis, an LOS C+ was used to represent a median between LOS B and C.

TABLE 3P
Level of Service Standards (IATA)
McAllen International Airport

AREA PER OCCUPANT								
Level of Service Standards	**A** Ft^2	**B** Ft^2	**C+** Ft^2	**C** Ft^2	**C-** Ft^2	**D** Ft^2	**E** Ft^2	**F** Ft^2
Check-in Queue Area	19.4	17.2	16.1	15.1	14	12.9	10.8	-
Wait/Circulate	29.1	24.8	22.6	20.4	18.3	16.1	12.8	-
Holdroom	15.1	13.5	12.8	12	11.3	10.5	8	-
Bag Claim Area (excl. claim device)	21.5	19.4	18.3	17.2	16.1	15.1	12.9	-
Federal Inspection Services	15.1	12.9	11.8	10.8	9.7	8.6	6.5	-

A – Excellent levels of service; conditions of free flow; excellent level of comfort.
B – High level of service; condition of stable flow; very few delays; high level of comfort.
C – Good level of service; condition of stable flow; acceptable delay; good level of comfort.
D – Adequate level of comfort and service; condition of unstable flow; acceptable delays for short periods.
E – Inadequate level of service; condition of unstable flow; unacceptable delays; inadequate levels of comfort.
F – Unacceptable levels of comfort and service; conditions of cross flows, system breakdown and unacceptable delays; applies to areas below LOS E.

Departures Processing

The first destination for most enplaning passengers in the terminal building is the ticket counters. The ticketing area includes the counters, queuing area and lobby, the ticket offices, and outbound bag screening and processing. Security screening is also included in the departures processing element.

Ticket Counters - The percentage of the departing passenger peak hour demand that checks in at the ticket lobby is estimated at 80 percent. The remainder are assumed to check in prior to arriving at the MFE and do not have checked baggage. The capacity at the ticket counters was calculated based on the passenger processing rate derived from IATA averages.

The ticket counter functions appear to be adequate through the long term planning period. Automated ticketing kiosk positions are widely used today and are anticipated to continue to grow in utilization. This is reflected with an identified need for an additional five kiosk positions by the long term.

Ticket Queuing - The adequacy of the ticket queueing area is also evaluated to determine whether demand levels result in an acceptable level of service. Industry standards assume that some passengers enter the queue with their friends or family for assistance. The evaluation was based on a service goal of a 2.5-minute maximum wait in queue and an LOS C+ of 16.1 square feet per person in queue with baggage.

The ticketing queuing area exceeds available capacity by the short term; however, portions of the circulation area immediately adjacent could be converted to queuing area to compensate.

Bag Screening and Processing – The Transportation Security Administration (TSA) must inspect every checked bag that is to be put on an aircraft. Each airline contracts with TSA for this service. The Airport has three Explosive Detection System (EDS) machines that are located on the lower level of the terminal. Baggage is collected at the airline counters and transported to the screening and processing area via a conveyor belt system. The total area for outbound baggage handling exceeds the projected long term area demand; however, an additional EDS machine may be necessary by the long term horizon.

Passenger Security Screening - The required queuing area for the checkpoint was determined using an area of 16.1 square feet per person at a level of service LOS C+. Across the country, TSA is making efforts to help streamline the screening process. Efforts are being made to provide staff during peak periods, install new equipment, and open pre-check lanes. The security screening at the MFE consists of two X-ray machines for bags. Passengers then pass through either a walk-thru metal detector (WTMD), of which there is one, or they pass through one automated whole-body imaginer (WBI) machine.

The security queuing and screening areas may need to be expanded over time to include additional WTMDs, WBIs, and bag X-ray machines.

Arrivals Processing

The passenger arrivals process consists primarily of those facilities and functions that provide means to reunite the arriving passenger with items that were checked at the origin of the flight.

Baggage Claim - It is estimated that 80 percent of arriving peak hour passengers claim checked baggage. The remaining 20 percent of the passengers bypass the baggage claim areas and go directly to the curb or to other ground transportation related facilities. An industry standard of 1.3 checked bags per passenger is utilized. The baggage claim capacity is based on the device frontage per person.

Claim Lobby - Claim lobby area requirements are based on meeting LOS C+ and is calculated as 18.3 square feet per person. The claim lobby floor area may become constrained as passenger levels rise so consideration should be given to expanding this area.

Federal Inspection Services (FIS) – ACRP Report 25 presents a model for estimating space requirements for processing international passengers through customs. Factors, such as the number of flights, passenger loading factors, and acceptable LOS, are considered. Currently, the MFE's FIS facilities are located on the lower level, including the FIS baggage claim area. The existing facilities are adequate to accommodate the existing and forecasted scheduled airline and unscheduled international general aviation flights.

Concourses

The concourses consist primarily of the public circulation spaces and secure passenger holdrooms. While holdrooms and circulation are calculated separately, it is common for actual usage to include both these elements. For example, while passengers are waiting, they will typically disperse throughout the secure concourse. As it gets closer to boarding time, passengers tend to gather in the gate area. As a result, it is common to consider holdroom and concourse capacity in aggregate.

Holdrooms - The holdroom capacity is based upon available seats for the design aircraft for each gate and average load factor at the MFE. Gate check-in spaces, which include podium space and queuing/exit space, is also considered. Additional holdroom space may be necessary as enplanement levels increase.

Circulation – The holdrooms are located on either side of the circulation element. The circulation requirement is based upon the number of gates and the total aircraft frontage required by the design aircraft. As the number of gates needed increased, circulation areas will also need to be expanded over the planning period.

Public Spaces

Public spaces include restrooms, concessions, rental car counters, and other public greeting areas.

Restrooms - Restrooms are strategically located throughout the terminal building on both the public and secure sides. Restroom capacity is calculated based on square footage per peak hour passenger, as provided in FAA Advisory Circular 150/5360-13, *Planning and Design Guidelines for Airport Terminal Facilities*. Current restroom capacity is adequate through the intermediate range forecast with additional space needed by the long term.

Concessions - While planning standards and demand are an important consideration in the adequacy of concessions in a terminal, there are marketing considerations that determine the capacity and economic viability of airport food/beverage services and retail concessions. Concessions are available on both the secure and non-secure sides of the terminal. Concessions are based on providing 10 square feet per 1,000 annual enplaned passengers and concession seating area is based upon 20 percent of the total concessions area. The concessions area is undersized for the short term but the concessions seating area in the secure area of the terminal is adequate through the planning period. Local economies will heavily influence actual space needed for these functions.

Rental Car – The rental car counters on the upper level of the terminal adjacent to the baggage claim lobby includes office space, counters, and a queuing area. The counter frontage is based upon 10 percent of the peak hour passengers and providing a minimum of ten feet per agency. The office space and queuing spaces are functions of the projected counter frontage with estimated depths of 15 feet and eight feet, respectively. By the long term, the rental car frontage demand will exceed capacity. Consideration in the alternatives analysis will explore options for a consolidated rental car facility, which would move the rental car counters offsite, freeing terminal space for other uses.

Greeting Lobby – The greeting lobby is located between the airline ticket counters and the baggage claim area of the terminal. This area has seating for passengers and greeters on the non-secure side of the terminal. Forecasted demand for this area is based on providing 50 square feet per design hour passenger with an 80 percent utilization factor. The available space is adequate to meet the long term demand.

Additional Office Spaces

MFE Administrative Spaces - Often airport administrative offices are located within an airport terminal building. At the MFE, the administration occupies space on each floor. By industry standards, the administrative offices are properly sized through the intermediate term planning period. Additional capacity may be necessary by the long term horizon.

Unclassified Office Space/Storage – Leasable office and storage spaces are located throughout the secured and un-secured areas of the terminal. These spaces are used for many purposes, including as additional office/storage for the airlines, TSA, and various terminal concessionaires. The available unclassified office space/storage capacity is adequate for the duration of the planning period.

HVAC/Mechanical/Server Rooms

The systems and support functions include mechanical rooms, heating and air conditioning (HVAC), and server rooms. These elements are necessary for the continued efficiency of the MFE terminal building. These elements are forecasted at approximately 11 percent of the total programmed functional area. This analysis does not show a long term need for additional space; however, if the building were to be expanded in the future, these elements should also be considered.

Total Terminal Building Requirements

At approximately 148,000 square feet, the current terminal building is adequately sized and is anticipated to function at between 74 and 83 percent capacity through the intermediate term and, by the long term horizon, the terminal is projected to be operating at near 100 percent capacity. Certain functional elements may become constrained within the 20-year planning horizon of the Master Plan, resulting in lower levels of service. For example, additional concourse and gate space could be needed at each planning horizon milestone. The alternatives analysis to follow will explore various terminal development alternatives.

TERMINAL CURB

The terminal curb element is the direct interface between the terminal building and the ground transportation system. The length of curb available for loading and unloading passengers and baggage is determined by the type and volume of ground vehicles anticipated during the peak period on the design

day. MFE has approximately 600 feet of enplaning/departure curb along the roadway fronting the terminal, which accommodates all private and commercial vehicles. A shade canopy extends along 485 feet of the curb sidewalk.

ACRP's terminal planning and design spreadsheet model was utilized to estimate the terminal curb requirements based upon the design hour passenger demand. The output from the model is the curb length range required to maintain a LOS "C." A terminal traffic study was not conducted for this master plan; therefore, an estimated 60 percent of design hour arriving and departing passengers are assumed to utilize the terminal curb in either a private auto, taxi, limousine, shuttle bus, or public bus.

Table 3Q provides the curb length analysis for the departure/enplanement and arrival/deplanement curb. The terminal curb is adequately sized through the intermediate planning period. With the long-range enplanement forecast, the terminal curb begins to slightly exceed the available curb length.

TABLE 3Q
Terminal Curb Requirements - Level of Service "C"
McAllen International Airport

	Available	Short	Intermediate	Long
Annual Enplanements	365,928	435,000	487,000	600,000
Terminal Curb Front				
Departure/Arrival Curb (lf)	600	505	559	664

lf – Linear Feet
Source: ACRP, Project Number 07-04, Spreadsheet Models for Terminal Planning and Design.

VEHICLE PARKING

Vehicle parking associated with the MFE includes spaces utilized by passengers, visitors, employees/overflow, and rental car companies. Parking needs are generally established by taking into consideration peak hour passengers, peak hour visitors, and the travel mode split. In accordance with airport parking industry standards, approximately 25 percent of total public parking is identified as short term parking. The existing and long term parking needs for the MFE is shown in **Table 3R**. This analysis shows that the short term lot is operating close to capacity, while the long term lot is only at about 49 percent capacity currently. Throughout the planning period, additional short term capacity is needed.

TABLE 3R
Vehicle Parking Requirements
McAllen International Airport

	Available	Current Need	Short	Intermediate	Long
Parking Requirements					
Short Term	143	120	145	160	190
Long Term	866	421	522	583	720
Employee/Overflow	320	183	218	244	300
Rental Car Ready/Return	209	201	239	268	330
Total All Parking	**1,538**	**925**	**1,124**	**1,255**	**1,540**

Source: Coffman Associates analysis

Employee and overflow parking is estimated as 500 spaces per one million enplaned passengers. The current supply of employee/overflow parking is adequate through the long range forecast. Future rental car ready/return needs are calculated at 550 spaces per one million originating passengers. This analysis shows a need for additional rental car parking capacity throughout the planning period. Due to the constrained nature of the existing rental car ready/return lot, the alternatives analysis will give consideration to the establishment of a consolidated rental car facility (CONRAC) in another location on the Airport or at an off-site location.

Overall, total parking capacity at MFE needs to be expanded over time to meet long term forecast needs. In addition to a CONRAC, the alternatives analysis will explore options for a parking structure on the Airport.

AIR CARGO REQUIREMENTS

The primary cargo-related facilities requiring analysis include the cargo apron, sort building space, and landside staging area (delivery truck and vehicle parking). The current air cargo facilities at the MFE are located to the northwest of the passenger terminal and immediately north of the Runway 14 threshold. The facilities include a 48,120-square-foot sort/warehouse building constructed in 1988. A 35,830-square-yard cargo apron is available. Ground support equipment (GSE) storage space is located on the south side of the building and encompasses a total of 8,385 square yards. Truck parking and loading docks encompass approximately 7,100 square yards of space. Building facilities are leased by UPS, Ace Forwarding, Inc., Davila's Delivery Service, GSI, and ATS.

Air Cargo Facility

Estimates of the appropriate size of an air cargo sort facility are based upon national industry standards and range between 1.0 and 2.5 square feet per total tonnage shipped. Generally, 1.0 square foot per ton typically indicates that the facility is more efficiently utilized, and 2.0 square feet per ton typically indicates that the facility has some capacity for near-term growth. Based on current building size and cargo shipped in 2016, the MFE cargo building maintains a 5.52 utilization rate. Future space requirements were calculated by multiplying the projected tons shipped and received by a 1.25 utilization rate. Based upon this space calculation, the available building capacity will be adequate to meet long term cargo handling needs.

Consideration should also be given to establishing a bi-national customs facility at MFE for both U.S. and Mexico. The Laredo International Airport opened the first bi-national customs facility in 2015, which allows cargo to be pre-inspected by Mexican customs officers. Laredo is currently the only U.S. airport with such a facility. The alternatives analysis will further explore this option and the associated facility needs.

Truck Dock/Staging/Parking Requirements

The existing air cargo building has a total of 34 truck dock positions. Truck dock requirements are based on a planning factor of 0.5 truck docks per 1,000 square feet of building space. No additional docks are necessary through the long term planning period.

Truck parking and staging is currently estimated at one-third of the building size at the MFE. Because the nature of air cargo is changing to include a larger percentage of truck deliveries, future estimates for staging and parking utilize the 50 percent factor. Additional truck staging/parking capacity may be needed by the long term.

Air Cargo Apron

The cargo apron area requirements are based on the current and projected aircraft type to be utilized in air cargo service at the MFE. As presented in the Forecasts chapter, total tons shipped are forecast for strong growth at 3.0 percent annually. The mix of aircraft used in cargo service is anticipated to consist primarily of operations by the Boeing 757-200 utilized by UPS and to ultimately include larger aircraft, such as the Boeing 767-300 freighter. Future cargo apron requirements are primarily based on the type and amount of aircraft utilizing the ramp. The apron should also provide for circulation and access lanes for active GSE.

At the MFE, there are four air cargo positions available for larger air cargo jets and smaller air cargo aircraft, such as turboprop and business jets. The larger air cargo jets generally fall in ADG IV (Boeing 757-200 and Boeing 767-300). Future cargo apron requirements are estimated at 9,000 square yards per ADG IV jet position and 1,600 square yards per turboprop and business jet aircraft position. These calculations include space for active ground service equipment and circulation, which includes the access taxilane and space for the turboprops to pull out without the need for a push-back.

Air cargo activities require extensive ground service equipment, including cargo lifters, moveable stairs, cargo containers, tug vehicles, and container movement vehicles. While some of this equipment is parked near the aircraft, most is stored to the side of the cargo building. Following national trends, the space requirements for GSE storage space is estimated at 25 percent of the air cargo building size.

Table 3S presents the requirements needed to fully accommodate air cargo activity at the MFE. As can be seen, there is a need for additional truck staging/parking area and cargo apron space.

Another consideration for the air cargo apron is the impact of the aircraft on airport airspace. Air cargo aircraft should be positioned on the air cargo apron so that they do not penetrate the Airport's Part 77 airspace, in particular the transitional surface for Runway 14-32. The transitional surface begins at the end of the primary surface (500 feet from the runway centerline) and extends outward and upward at a 7':1' slope. In its current location, the air cargo apron begins approximately 580 feet from the Runway 14-32 centerline. **Figure 3D** depicts the minimum clearance distance that larger air cargo aircraft (Boeing 757-200 and 767-300f) should be positioned so that the tail height does not penetrate the transitional surface. As can be seen in the figure, larger air cargo aircraft are currently limited to a single position.

Any expansion of the air cargo apron should consider the type of air cargo aircraft to be served and how they will be positioned so that airport airspace is not impacted.

TABLE 3S
Air Cargo Requirements
McAllen International Airport

Cargo Element	Available	Current	Short Term	Intermediate Term	Long Term
Total Cargo Forecast (in tons)		8,722	10,000	11,500	15,800
Cargo Building Requirements					
Air Cargo Building (s.f.)	48,120	10,900	12,500	14,380	19,750
Truck Dock Positions	34	6	7	8	11
Truck Staging/Parking (s.y.)	7,100	3,630	4,170	5,750	9,880
Cargo Apron Requirements					
Total Positions	4	4	5	6	8
Total Apron Space (s.y.)	27,445	21,200	26,500	31,800	42,400
Ground Support Equipment Space (s.y.)	8,385	2,730	3,130	3,600	4,940

Source: Coffman Associates analysis

FIGURE 3D
Cargo Apron – Tail Height Limitations

GENERAL AVIATION FACILITY REQUIREMENTS

General aviation facilities are those necessary to accommodate airport activity by all aviation segments except commercial passenger service. This includes recreational flying, business aviation, charter, and some portions of air cargo and air ambulance activity. These airport users require a variety of services, such as fueling, terminal services, maintenance, and aircraft storage. The primary components considered for general aviation needs include:

- Aircraft Hangars
- Aircraft Parking Aprons
- General Aviation Terminal Building Services
- Auto Parking and Access

The future need for each of these components has been analyzed based on the aviation demand forecasts.

GENERAL AVIATION TERMINAL FACILITIES

The general aviation terminal facilities at the Airport are often the first impression of the community that corporate officials and other visitors will encounter. General aviation terminal facilities at an airport provide space for passenger waiting, pilots' lounge, pilot flight planning, concessions, management, storage, and various other needs. This space is not necessarily limited to a single, separate terminal building, but can include space offered by fixed base operators (FBOs) and other specialty operators for these functions and services. At MFE, general aviation terminal services are provided by McCreery Aviation, the only FBO located on the airfield.

The methodology used in estimating general aviation terminal facility needs was based upon the number of airport users expected to utilize general aviation facilities during the design hour. Space requirements for terminal facilities were based on providing 125 square feet per design hour itinerant passenger. A multiplier of 2.5 in the short term, increasing to 3.0 in the long term, was also applied to terminal facility needs in order to better determine the number of passengers associated with each itinerant aircraft operation. This increasing multiplier indicates an expected increase in business and recreational operations through the long term. These operations often support larger turboprop and jet aircraft, which accommodate an increasing passenger load factor.

Table 3T outlines the space requirements for general aviation terminal services at MFE through the long term planning period. As shown in the table, up to 8,300 square feet of space could be needed in the long term for general aviation passengers. The amount of space currently offered by the FBO is approximately 4,700 square feet. These spaces include designated areas for a passenger waiting lobby, flight planning, pilots' lounge, restroom facilities, and other amenities.

General aviation vehicular parking demands have also been determined for MFE. Space determinations for itinerant passengers were based on an evaluation of existing airport use, as well as standards set forth to help calculate projected terminal facility needs.

TABLE 3T
General Aviation Terminal Area Facilities
McAllen International Airport

	Available	Short Term	Intermediate Term	Long Term
General Aviation Services Facility Area (s.f.)	4,700	6,000	7,000	8,300
Design Hour Passengers	34	48	56	66
Passenger Multiplier	2.0	2.5	2.8	3.0
GA Terminal Parking Spaces	--	36	40	48
GA Based Aircraft Parking Spaces	--	64	68	75
GA FBO/SASO Employee Parking	--	51	54	60
Total General Aviation Parking Spaces	161	151	162	183

Source: Coffman Associates analysis

The parking requirements of based aircraft owners should also be considered. Although some owners prefer to park their vehicles in their hangar, safety can be compromised when automobile and aircraft movements are intermixed. For this reason, separate parking requirements, which consider one-half of based aircraft at the Airport, were applied to general aviation automobile parking space requirements. Utilizing this methodology, parking requirements for general aviation activity call for approximately 151 spaces in the short term, increasing to approximately 183 spaces in the long term planning horizon. There are approximately 161 marked vehicle parking spaces at MFE currently serving GA airport activities, including the FBO, SASO, and other general aviation functions. Future consideration in the Master Plan will be given to providing vehicle parking to support additional development potential.

AIRCRAFT HANGARS

Utilization of hangar space varies as a function of local climate, security, and owner preferences. The trend in general aviation aircraft, whether single or multi-engine, is toward more sophisticated aircraft (and, consequently, more expensive aircraft); therefore, many aircraft owners prefer enclosed hangar space to outside tiedowns.

The demand for aircraft storage hangars is dependent upon the number and type of aircraft expected to be based at the Airport in the future. For planning purposes, it is necessary to estimate hangar requirements based upon forecast operational activity. However, actual hangar construction should be based upon actual demand trends and financial investment conditions.

There are a variety of aircraft storage options typically available at an airport, including shade hangars, T-hangars, linear box hangars, executive/box hangars, and bulk storage conventional hangars. Shade hangars are the most basic form of aircraft protection and are common in warmer climates. These structures provide a roof covering, but no walls or doors. There are no shade hangars at MFE, and for purposes of planning, any future shade hangars would be included in the T-hangar need forecast.

It is important to note that the types of hangars detailed in this section are categorized based on the proposed size and layout of the facility, and do not necessarily correspond with the locally designated

hangar facility categories. For example, certain categories, such as T-hangars and linear box hangars, can be grouped into the same category. Other hangar types, such as condominium box hangars, aircraft storage hangars, fixed base operator (FBO), and specialized aviation service operator (SASO) hangars, correspond to conventional style hangars detailed in this section.

T-hangars are intended to accommodate one small single engine piston aircraft or, in some cases, one multi-engine piston aircraft. T-hangars are so named because they are in the shape of a "T," providing a space for the aircraft nose and wings, but no space for turning the aircraft within the hangar. Basically, the aircraft can be parked in only one position. T-hangars are commonly "nested" with several individual storage units to maximize hangar space. In these cases, taxiway access is needed on both sides of the nested T-hangar facility. T-hangars are popular with aircraft owners with tighter budgets as they tend to be the least expensive enclosed hangar space to build and lease. There are currently 34 T-hangar positions at MFE, totaling 39,389 square feet of aircraft storage capacity.

Conventional hangars are the large, clear span hangars typically located facing the main aircraft apron at airports. These hangars provide for bulk aircraft storage and are often utilized by airport businesses, such as an FBO and/or SASOs (an aircraft maintenance business, for example). Conventional hangars generally range in size from 4,000 square feet to more than 20,000 square feet. Often, a portion of a conventional hangar is utilized for non-aircraft storage needs, such as maintenance or office space. There are 23 conventional hangars at MFE encompassing approximately 247,317 square feet.

Planning for future aircraft storage needs is based on typical owner preferences and standard sizes for hangar space. For determining future aircraft storage needs, a planning standard of 1,200 square feet per single-engine piston aircraft and 1,500 square feet per multi-engine piston aircraft is utilized for T-hangars. For conventional hangars, a planning standard of 3,000 square feet is utilized for turboprop aircraft, 6,000 square feet is utilized for business jet aircraft, and 1,500 square feet is utilized for helicopter storage needs.

MFE has a total of 122 based aircraft and currently all hangar space is occupied. With the trend toward aircraft owners preferring enclosed aircraft storage space, no growth is projected for aircraft that utilize outside tiedowns. Providing a mix of aircraft storage options is preferred when planning storage needs, in order to meet the varied needs of aircraft owners. **Table 3U** provides a summary of the aircraft storage needs through the long term planning horizon.

TABLE 3U
Aircraft Hangar Requirements
McAllen International Airport

	Available	Short Term	Intermediate Term	Long Term
Total Based Aircraft	122	128	135	150
Hangar Area Requirements				
T-Hangar Hangar Area (s.f.)	39,389	37,500	33,800	31,200
Conventional Hangar Area (s.f.)	247,317	272,800	304,300	364,300
Service/Maintenance Area (s.f.)		32,000	33,800	37,500
	286,706*	**342,300**	**371,900**	**433,000**

Note: *Includes total hangar and maintenance area currently at the Airport
Source: Coffman Associates analysis

The analysis shows that future hangar requirements indicate that there is a potential need for over 146,000 square feet of new hangar storage capacity through the long term planning period. This includes a mixture of hangar and maintenance areas. Due to the projected increase in based aircraft, annual general aviation operations, and hangar storage needs, facility planning will consider additional hangars at the Airport. It is expected that the aircraft storage hangar requirements will continue to be met through a combination of hangar types. The largest need could involve the construction of conventional-style hangars that are better suited to accommodate larger turboprop and jet aircraft. T-hangar storage space requirements are anticipated to decrease over time as smaller multi-engine piston aircraft are projected to decrease in numbers over the planning period.

It should be noted that hangar requirements are general in nature and based on the aviation demand forecasts. The actual need for hangar space will further depend on the actual usage within hangars. For example, some hangars may be utilized entirely for non-aircraft storage, such as maintenance; yet from a planning standpoint, they have an aircraft storage capacity. Therefore, the needs of an individual user may differ from the calculated space necessary.

AIRCRAFT PARKING APRONS

FAA Advisory Circular 150/5300-13A, *Airport Design*, suggests a methodology by which transient apron requirements can be determined from knowledge of busy-day operations. At MFE, the number of itinerant spaces required was determined to be approximately 18 percent of the busy-day itinerant operations for general aviation operations. A planning criterion of 800 square yards per aircraft was applied to determine future transient apron requirements for single and multi-engine aircraft. For business jets, a planning criterion of 1,600 square yards per aircraft position was used. In addition, MFE has based aircraft that utilize outside aircraft tiedowns for storage on occasion. It is assumed that these aircraft require less space than transient aircraft; therefore, a planning criterion of 500 square yards per aircraft was applied. Apron parking requirements are presented in **Table 3V**. Transient apron parking needs are divided into business jet needs and smaller single and multi-engine aircraft needs.

TABLE 3V
Aircraft Parking Apron Requirements
McAllen International Airport

	Available	Short Term	Intermediate Term	Long Term
Transient Single and Multi-Engine Aircraft Positions		30	32	36
Apron Area (s.y.)		24,000	25,600	28,800
Transient Turboprop and Jet Positions		8	8	9
Apron Area (s.y.)		12,000	12,800	14,400
Locally-Based Aircraft Positions		21	22	24
Apron Area (s.y.)		10,400	10,750	12,000
Total Marked Positions		58	62	69
Total Apron Area (s.y.)	86,112	46,400	49,200	55,200

Source: Coffman Associates analysis

Currently, the existing GA aircraft parking aprons encompass approximately 86,112 square yards of space at the Airport, including the US Customs apron. Available GA apron space is sufficient to meet long term needs of GA activity at MFE.

In addition to fixed-wing aircraft parking, areas should also be dedicated for helicopter parking. Helicopters also operate on various apron areas shared by fixed-wing aircraft at MFE. Helicopter operations should be segregated to the extent practicable to increase safety and efficiency of aircraft parking aprons. Long term facility planning will continue to consider dedicated helicopter activity areas at the Airport.

AIRPORT SUPPORT FACILITIES

Various facilities that do not logically fall within classifications of airfield or landside facilities have also been identified. These other areas provide certain functions related to the overall operation of the Airport.

Fuel Storage

McCreery Aviation is the Airport's primary fuel service provider, which has four underground storage tanks for Jet A fuel and one for AvGas (100LL). McCreery's total storage equals 72,000 gallons for Jet A and 12,000 gallons for AvGas. Rio Grande Chemical also has a fuel storage tank with storage capacity for 1,700 gallons for Jet A.

Based upon historic fuel flowage records provided by airport management, in 2016, the Airport pumped 1,594,307 gallons of Jet A and 178,887 gallons of AvGas. Based upon operations reported by the FAA's Traffic Flow Management System Count database, which have been inflated to account for unreported operations, the number of turbine operations in 2016 totaled approximately 23,538 with the remainder being piston operations. Dividing the total fuel flowage by the total number of operations provides a ratio of fuel flowage per operation. In 2016, the Airport pumped approximately 67.7 gallons of Jet A per turbine operation and 5.3 gallons of AvGas per piston operation. It is anticipated that, over the course of the planning period, the Jet A flowage ratio will increase slightly as the Airport accommodates larger jets and the AvGas flowage ratio will remain static.

Maintaining a 14-day fuel supply would allow the Airport to limit the impact of a disruption of fuel delivery. Currently, the Airport has enough static fuel storage to meet the 14-day supply criteria for both Jet A and AvGas fuel. The forecasted fuel storage requirements are summarized in **Table 3W**.

In the future, based on these usage assumptions, additional Jet A fuel storage capacity will be needed to meet demand.

TABLE 3W
Fuel Storage Requirements
McAllen International Airport

			Planning Horizon		
	Available	Current Need	Short Term	Intermediate Term	Long Term
Jet A					
Daily Usage (gal.)		4,368	4,927	5,726	8,029
14-Day Supply (gal.)	73,700	30,600	69,000	80,200	112,400
Annual Usage (gal.)		1,594,307	1,798,400	2,089,900	2,930,500
AvGas					
Daily Usage (gal.)		490	483	486	461
14-Day Supply (gal.)	12,000	6,900	6,800	6,800	6,400
Annual Usage (gal.)		178,887	176,200	177,300	168,100

Sources: Historic fuel flowage data provided by MFE Management; Fuel supply projections prepared by Coffman Associates.

Aircraft Rescue and Firefighting

Part 139 airports are required to provide ARFF services during air carrier operations. Each certificated airport maintains equipment and personnel based on an ARFF index established according to the length of aircraft and scheduled daily flight frequency. In terms of flight frequency, an airport's ARFF index is determined by the longest aircraft conducting at least five or more daily departures. In terms of aircraft length, there are five indices, A through E, with A applicable to the smallest aircraft and E the largest.

The current ARFF equipment and staffing available at MFE generally meets ARFF Index C, based on operations by large air carrier aircraft with a length between 126 feet and 159 feet (i.e., MD-80; Boeing 737/757). The ARFF index applicable to MFE is anticipated to remain within ARFF Index C; therefore, no changes are needed to maintain an adequate level of fire protection. **Table 3X** presents the vehicle requirements and capacities for each index level.

FAA design standards recommend ARFF station facilities and equipment be located such that equipment can respond to emergencies on the terminal apron without having to cross an active runway. The ARFF station is currently located on the east side of Runway 18-36. In this location, ARFF equipment must cross the active Runway 18-36 in the event of an emergency on the terminal apron. Future plans include the closure of Runway 18-36, which will also eliminate this runway crossing issue.

Maintenance Facilities

Airport maintenance equipment are stored in bays 1-4 in the air cargo facility. Future planning will consider other potential locations that could accommodate a dedicated maintenance facility in order to maximize space for air cargo needs and better segregate maintenance activities from the airfield activities.

A summary of the general aviation landside facilities previously discussed at MFE is presented on **Exhibit 3G**.

TABLE 3X
ARFF Index Requirements

Index	Aircraft Length	Requirements
Index A	<90'	1. One ARFF vehicle with 500 lbs. of sodium-based dry chemical or 2. One vehicle with 450 lbs. of potassium-based dry chemical and 100 lbs. of water and AFFF for simultaneous water and foam application
Index B	90'-126'	1. One vehicle with 500 lbs. of sodium-based dry chemical and 1,500 gallons of water and AFFF or 2. Two vehicles, one with the requirements for Index A and the other with enough water and AFFF for a total quantity of 1,500 gallons
Index C	126'-159'	1. Three vehicles, one having Index A, and two with enough water and AFFF for all three vehicles to combine for at least 3,000 gallons of agent or 2. Two vehicles, one with Index B and one with enough water and AFFF for both vehicles to total 3,000 gallons
Index D	159'-200'	1. One vehicle carrying agents required for Index A and 2. Two vehicles carrying enough water and AFFF for a total quantity by the three vehicles of at least 4,000 gallons
Index E	>200'	1. One vehicle with Index A and 2. Two vehicles with enough water and AFFF for a total quantity of the three vehicles of 6,000 gallons

AFFF: Aqueous Film-Forming Foam
ARFF: Aircraft Rescue and Firefighting

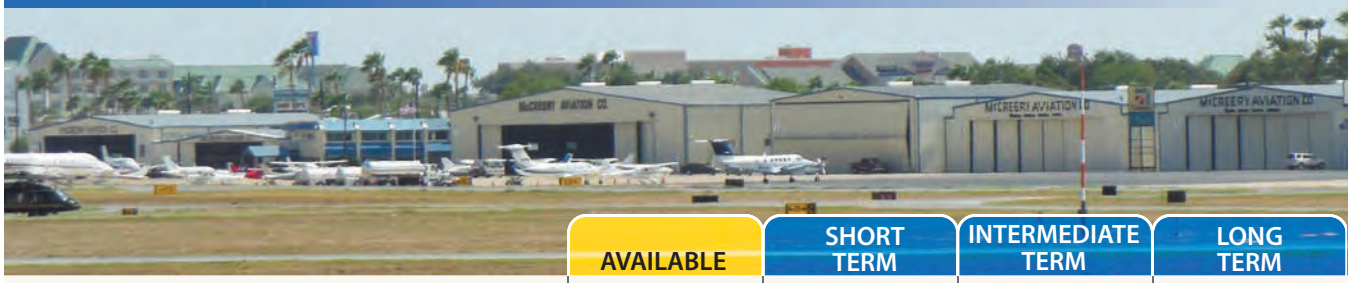
Source: Title 14 Code of Federal Regulations Part 139

SUMMARY

This chapter has outlined the safety design standards and facilities required to meet potential aviation demand projected at MFE for the next 20 years. In an effort to provide a more flexible Master Plan, the yearly forecasts from Chapter Two have been converted to planning horizon levels. The short term roughly corresponds to a five-year timeframe, the intermediate term is approximately 10 years, and the long term is 20 years. By utilizing planning horizons, airport management can focus on demand indicators for initiating projects and grant requests rather than on specific dates in the future.

In Chapter Four, potential improvements to the airfield and landside systems will be examined through a series of airport development alternatives. Most of the alternatives discussion will focus on those capital improvements that would be eligible for federal and state grant funds. Other projects of local concern will also be presented. Ultimately, an overall development plan that presents a vision beyond the 20-year scope of this Master Plan will be developed for MFE.

Aircraft Storage Hangar Requirements



	AVAILABLE	SHORT TERM	INTERMEDIATE TERM	LONG TERM
T-Hangar Area (sf)	39,389	37,500	33,800	31,200
Conventional Hangar Area (sf)	247,317	272,800	304,300	364,300
Service/Maintenance Area (sf)		32,000	33,800	37,500
Total Hangar Storage Area (sf)	286,706	342,300	371,900	433,000

Aircraft Parking Apron

Transient Single/Multi-Engine Aircraft (sy)		24,000	25,600	28,800
Transient Business Jet (sy)		12,000	12,800	14,400
Local Based (sy)		10,400	10,750	12,000
Total Apron Area (sy)	86,112	46,400	49,200	55,200

General Aviation Terminal Facilities and Parking

Building Space (sf)	4,700	6,000	7,000	8,300
GA Terminal Parking Spaces		36	40	48
GA Based Aircraft Spaces		64	68	75
GA FBO/SASO Employee Spaces		51	54	60
Total GA Parking Spaces	161	151	162	183

Support Facilities

14-Day Fuel Storage - 100LL	12,000	6,800	6,800	6,400
14-Day Fuel Storage - Jet A	73,700	69,000	80,200	112,400
ARFF Index	Index C	Index C	Index C	Index C
Security Fencing/Gates	Chainlink security fencing; 9 electrically operated vehicle gates	Maintain and expand as necessary		
Perimeter Service Road	Pavement perimeter service roadway with access controls	Maintain and expand as necessary		
Airport Maintenance Facility	Maintenance equipment housed in air cargo facility	Construct dedicated airport maintenance facility		

McAllen International Airport

Chapter 4

Airport Development Alternatives

CHAPTER FOUR

Airport Development Alternatives

In the previous chapter, airside and landside facilities required to satisfy the demand through the long-range planning period were identified. The next step in the planning process is to evaluate reasonable ways these facilities can be provided. There can be numerous combinations of design alternatives, but the alternatives presented here are those with the perceived greatest potential for implementation.

Any development proposed for a master plan is evolved from an analysis of projected needs for a set period of time. Though the needs were determined by utilizing industry accepted statistical methodologies, unforeseen future events could impact the timing of the needs identified. The master planning process attempts to develop a viable concept for meeting the needs caused by projected demands for the next 20 years. However, no plan of action should be developed which may be inconsistent with the future goals and objectives of the City of McAllen, which has a vested interest in the development and operation of the McAllen International Airport (MFE or Airport).

The development alternatives for the Airport can be categorized into two functional areas: the **airside** (runways, navigational aids, taxiways, etc.) and **landside** (terminal area, hangars, apron, and support facilities). Within each of these areas, specific capabilities and facilities are required or desired. In addition, the utilization of Airport property to provide revenue support and to benefit the economic development and well-being of the local area must be considered.

Each functional area interrelates and affects the development potential of the others. Therefore, all areas are examined individually and then coordinated as a whole to ensure the final plan is functional, efficient, and cost-effective. The total impact of all these factors on the Airport must be evaluated to determine if the investment in MFE will meet the needs of the City and the Rio Grande Valley, both during and beyond the 20-year planning period.

The alternatives considered later in this chapter will be evaluated by a variety of methods to determine which of the alternatives will best fulfill the local aviation needs. With this information, as well as input from various Airport stakeholders, a final Airport concept can evolve into a realistic development plan.

NON-DEVELOPMENT ALTERNATIVES

Prior to the presentation of development alternatives for MFE, there are several non-development options that should be considered. Non-development alternatives include a "no-build" or "do-nothing" alternative, development of a new replacement airport at a new location, or closure of the existing Airport and the transfer of services to another existing airport. The following will present a discussion of the three primary non-development alternatives and the impact of pursuing each.

NO-BUILD/DO-NOTHING ALTERNATIVE

The no-build alternative essentially considers making no new capital investments in the Airport. Limited maintenance and upkeep would continue so that the Airport remains safe for aviation activity. No new hangars or apron area would be planned to be built by the airport sponsor; however, this would not, and could not, include the prohibition of hangar construction by a private entity. The obvious result of the no-build alternative is that the Airport would be unable to meet the forecast demand for aviation services in the area.

The primary reason a community might choose a no-build alternative is to ultimately not be bound by the grant assurances associated with the acceptance of airport development grants. As described in the previous section, grant assurances are part of the grant package contract that the airport sponsor commits to when accepting a development grant from FAA. As such, airport sponsors are bound to maintain the useful life of the facilities developed or equipment acquired for an airport development project. Useful life is a term not to exceed twenty (20) years from the date of acceptance of a grant offer of federal (FAA) funds for a project. There is no limit on the duration of the terms, conditions, and assurances with respect to real property acquired with federal (FAA) funds.

The Airport has received more than $36.5 million in development grants since 2005. These grants represent a direct economic stimulus that has lasting positive economic impacts. The no-build alternative means that the City of McAllen would forgo future grants for airport development, which would have a negative economic impact which, over time, would become more noticeable.

The City of McAllen has a vested interest in maintaining and improving airport facilities for commercial and general aviation users. Without a commitment to ongoing improvement of the Airport, users of the Airport will be constrained from taking full advantage of the Airport's air transportation capabilities.

The unavoidable consequence of the no-build alternative is that the capability of the Airport would diminish over time. It's ability to serve commercial passenger airline service, air cargo airline service, and general aviation markets would deteriorate. This would lead to diminished activity levels and would ultimately negatively impact the local and regional economy. Safety concerns would arise, especially if necessary routine maintenance were deferred and the liability for damage to aircraft or accidents would increase. The long-term consequences of the no-build alternative would be to reduce the quality of the existing airport facilities over time, producing undesirable results. This scenario would result in an overall unpleasant experience for regular users and visitors.

RELOCATE AIRPORT ALTERNATIVE

This option considers constructing a new airport to replace the existing MFE. The new airport would have to be completed prior to closure of the existing airport. Additional study beyond the scope of this master plan would be required. These would include a feasibility study, a site selection study, a master plan for the replacement site, and appropriate environmental documentation of the new site (typically an environmental assessment [EA] or environmental impact statement [EIS]).

An important consideration is the potential cost associated with both constructing a new airport and closing the existing airport. **Table 4A** presents broad estimates of associated costs based on knowledge of current construction costs in Texas and on costs associated with various federal regulations, such as the *Uniform Act*, which provides minimum standards for federally funded projects that require property acquisition or displacing persons from their homes, businesses, or farms. It is estimated that it would cost up to $472 million to construct a new airport with similar capabilities as the existing airport.

A more detailed analysis would need to be undertaken to identify an acceptable site and to refine the project cost estimates. A large portion of the development costs would be eligible for FAA grant funding. Typically, non-revenue producing facilities to be located within the airport property line are eligible for funding. Elements outside the property line, such as utility extension and surface roads, are not eligible for funding.

Often the trigger for pursuing a replacement airport is encroachment upon the existing airport to the point where it can no longer fulfill its role in the national aviation system. MFE is constrained to a certain degree; however, it can serve its existing aviation fleet mix of passenger service, air cargo, and general aviation aircraft. The Airport's airfield is limited in that it lacks redundancy so if the primary runway is shut down for maintenance or an emergency incident, the Airport is closed to operations. The crosswind runway is too short to accommodate most aircraft and it is ultimately planned to be closed. As a result, any major pavement rehabilitation projects to the primary runway could close the Airport for a lengthy period potentially risking the elimination of commercial activities.

TABLE 4A
Replacement Airport Initial Cost Estimate

Project Element	Quantity	Unit	Unit Cost	Estimate
Land	370	ac	$50,000	$18,500,000
Earthworks/Drainage	2,000,000	cy	$5	$10,000,000
Runway Pavement	47,000	sy	$150	$7,050,000
Taxiway Pavement	120,000	sy	$150	$18,000,000
Taxilane Pavement	100,000	sy	$130	$13,000,000
Apron	200,000	sy	$150	$30,000,000
Runway Edge Lighting	140	Unit	$2,500	$350,000
Taxiway Edge Lighting	140	Unit	$2,500	$350,000
Signage	40	Unit	$7,000	$280,000
Marking	30,000	lf	$15	$450,000
MALSR	1	Unit	$1,500,000	$1,500,000
PAPI, REIL	1	Unit	$120,000	$120,000
AWOS	1	Unit	$200,000	$200,000
Terminal Building	1	Unit	$52,000,000	$52,000,000
ARFF Facilities	1	Unit	$5,000,000	$5,000,000
Roads/Utilities (On Airport)	1	Unit	$20,000,000	$20,000,000
Hangars/Relocation Costs	700,000	sf	$200	$140,000,000
Subtotal				**$208,861,667**
Engineering, Design (12%)				$38,016,000
Construction Inspection, Admin. (13%)				$41,184,000
Contingency (15%)				$47,520,000
Roads/Utilities (Off-Airport) [1]	1	Unit	$25,000,000	$25,000,000
Planning Studies	1	Unit	$2,000,000	$2,000,000
Environmental – EA/EIS	1	Unit	$1,500,000	$1,500,000
TOTAL				**$472,020,000**

[1] Not eligible for federal funding.

If a replacement airport feasibility study were to be undertaken, a detailed analysis should identify a site capable of developing equivalent airside, terminal, and general aviation facilities that exist at MFE today, with added airfield redundancy, while providing convenient access to the local and regional service area. In addition, the replacement airport would have to obtain an Airport Operating Certificate (AOC) as a Part 139 commercial service airport. All regulations regarding Part 139 airports would have to be adhered to, including TSA passenger and bag screening, on-airport firefighting, security measures, and daily inspections, to name a few.

TRANSFER SERVICE TO ANOTHER AIRPORT ALTERNATIVE

The feasibility of transferring services to an alternate airport relies on answering two primary questions: first, is a capable alternative airport reasonably located to accommodate MFE's primary air service area

(Rio Grande Valley) and, second, can a nearby airport accommodate MFE's existing and projected aviation demand factors? An analysis of regional airports has been completed to determine if transferring aviation demand is reasonable.

There are five public-use airports within 60 miles of MFE; however, three of those (South Texas International Airport at Edinburg, Mid Valley Airport, and Port Isabel-Cameron County Airport) are general aviation airports that do not have adequate facilities to accommodate scheduled commercial passenger or cargo airline service activity. Transferring commercial airline service activities to a general aviation airport would require substantial capital investment, extensive modifications, and potentially significant environmental impacts. Also, general aviation airports are not certified as 14 Code of Federal Regulations (CFR) Part 139 airports. Part 139, (which implemented provisions of the *Airport and Airway Development MFE of 1970*, as amended Nov. 27, 1971) set standards for airport facilities, including: marking and lighting of areas used for operations; firefighting, public protection, and rescue equipment and services; handling and storing of hazardous materials; identification of obstructions; and safety inspection and reporting procedures. Airports that meet the requirements for Part 139 certification are issued an Airport Operating Certificate (AOC). AOCs serve to ensure safety in air transportation. To obtain a certificate, an airport must comply with operational and safety standards and provide for certain safety services and facilities.

The two other public-use airports serving the region are Valley International Airport (HRL) and Brownsville/South Padre Island International Airport (BRO), both of which are Part 139 certificated primary commercial service airports. Both airports are located within a one hour and 15-minute drive time from McAllen and offer scheduled commercial operations. **Table 4B** provides a summary of available facilities at these airports compared with MFE.

TABLE 4B
Rio Grande Valley Commercial Service Airport Facility Comparison

	Airport Property (Acres)	Runways / Longest	Visibility Minimums	Terminal Building Area (sf)	Available Terminal Gates	ARFF Index
MFE	370	2 / 7,120'	½-mile	148,176	6	C
HRL	2,428	3 / 8,301'	½-mile	144,000	7	B
BRO	1,700	2 / 7,399'	½-mile	85,000[a]	4[b]	B

[a] Planned new terminal building under development.
[b] Information per *Draft Environmental Assessment for the Brownsville/South Padre Island International Airport New Passenger Terminal*, March 2015.
Additional sources: FAA Form 5010 Airport Master Records; Airnav.com; FAA *Part 139 Certification Status List*, 12/12/2017; Communication with Valley International Airport staff.

HRL and BRO are both equipped with two or more runways, with each airport's longest runways exceeding the 7,120 feet available at MFE. HRL's runways are constructed to accommodate airline and air cargo aircraft operations with pavement strengths (up to 350,000 pounds dual tandem wheel) and at lengths, up to 8,300-feet, that can accommodate the current and forecasted MFE aircraft fleet mix. BRO's primary runway is strength-rated up to 240,000 pounds dual tandem wheel and is 7,399 feet long, which

would also accommodate MFE's aircraft fleet mix but to a lesser degree than HRL. HRL's terminal building is 144,000 square feet (sf) with seven available gates. The MFE terminal requirements analysis in this Master Plan identified a need for a 150,000-sf terminal facility with nine gates in the long-term. To accommodate the airport's current passenger levels, plus the activity forecasted at MFE, HRL's terminal building would need to undergo extensive expansion. BRO received a federal Airport Improvement Program (AIP) grant in 2017 to construct a new terminal building, totaling 85,000 sf with four gates. This new facility would also not accommodate the addition of MFE's forecasted passenger traffic.

In addition to needed terminal facility expansions, if services were transferred from MFE to either HRL or BRO, aircraft rescue and firefighting (ARFF) equipment and facilities would also need to be expanded. MFE currently meets Index C ARFF requirements, while HRL and BRO report as Index B airports. Moving to Index C could require these airports to purchase additional equipment and possibly increase ARFF staffing levels.

At 2,428 acres, HRL is the least land-constrained airport of the three, allowing for the ability to more easily expand airfield and terminal area facilities. BRO, situated on 1,700 acres, is located in a more developed area with expansion constraints in all directions. Finally, HRL is nearer to McAllen than BRO making it a more convenient site to transfer services from MFE.

In addition to scheduled airline service, MFE has significant air cargo and general aviation activities that have invested in their facilities. MFE's air cargo operations are projected to grow to 15,800 tons handled by 2036, which requires air cargo handling facilities, docking positions, and staging areas. HRL has air cargo handling facilities; however, adding MFE's operations would require the addition of new facilities and apron areas. Furthermore, the general aviation activity at MFE consists of 122 based aircraft growing to 150 by 2036 and a need for up to 146,300 sf of new hangar storage capacity. HRL currently has 60 based aircraft. It is likely that if MFE were to transfer services, based aircraft would redistribute among the various airports in the region so the full general aviation demand would not need to be accommodated at HRL.

Another consideration would be to only shift a portion of demand to another airport in the area. One option could be to shift cargo operations from MFE to another airport which could minimize ultimate runway length needs. A nearby solution for relieving cargo operations from MFE is Moore Field Airport (7TE7), located approximately 10 miles northwest of Mission, Texas. Moore Field Airport, previously a U.S. Air Force flight training facility, is currently owned by the Department of Agriculture and is a private-use only airport with three runways, the longest of which measures 5,150 feet long and 300 feet wide. The reason this facility may be attractive for air cargo operations is that Hidalgo County is constructing a new loop road (State Highway 365) around the McAllen metropolitan area and Moore Field Airport is within proximity to Section C of the planned new loop road. The loop could lead to significant development of the area as it is planned to be constructed over the next 25-30 years and will consist of approximately 102 miles of new roadway.

Some considerations for transferring air cargo services to Moore Field include that it is a private-use airport and is not included within the FAA's NPIAS; therefore, it is not currently eligible for federal AIP funding. So, any improvements needed to make it suitable for air cargo operations would need to be

locally funded unless it is first inserted into the NPIAS, which can be a challenging endeavor. Furthermore, it is currently a private-use only airport. The airport's owner would need to be willing to sponsor the airport for FAA NPIAS and grant funding eligibility and would also be required to update and upgrade the airport accordingly.

If it is determined that the sponsor of Moore Field Airport is willing to accept air cargo operations, significant facility upgrades would be needed. To accommodate air cargo operations similar to those operating at MFE currently, the airport would need new cargo handling facilities and associated infrastructure, a dedicated air cargo apron, and expanded airfield, including enlarged safety areas and a runway extension. **Exhibit 4A** depicts simplistic and straight-forward extension alternatives for Runways 13-31 and 18-36 at Moore Field Airport. Options are shown for extensions to either end of both runways, which are oriented generally north/south, and are the most likely candidates for an extension with prevailing wind conditions favoring this runway alignment.

The alternatives show a two-phased extension: the first phase takes the runway to 7,200 feet, which is similar to the length available at MFE currently, and a second phase extension to 9,400 feet, which accommodates the Boeing 767-300F at 90 percent useful load. As shown, an extension of Runway 13-31 to the southeast would require the rerouting of Moorefield Road and impacts residential properties in that area. An extension of Runway 13-31 to the northwest has fewer constraints but would still impact a developed commercial property. An extension of Runway 18-36 to the north would impact the access road to the La Gloria landfill and an extension to the south would impact several residential properties.

Ultimately, transferring air cargo operations to Moore Field Airport would take significant local capital investment, and if not yet included in the NPIAS, no federal grant dollars would be available through the AIP program. In addition, shifting cargo from MFE to Moore Field would not be reasonable and/or feasible until after the completion of the loop road system, which may not be done for many years. MFE has the capacity to accommodate air cargo operations now and, unless there is drastic growth in activity, should be able to accommodate air cargo operations for years to come. Furthermore, transferring air cargo operations to another airport would eliminate a revenue stream for MFE, so this alternative should be carefully scrutinized before being moved forward.

Other factors should also be considered prior to suggesting a transfer of service to another airport. The City of McAllen has accepted federal development grant funding through the AIP for projects at MFE. Development grants come with certain grant assurances that the airport sponsor must comply with the award of the grant. One of the grant assurances is for the sponsor to maintain the improvement for its useful life, typically twenty (20) years. Acceptance of development grants also obligates the airport sponsor to maintain the airport as an airport. Closing the existing Airport and transferring services to another existing airport would be considered a violation of these grant assurances, requiring repayment of grants not yet fully depreciated. Since 2005, the FAA has invested approximately $36.5 million dollars in projects at MFE. If scheduled airline activities were transferred to another Airport with MFE continuing to operate as a general aviation airport, FAA investments in the terminal and other airline support-related grants, such as aircraft rescue and firefighting (ARFF) equipment and facilities, may be required to be paid back to the FAA. Since 2005, the FAA has invested approximately $8.5 million dollars in terminal and airline support projects at MFE. The investments made, and the economic benefits received

from the Airport, both public and private, could not readily be shifted or regenerated to another airport without significant costs/losses. As such, this alternative is not considered practical, reasonable, and/or financially feasible.

NON-DEVELOPMENT ALTERNATIVES SUMMARY

The purpose of this Master Plan is to examine aviation needs at MFE over the course of the next 20 years. Therefore, this Master Plan will examine the needs of the existing airport and will present a program of needed capital improvement projects to cover the scope of the plan. Nonetheless, various non-development alternatives may be considered by the airport sponsor.

Information pertaining to the three most common non-development alternatives has been presented. These are the no-build, relocate/replacement alternatives, and transfer of services. This evaluation is not intended as a recommendation to pursue one of these alternatives; instead, it is for informational purposes only. If the airport sponsor were to pursue one of these alternatives, additional study beyond the scope of this Master Plan would be required.

Two of the three non-development alternatives would lead to the closure, or a significantly reduced operation, of the existing airport. There is a lengthy process to obtain approval for this course of action. As outlined, the primary hindrance to considering airport closure is the fact that airports have accepted federal development grants that include certain grant assurances, one of which is to maintain the improvement for its useful life (20 years). If an airport is closed in the interim, then the sponsor could be required to refund all or a portion of the past federal investment. Moreover, private investments by any airport operator would also require some form of repayment based on negotiated lease terms.

REVIEW OF THE PREVIOUS AIRPORT PLAN

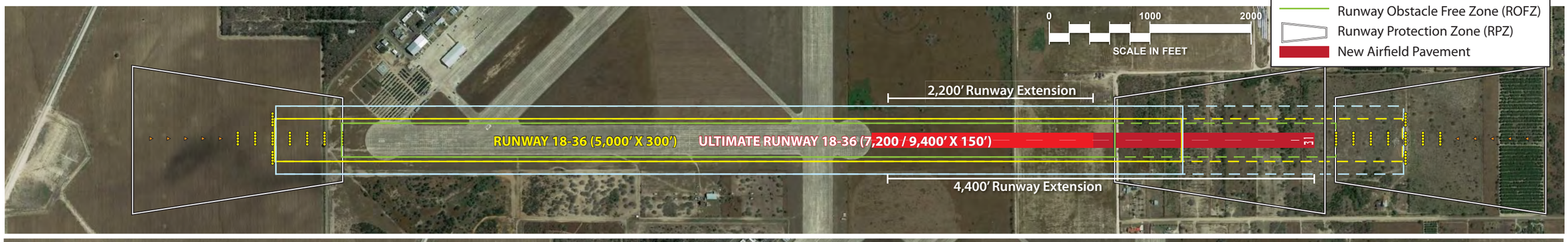
The last master plan was completed in 2005. The following is a summary of major facility needs from the previous master plan:

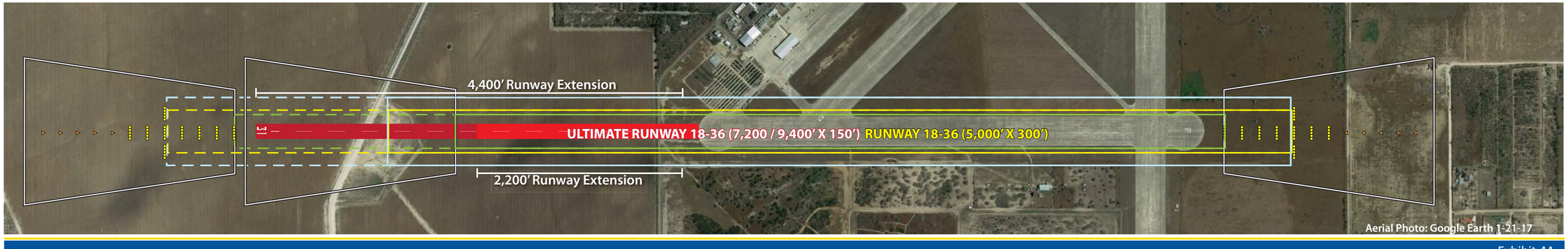
Airfield

- Land for airport expansions, the most critical master plan need
- Replace the Runway 13 (now 14) instrument landing system (ILS)
- Runway 13-31 (now 14-32) extension to 8,500 feet and to 10,000 feet ultimately
- Install ILS, Runway 31 (now 32)
- Potential new runway (after 20 years)
- Potential air cargo apron expansion
- Close Runway 18-36

2,050′ Runway Extension
RUNWAY 13-31 (5,150′ X 300′)
ULTIMATE RUNWAY 13-31 (7,200 / 9,400′ X 150′)
31
RUNWAY 18-36
RUNWAY 9-27
4,250′ Runway Extension

2,050′ Runway Extension
13
RUNWAY 13-31 (5,150′ X 300′)
ULTIMATE RUNWAY 13-31 (7,200 / 9,400′ X 150′)
4,250′ Runway Extension
NORTH
LEGEND
Runway Safety Area (RSA)
Runway Object Free Area (ROFA)
Runway Obstacle Free Zone (ROFZ)
Runway Protection Zone (RPZ)
New Airfield Pavement


0
1000
2000
SCALE IN FEET
2,200′ Runway Extension
RUNWAY 18-36 (5,000′ X 300′)
ULTIMATE RUNWAY 18-36 (7,200 / 9,400′ X 150′)
31
4,400′ Runway Extension


4,400′ Runway Extension
31
ULTIMATE RUNWAY 18-36 (7,200 / 9,400′ X 150′)
RUNWAY 18-36 (5,000′ X 300′)
2,200′ Runway Extension
Aerial Photo: Google Earth 1-21-17

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Terminal

- Expand security screening area
- Expand outbound baggage area
- Expand inbound baggage and bag claim areas
- Relocate Gate One
- Add air carrier gates

Parking and Access

- Short-term and long-term parking expansion
- Potential parking garage
- Relocate various facilities to accommodate parking expansions
- Westbound ramp from U.S. 83 to Bicentennial Boulevard
- Land acquisition for surface parking expansions

Since the completion of the last master plan, the most significant improvements at MFE have focused on the terminal building, which has been upgraded and expanded. Additional projects included routine airfield pavement rehabilitation and maintenance projects, improvements to the air cargo apron, and improvements to the runway safety area (RSA), including the installation of an engineered material arresting system (EMAS) bed beyond the end of Runway 14.

AIRSIDE PLANNING CONSIDERATIONS

Generally, airside issues relate to those airport elements that contribute to the safe and efficient transition of aircraft and passengers from air transportation to the landside facilities at the airport. Planning must factor and balance many airside items, including meeting FAA design parameters of the established design aircraft, instrument approach capability, airfield capacity, runway length, taxiway layouts, and pavement strengths. Each of these elements for MFE was analyzed in the previous chapters. This chapter will examine airside improvement opportunities to meet design standards and/or capacity constraints. **Exhibit 4B** presents a summary of the primary airside planning issues to be considered in this alternatives analysis.

As discussed in the Aviation Demand Forecasts chapter of this Master Plan, a Runway Design Code (RDC) identifies the appropriate design standards to apply to the runway and taxiway system. The existing and ultimate RDC for Runway 14-32 and the planned future parallel runway is D-IV-2400. The RDC for Runway 18-36 is A-I(S)-VIS; however, Runway 18-36 is planned to ultimately be closed. The applicable design standards were presented on Table 3L in the previous chapter.

PARALLEL RUNWAY

The airfield capacity analysis conducted in the previous chapter concluded the long-term planning horizon operation levels will reach approximately 55.7 percent of the airfield's annual service volume (ASV).

AIRSIDE:

- Meet Runway Design Code (RDC) RDC D-IV-2400 design standards for Runway 14-32 and a planned future parallel runway
- Runway 14-32 extension alternatives
- Parallel runway siting alternatives
- Meet Taxiway Design Group (TDG) 5 standards
- Mitigate non-standard taxiway geometry conditions
- Close Runway 18-36

TERMINAL:

- Expand concourse area including additional gates
- Expand terminal building footprint to allow for functional area reorganization/growth

LANDSIDE:

- Expansion of the air cargo apron
- Development sites for a Consolidated Rental Car Center (CONRAC)
- Vehicle parking lot expansion including a potential parking garage
- Development potential for Runway 18-36 once closed
- Identify potential hangar development sites
- Potential ARFF Station Relocation Sites

The 60 percent level threshold that indicates additional airfield capacity could be needed and, at a minimum, plans for improving capacity should be developed. Furthermore, as a commercial service airport, it is important to have redundancy in the airfield system to ensure operations can continue uninterrupted in the instance that the primary runway is undergoing significant rehabilitation or is closed for any reason. Most commercial service airports, especially small through large hub level airports, are served with at least two runways capable of serving commercial airline operations.

Currently, the crosswind runway at MFE is too short to accommodate commercial service activities, and it cannot be reasonably upgraded to meet RDC D-IV-2400 design standards. As a result, when Runway 14-32 undergoes rehabilitation work, which will be needed at some point in the future, the Airport would effectively have to close for a lengthy period lasting anywhere between weeks or months depending on the scope of work. Commercial airline operators, including the passenger and cargo airlines, may choose to stop serving MFE altogether and relocate their activities to other regional airports rather than cease activity for the duration. At a minimum, the loss of commercial airline operations would significantly disrupt local economic conditions. To guard against this threat, a new parallel runway has been planned to provide redundancy and support the long-term viability of commercial airline operations.

A planned parallel runway should be constructed to accommodate the commercial service operators using the Airport now and planned in the future. This includes narrow body aircraft such as the Boeing 737-700/800/900 series, Airbus A320 series, and the Boeing 757-200 and 767-300F air cargo aircraft. The RDC applied to the parallel runway should also match that of the existing Runway 14-32, again to provide redundancy in the system. Therefore, RDC D-IV-2400 design standards will be applied to the parallel runway.

The most significant challenge is siting of the parallel runway in a relatively constrained environment. The Airport does not have land available to construct a new runway; therefore, additional property would need to be acquired. Constraints to expansion around the airport include:

- The Colonia Hermosa residential subdivision immediately west of the airfield.
- La Plaza shopping mall, McAllen Country Club, and other commercial and residential developments north/northeast of the Airport.
- The Mission Inlet Floodway Channel and associated levees that extend along the Airport's southern boundary.
- The Hidalgo County Water Irrigation District Channel along the Airport's southern boundary.
- Springfest Park located south of the Airport.
- A motocross park planned by the City of McAllen, which is proposed to be located south of the Airport.
- An unnamed reservoir south of the Airport.
- South 23rd Street to the west of the Airport.
- South 10th Street to the east of the Airport.

Developments to the north make the construction of a parallel runway to the north impractical and unreasonable. The Mission Inlet floodway channel south of the Airport has protected against significant encroachment by residential and commercial development; however, the channel itself is a barrier to

airport expansion as well. With no other feasible option, development of a parallel runway will need to be considered only on sites to the south of the current runway.

RUNWAY LENGTH

The runway length analysis in the previous chapter concluded that the existing Runway 14-32 length of 7,120 feet is adequate for most aircraft operating at the Airport currently, especially during temperate weather and when aircraft operate at useful loads less than 90 percent. During hot days, heavier aircraft can be restricted down to 70 percent useful loads. To allow for heavier aircraft to operate on hot days at heavier useful loads, additional runway length is needed.

The current critical design aircraft, the Boeing 737-800/900, needs up to 10,500 feet to operate at 100 percent useful load, and the Boeing 757-200 needs up to 8,400 feet to operate at 100 percent useful load. The ultimate critical design aircraft, the Boeing 767-300F, needs up to 11,500 feet to operate at 100 percent useful load. However, these aircraft operate to destinations well under the maximum range of the aircraft, so they do not typically need to operate at 100 percent useful load. Therefore, the airfield alternatives will consider various lengths between the range of 7,200 feet and 10,331 feet, the latter being what is proposed for Runway 14-32 on the current Airport Layout Plan (ALP).

AIRFIELD DESIGN STANDARDS

The Safety Area Design Standards section in the previous chapter outlined several non-standard airfield conditions associated with the Runway Protection Zones (RPZs) and the Runway Object Free Area (ROFA). As was previously outlined, Runway 14-32 is planned to meet RDC D-IV-2400 airfield design standards. The standard ROFA on the Runway 32 end is obstructed by the perimeter service road, perimeter fencing, and S. 10th Street. The Airport has ownership/easement control over 91.6 percent of its RPZs; however, the Runway 14 RPZ includes incompatible land uses including residential properties, commercial buildings, and Airport Park. A portion of the Runway 32 RPZ also extends beyond Airport property and includes S. 10th Street, which is an incompatible land use.

The airfield alternatives to follow will examine options to fully meet RDC D-IV-2400 airfield design standards in concert with extending the primary runway and adding a new parallel runway. Typically, alternatives to meet FAA design standards can include options to reduce available runway length or to increase instrument approach visibility minimums to mitigate non-standard conditions; however, these alternatives would further restrict aviation activity, making the Airport less accessible to aircraft. This is counter to the primary issues under consideration at MFE, which are to examine options to improve airfield capacity and safety and to make the Airport more accessible to a wider range of aircraft. Therefore, any alternative that results in a shorter available runway length or increased instrument approach procedure minimums has been eliminated from consideration.

TAXIWAY CONFIGURATION

There are several existing non-standard taxiway geometry conditions that need to be addressed. These non-standard conditions include:

1. Taxiway A at the Runway 14 threshold provides direct access from the air cargo apron to the runway.
2. Taxiway A3 provides direct access to Runway 14-32 from the terminal apron.
3. Taxiways C1, C2, and D provide direct access to Runway 18-36 from the general aviation apron.
4. Approximately 150 feet of the north end of Runway 18-36 is marked as an aligned taxiway. Aligned taxiways are prohibited by the FAA.
5. Taxiway D intersects with Runway 18-36 in the high energy area.

Each of these conditions can lead to pilots inadvertently taxiing onto the runway and causing a runway incursion and other potentially dangerous airfield safety concerns. Conditions 3, 4, and 5 are corrected by closing Runway 18-36. For Conditions 1 and 2, the simplest and most feasible method to correct a direct-access taxiway is to add no-taxi islands to Taxiway A and A3 that would force pilots to make turns prior to entering the runway. The no-taxi islands alternative is depicted in **Figure 4A**.

Alternatives to reroute the physical pavement connectors are not feasible in these cases because the terminal apron connects directly to Taxiway A, so offsetting A3 would only create a new direct-access point. Constructing an off-set taxiway to the cargo apron would still require incorporating a no-taxi island, as proposed in **Figure 4A**. No-taxi islands are typically the least costly alternative and easiest to implement compared to alternatives that involve adding new pavement and demolishing/abandoning existing pavement.

FIGURE 4A
No-Taxi Island Alternative

AIRSIDE ALTERNATIVES

Eight airfield alternatives have been prepared to address the issues outlined above. The details of each alternative are described below along with the alternative's associated advantages and disadvantages. Each alternative will be evaluated based upon the following factors:

1. Primary runway length
2. Parallel runway length
3. Capability for simultaneous takeoff/landing operations
4. Amount of property acquisition needed
5. Impacted residential properties
6. Noise exposure
7. Ability to meet full FAA RSA/ROFA/RPZ design standards
8. Estimated cost

The first three evaluation criteria consider the alternative's impact on airfield capacity. Criterions 4-6 evaluate the alternative's impact on the surrounding community, property ownership impacts, and the potential for noise exposure impacts. For any properties within RPZs Criterion 7 evaluates whether the alternative fully meets FAA's airport design standards, and criterion 8 provides an estimated cost range for the alternative.

Since the alternatives will consider expanding the footprint of the Airport it will also be necessary to consider impacts of extending Runway 14-32 and of a future parallel runway to the vicinity roadway network. For this purpose, Hidalgo County's Metropolitan Planning Organization's *2015 Thoroughfare Plan*[1], as amended, will be utilized.

Cost estimates have been developed for each alternative by an engineering services firm. Due to the scale of the projects under consideration, an estimated cost range is provided which allows for variability that is inevitable within any project design and construction process.

AIRFIELD ALTERNATIVE 1

Depicted on **Exhibit 4C**, Airfield Alternative 1 is the simplest of all alternatives under consideration. The purpose of this alternative is to address only the airfield design standard issues. The various constraints to expansion may result in a lengthy time before the Airport will be able to pursue the construction of a runway extension or a new parallel runway. This alternative allows the Airport to ensure it meets all airfield design standards on the existing runway while it pursues expansion alternatives.

This alternative carries forward previous plans to install a new EMAS bed at the far end of Runway 32. The EMAS bed is the same size as what currently exists beyond the end of Runway 14. Adding the EMAS

[1] Approved by the Transportation Policy Committee on February 18, 2016 and by the County Commissioner's Court on March 22,2016.

ALTERNATIVE 1 - Estimated Cost: $25,469,900

DECLARED DISTANCES	RUNWAY 14	RUNWAY 32
TORA	7,120′	7,120′
TODA	7,120′	7,120′
ASDA	7,120′	7,120′
LDA	6,983′	7,120′

TODA - Takeoff Distance Available
TORA - Takeoff Run Available
ASDA - Accelerate/Stop Distance Available
LDA - Landing Distance Available

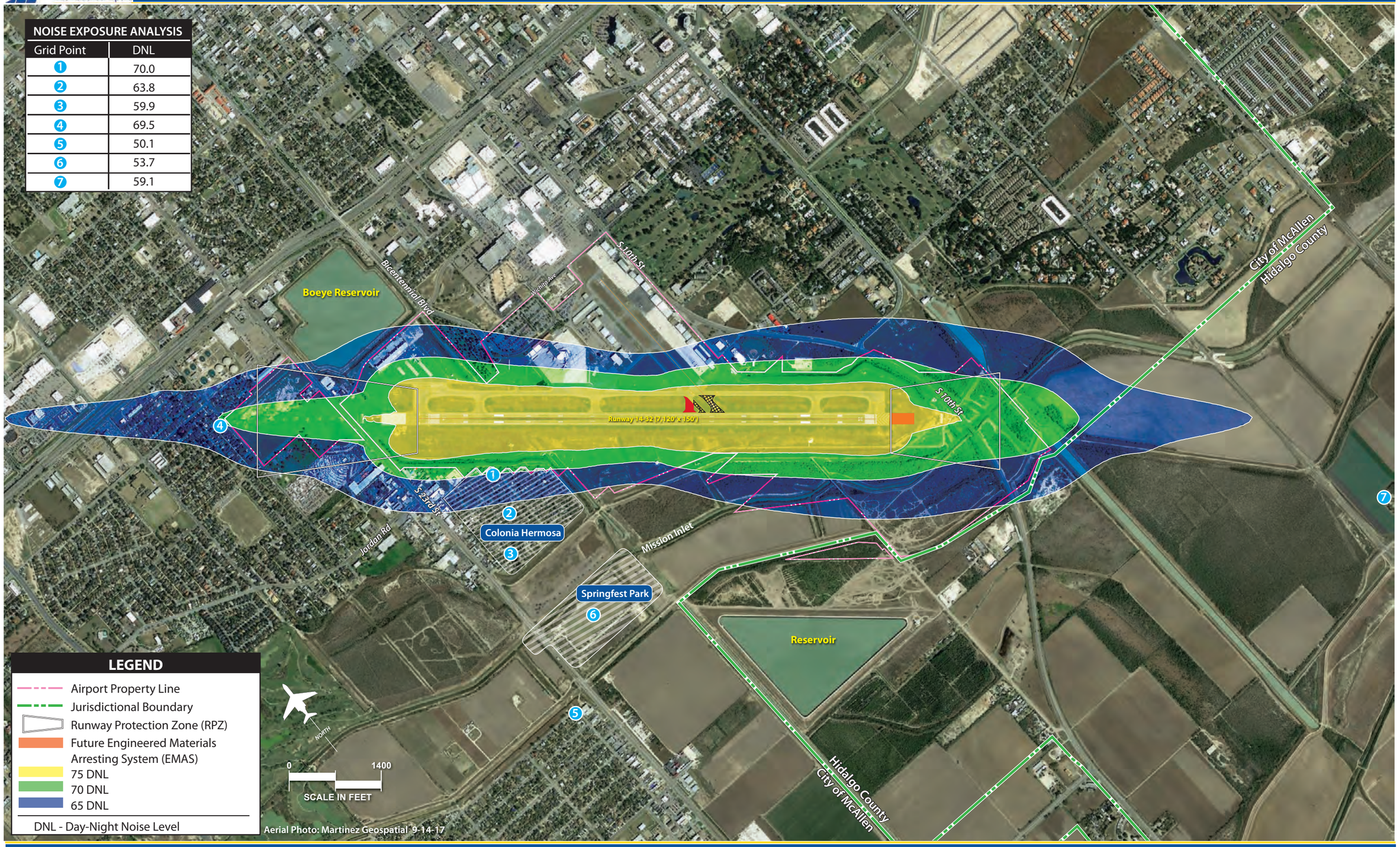
Boeye Reservoir
Bicentennial Blvd
Wichita Ave
S 10th St
2nd Street
Runway 32R
TORA, TODA, ASDA, LDA 7,120′
Runway 14L
TORA, TODA 7,120′
ASDA 7,120′
LDA 6,983′
Potentially Impacted Commercial Properties
+/-4 acres
+/-2 acres
+/-1.5 acres
+/-1 acre
A
A
A
C1
C
A4
A3
A1
EMAS
820′
682′
Runway 14-32 (7,120′ x 150′)
EMAS
S 10th St
+/-13.8 acre
Potentially Impacted Residential Properties
Potentially Impacted Commercial Properties
23rd St
Colonia Hermosa
Hidalgo County Water Irrigation District Channel
Mission Inlet
City of McAllen
Hidalgo County
Proposed Motocross Site
Springfest Park
Hidalgo County
City of McAllen
Reservoir

LEGEND
- Airport Property Line
- Jurisdictional Boundary
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Runway Protection Zone (RPZ)
- Land Acquisition
- Future Engineered Materials Arresting System (EMAS)
- To Be Removed

NORTH
0 800
SCALE IN FEET

Aerial Photo: Martinez Geospatial 9-14-17

NOISE EXPOSURE ANALYSIS	
Grid Point	DNL
1	70.0
2	63.8
3	59.9
4	69.5
5	50.1
6	53.7
7	59.1



LEGEND

- Airport Property Line
- Jurisdictional Boundary
- Runway Protection Zone (RPZ)
- Future Engineered Materials Arresting System (EMAS)
- 75 DNL
- 70 DNL
- 65 DNL

DNL - Day-Night Noise Level

bed allows the Airport to reduce the length of the ROFA beyond the end of the runway, which would eliminate the ROFA object penetrations (perimeter service road/fence and S. 10th Street). Adding an EMAS bed would not affect the runway's declared distances, which would remain at the same lengths currently published.

The reverse side of **Exhibit 4C** depicts the noise contours for the ultimate condition (2036). As shown, the 65 and 70 DNL contours extend beyond Airport property, encompassing noise-sensitive properties including residential properties within Colonia Hermosa and northwest of the airfield. The 75 DNL contour remains on Airport property. This alternative maintains the airfield in a condition that aircraft operations would continue to operate in the same manner as they do currently, so this is considered the baseline for future noise exposure that the remaining alternatives will be compared to.

Connected actions associated with this alternative include:

- To address the RPZ incompatibilities, this alternative proposes the acquisition of approximately 22.3 acres of property within the Runway 14 RPZ and the 32 RPZ.
- An approach lighting system is not planned for Runway 32; therefore, the lowest achievable visibility minimum is ¾ mile, which is what is currently available on Runway 32.

Alternative Estimated Cost: $25,469,900

Advantages:

- This alternative allows the Airport to meet design standards without impacts to the Mission Inlet Floodway, S. 10th Street, and S. 23rd Street.
- This alternative has the least amount of property acquisition of all the alternatives considered.
- This alternative is the least costly alternative under consideration.
- This alternative has no impacts on the Colonia Hermosa subdivision, Springfest Park, the unnamed reservoir, and the proposed motocross park.
- Does not require the relocation of on-airport navigational aid facilities including the VOR or ILS equipment.

Disadvantages:

- Does not provide for longer runway length, which restricts useful loads on heavier aircraft during hot days.
- Does not provide airfield redundancy with a parallel runway.
- EMAS beds are costly to construct and maintain and the original supplier no longer offers the product (FAA is in the process of securing a new vendor and product for the future).
- Residential property is impacted due to proposed acquisition of property within the Runway 14 RPZ.

AIRFIELD ALTERNATIVE 2

Depicted on **Exhibit 4D**, Airfield Alternative 2 introduces the idea of a future parallel runway option. This alternative considers constructing what would essentially be a parallel taxiway (Taxiway B) on the south side of the runway that could serve as an active runway only during periods that current Runway 14-32 is closed for extended periods. The new taxiway/runway pavement is shown at a separation distance of 400 feet from the existing runway centerline, which is the minimum separation distance for a parallel taxiway but less than the minimum separation distance of 700 feet required for a parallel runway.

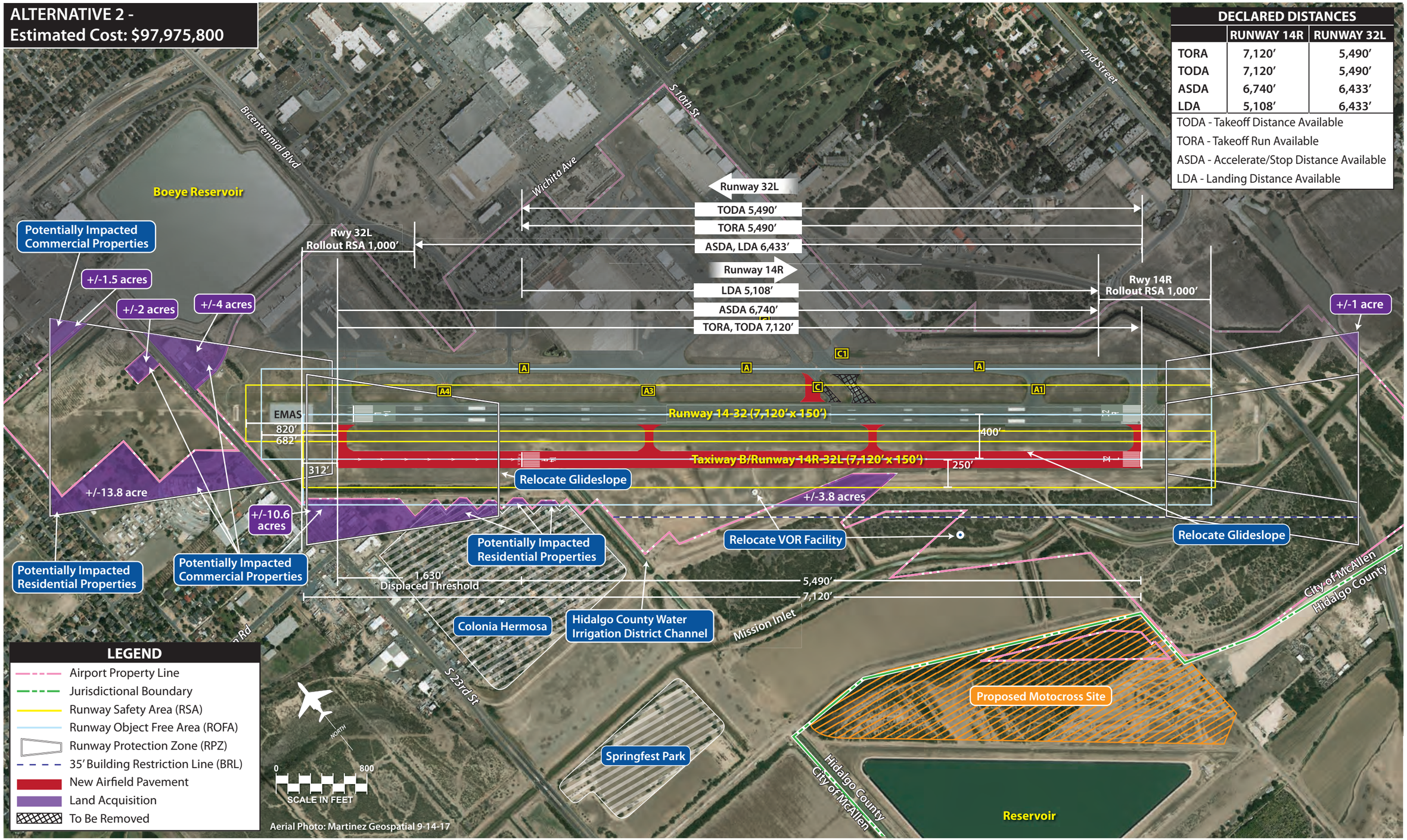
The new pavement length would match that of the current runway at 7,120 feet; however, to mitigate the impact of the temporary Runway 14 RPZ on incompatible land uses, the Runway 14 threshold would need to be displaced 1,630 feet south of the pavement end. The resulting declared distances for the temporary runway would be significantly reduced in meeting airfield design standards. The accelerated stop distance available (ASDA) on the temporary Runway 14 is reduced to 6,740 feet to account for the 1,000-foot rollout RSA extending beyond the opposite end of the runway. The temporary Runway 14 landing distance available (LDA) is reduced to 5,108 feet to account for the threshold displacement and the 1,000-foot rollout RSA. The temporary Runway 32 declared distances are also reduced again to meet RSA standards and to keep departure RPZ impacts to a minimum. The resulting temporary Runway 32 ASDA and LDA are 6,433 feet and the takeoff distance available (TODA) and takeoff runway available (TORA) are even shorter at 5,490 feet. At the resultant lengths offered under this alternative, the temporary runway would be significantly restricted in the types of commercial aircraft it could accommodate, especially during hot days.

Taxiway B/temporary Runway 14-32 would be constructed to the same standards as a runway, at 150 feet wide and at pavement strengths up to 412,000 pounds dual tandem wheel loading (DTWL). As mentioned, the utility of this pavement is limited to periods that the existing runway is closed for maintenance. When used as a taxiway, it is likely that this pavement see limited usage as there is no existing landside development on the southwest side of the airfield, and due to the various constraints previously outlined, future landside development in this area is unlikely to occur during the planning period of this master plan.

Connected actions associated with this alternative include:

- Property acquisition in the amount of 36.7 acres is needed to accommodate the expansion of the airfield and to protect the RPZs. Property acquisition includes a portion of the Colonia Hermosa subdivision and adjacent commercial property along S. 23rd Street.
- For those areas that would be subject to RSA/ROFA standards, existing structures, vegetation, or water handling facilities may need to be removed/relocated or modified to meet grading standards.
- No approach lighting systems would likely be provided for the temporary runway; therefore, the lowest achievable visibility minimum would be ¾ mile, which is what is currently available on Runway 32. The FAA may not offer minimums below one mile for a temporary runway.
- The Runway 14 and 32 ILS glide slope antennas and the VOR would need to be relocated.

Alternative Estimated Cost: $97,975,800


ALTERNATIVE 2 -
Estimated Cost: $97,975,800

DECLARED DISTANCES

	RUNWAY 14R	RUNWAY 32L
TORA	7,120'	5,490'
TODA	7,120'	5,490'
ASDA	6,740'	6,433'
LDA	5,108'	6,433'

TODA - Takeoff Distance Available
TORA - Takeoff Run Available
ASDA - Accelerate/Stop Distance Available
LDA - Landing Distance Available

Exhibit 4D
AIRFIELD ALTERNATIVE 2

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Advantages:

- This alternative provides a more economical solution to ensure the Airport remains open when the primary runway is closed for maintenance.

Disadvantages:

- Alignment of the parallel runway/taxiway would not allow for the runways to be operable at the same time.
- Available temporary runway length is shorter than what is currently available, which could make the Airport less accessible while the primary runway is closed for extended periods.
- This alternative impacts the Colonia Hermosa subdivision to a lesser degree than some other alternatives; however, several residents and commercial properties could be displaced.
- As a taxiway, the utility of the proposed pavement is limited with no landside developments on the southwest side of the airfield.

AIRFIELD ALTERNATIVE 3

Depicted on **Exhibit 4E**, Airfield Alternative 3 incorporates a parallel runway design along with an extension to the existing runway. The existing runway is extended by 1,480 feet to the southeast for a full length of 8,600 feet. At 8,600 feet, the primary runway would be capable of accommodating the entire commercial aircraft fleet at 80 percent useful load, and all but the Boeing 737-900 and the 767-300F at 90 percent useful load.

The parallel runway (Runway 14R-32L) is planned at a length of 7,200 feet, which exceeds what is currently available and can accommodate the entire commercial fleet at 70 percent useful load. The parallel runway width is planned at 150 feet, which meets RDC D-IV design standards, and its pavement strength is planned up to 412,000 pounds DTWL.

The parallel runway configuration is at an 800-foot separation distance from the existing runway centerline. This separation distance allows for the construction of a parallel taxiway between the two runways and exceeds the minimum separation distance of 700 feet required for simultaneous visual flight rules (VFR) landing and takeoff operations. Runway 14R-32L is planned to be equipped to accommodate instrument approach procedures with visibility minimums down to ½ mile. Runway 14R-32L is offset to the east from the existing runway, situated so that the Runway 14L RPZ does not encompass the Colonia Hermosa subdivision.

Connected actions associated with this alternative include:

- Property acquisition in the amount of 346.5 acres is needed to accommodate the expansion of the airfield and to protect the RPZs for both runways.
- South 10th Street will need to be rerouted. Option 1 is to reroute S. 10th Street to the southeast so that it avoids crossing through the ultimate RPZs for Runway 32R and 32L. Option 2 is to

reroute S. 10th Street underground and tunnel under the Airport. Option 3 is to abandon S. 10th Street at 2nd Street.

- A portion of McColl Road would be abandoned where it extends through the ultimate Runway 32L RPZ.
- The Mission Inlet Channel and its associated levees would be realigned to accommodate the growth of the airfield to the southeast.
- For those areas that would be subject to RSA/ROFA standards, existing structures, vegetation, or water handling facilities may need to be removed/relocated or modified to meet grading standards.
- Construction of an aircraft holding bay is planned at the southeast end of Taxiway A. This holding bay allows aircraft to bypass each other if necessary and serves as a location for aircraft to perform pre-flight engine runups.
- Installation of a MALSR approach lighting system to Runway 14R, 32R, and 32L to achieve ½ mile visibility minimum instrument approach procedures is needed.
- The VOR and Runway 32R ILS glide slope antenna will need to be relocated.

Alternative Estimated Cost Range: $259,036,400 - $383,459,100. The range in cost is due to the three options to address S. 10th Street, which include realigning the road, tunneling under the airport, and abandoning at 2nd Street.

Advantages:

- Parallel runway alignment allows for simultaneous VFR takeoff and landing operation.
- No property acquisition within the Colonia Hermosa subdivision.
- No physical impacts to Springfest Park or the unnamed reservoir south of the Airport.

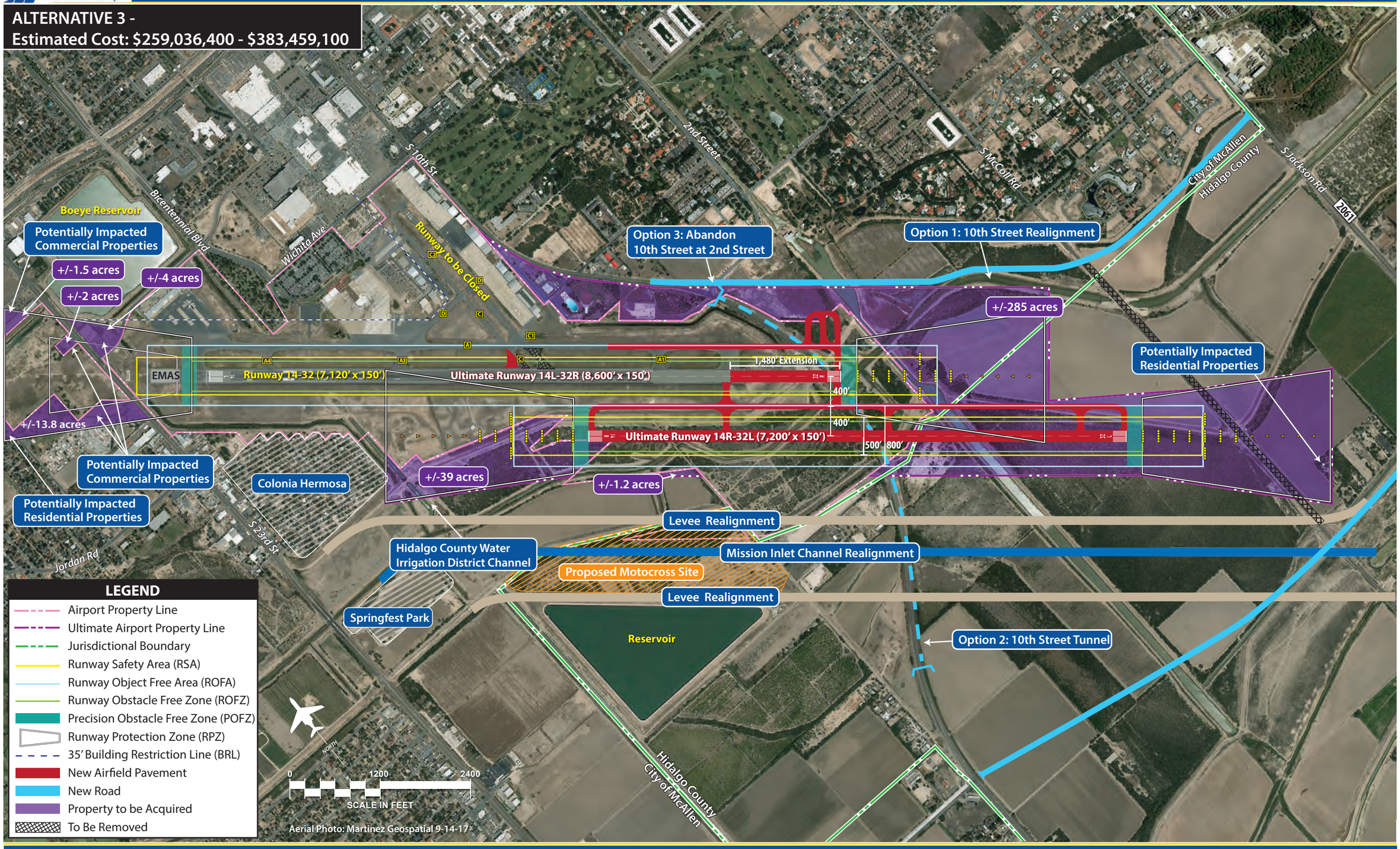
Disadvantages:

- Parallel runway alignment would not allow for simultaneous IFR takeoff and landing operations.
- While the Colonia Hermosa subdivision is not directly impacted by property acquisition, the alignment of Runway 14R-32L would result in aircraft overflights of the subdivision.

AIRFIELD ALTERNATIVE 4

Depicted on **Exhibit 4F**, Airfield Alternative 4 considers extending the primary runway by 2,280 feet for a full length of 9,400 feet. At this length, the runway could accommodate the entire commercial fleet, including the Boeing 737-900 and the Boeing 767-300F, at 90 percent useful load. The new parallel (Runway 14R-32L) is planned to a length of 7,200 feet, which exceeds what is currently available and could accommodate the entire commercial fleet at 70 percent useful load. The parallel runway width is planned at 150 feet, which meets RDC D-IV design standards and its pavement strength is planned up to 412,000 pounds DTWL.

ALTERNATIVE 3 -
Estimated Cost: $259,036,400 - $383,459,100



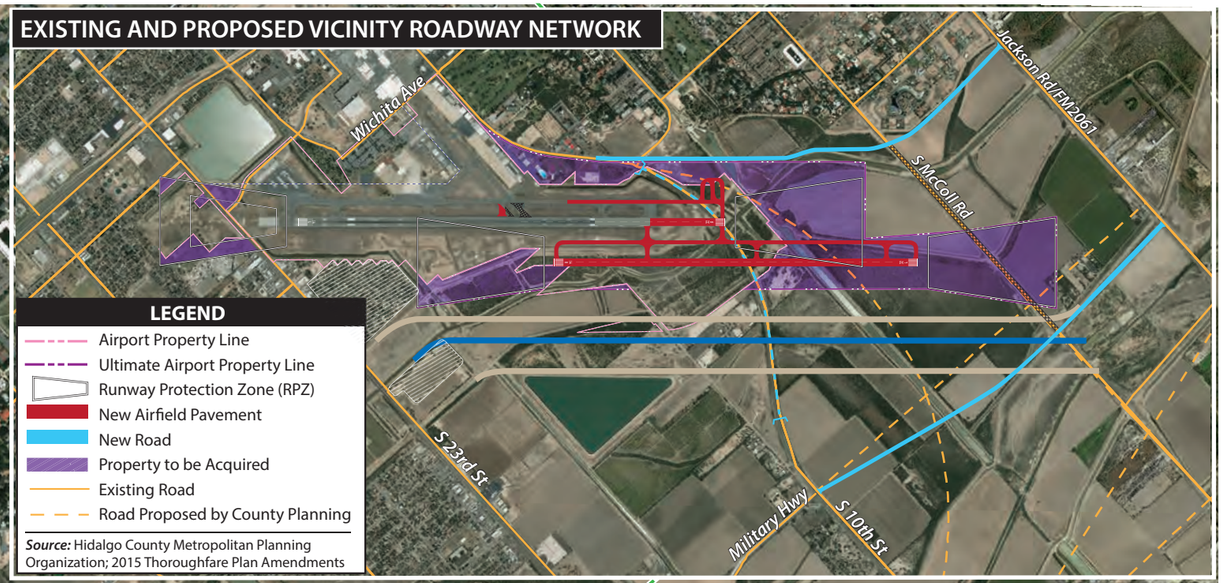
LEGEND

- Airport Property Line
- Ultimate Airport Property Line
- Jurisdictional Boundary
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Runway Obstacle Free Zone (ROFZ)
- Precision Obstacle Free Zone (POFZ)
- Runway Protection Zone (RPZ)
- 35' Building Restriction Line (BRL)
- New Airfield Pavement
- New Road
- Property to be Acquired
- To Be Removed

NOISE EXPOSURE ANALYSIS

Grid Point	DNL
1	69.1
2	63.5
3	60.0
4	65.9
5	52.4
6	56.6
7	67.6

EXISTING AND PROPOSED VICINITY ROADWAY NETWORK



LEGEND

- Airport Property Line
- Ultimate Airport Property Line
- Runway Protection Zone (RPZ)
- New Airfield Pavement
- New Road
- Property to be Acquired
- Existing Road
- Road Proposed by County Planning

Source: Hidalgo County Metropolitan Planning Organization; 2015 Thoroughfare Plan Amendments

Boeye Reservoir
Bicentennial Blvd
Wichita Ave
S 10th St
Runway to be Closed
City of McAllen
Hidalgo County
Runway 14-32 (7,120' x 150')
Ultimate Runway 14L-32R (8,600' x 150')
Ultimate Runway 14R-32L (7,200' x 150')
Colonia Hermosa
S 23rd St
Jordan Rd
Levee Realignment
Mission Inlet Channel Realignment
Springfest Park
Levee Realignment
Reservoir
Hidalgo County
City of McAllen

LEGEND

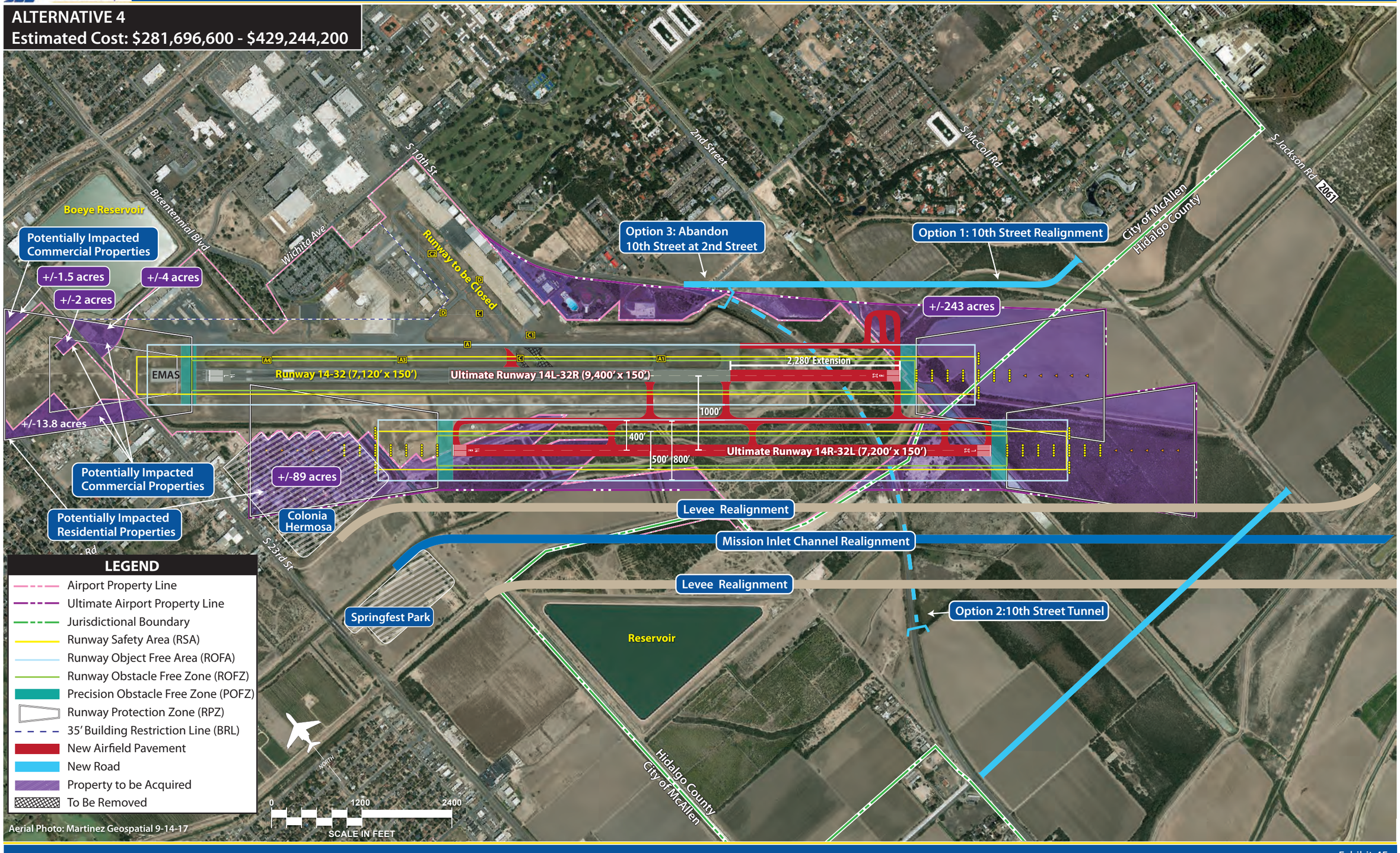
- Airport Property Line
- Jurisdictional Boundary
- Runway Protection Zone (RPZ)
- New Airfield Pavement
- To Be Removed
- 75 DNL
- 70 DNL
- 65 DNL

DNL - Day-Night Noise Level

0 1400
SCALE IN FEET

Aerial Photo: Martinez Geospatial 9-14-17

ALTERNATIVE 4
Estimated Cost: $281,696,600 - $429,244,200



NOISE EXPOSURE ANALYSIS

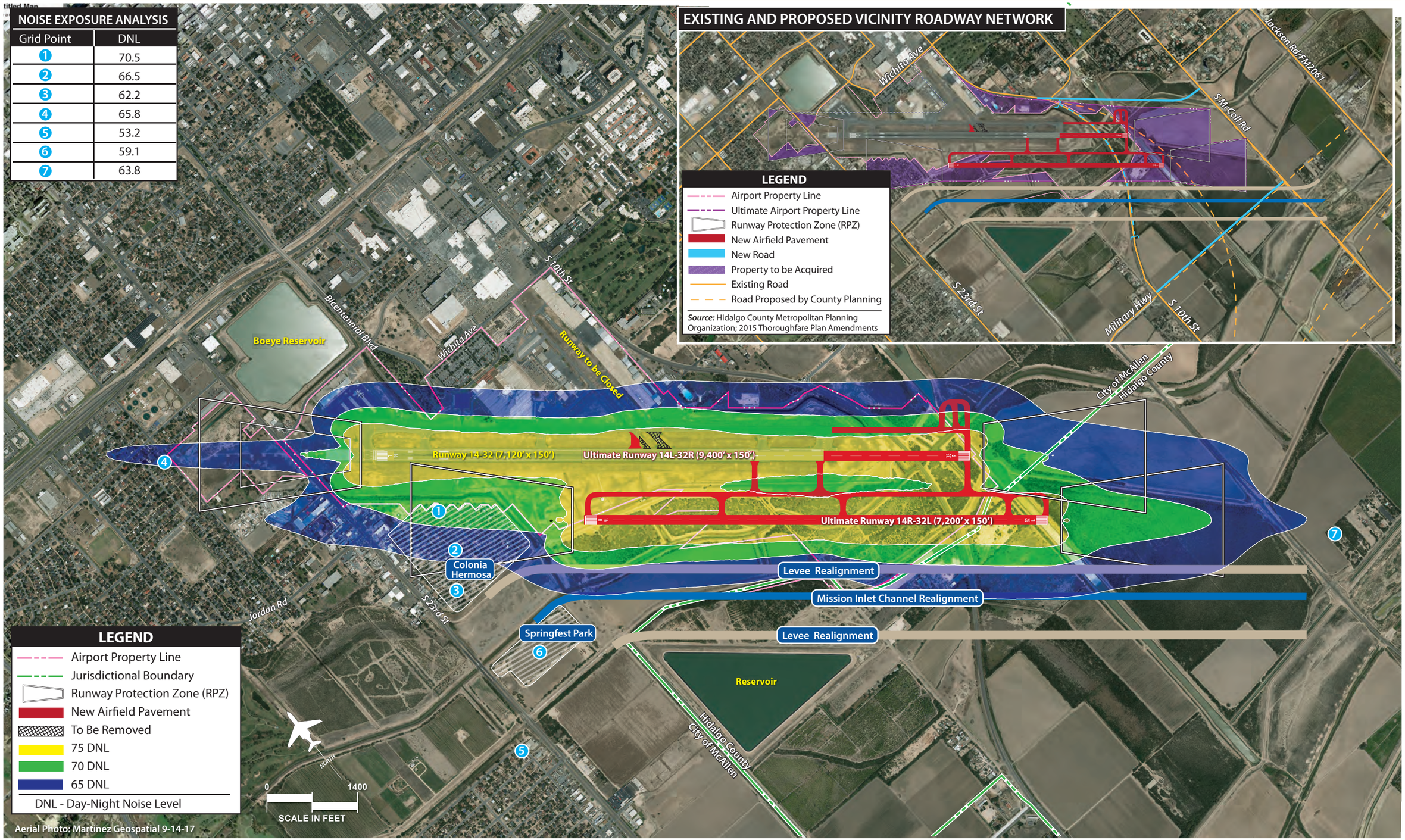
Grid Point	DNL
1	70.5
2	66.5
3	62.2
4	65.8
5	53.2
6	59.1
7	63.8

EXISTING AND PROPOSED VICINITY ROADWAY NETWORK

LEGEND

- Airport Property Line
- Ultimate Airport Property Line
- Runway Protection Zone (RPZ)
- New Airfield Pavement
- New Road
- Property to be Acquired
- Existing Road
- Road Proposed by County Planning

Source: Hidalgo County Metropolitan Planning Organization; 2015 Thoroughfare Plan Amendments



LEGEND

- Airport Property Line
- Jurisdictional Boundary
- Runway Protection Zone (RPZ)
- New Airfield Pavement
- To Be Removed
- 75 DNL
- 70 DNL
- 65 DNL

DNL - Day-Night Noise Level

Aerial Photo: Martinez Geospatial 9-14-17

This alternative considers a separation distance between runways at 1,000 feet, which allows for simultaneous visual takeoff and landing operations but not simultaneous instrument takeoff and landing operations. In this alternative, the parallel runway alignment has been shifted to the northwest so that the RPZ for Runway 14L overlaps with the Colonia Hermosa subdivision. The purpose of this would be to provide justification in acquiring and relocating the residents within the subdivision. Should a parallel runway be constructed in the future, it is likely this subdivision will be impacted by new overflights and increased noise levels. From a socioeconomic justice standpoint, it may be more beneficial to the residents to be relocated by the Airport.

Connected actions associated with this alternative include:

- Property acquisition in the amount of 353.3 acres is needed to accommodate the expansion of the airfield and to protect the RPZs for both runways.
- South 10th Street would need to be rerouted. Option 1 is to reroute S. 10th Street to the southeast so that it avoids crossing through the ultimate RPZs for Runway 32R and 32L. Option 2 is to reroute S.10th Street underground and tunnel under the Airport. Option 3 is to abandon S. 10th Street at 2nd Street.
- The Mission Inlet Channel and its associated levees would be realigned to accommodate the growth of the airfield to the southeast.
- For those areas that would be subject to RSA/ROFA standards, existing structures, vegetation, or water handling facilities may need to be removed/relocated or modified to meet grading standards.
- Construction of an aircraft holding bay is planned at the southeast end of Taxiway A. This holding bay allows aircraft to bypass each other if necessary and serves as a location for aircraft to perform pre-flight engine runups.
- Installation of a MALSR approach lighting system to Runway 14R, 32R, and 32L to achieve down to ½ mile visibility instrument approach procedures is needed.
- The VOR and Runway 32R ILS glide slope antenna will need to be relocated.

Alternative Estimated Cost Range: $281,696,600 - $429,244,200. The range in cost is due to the three options to address S. 10th Street, which include realigning the road, tunneling under the airport, and abandoning at 2nd Street.

Advantages:

- Parallel runway alignment allows for simultaneous visual takeoff and landing operations.
- Relocation assistance for the Colonia Hermosa subdivision.
- No physical impacts to Springfest Park or the unnamed reservoir south of the Airport.

Disadvantages:

- Potentially significant political, environmental, and socioeconomic impacts to the Colonia Hermosa subdivision.
- The proposed motocross development site is potentially impacted by the realignment of the Mission Inlet channel and its associated levees.

AIRFIELD ALTERNATIVE 5

Depicted on **Exhibit 4G**, Airfield Alternative 5 reflects what is currently shown on the Airport's ALP drawing. The plan calls for the extension of the primary runway by 3,211 feet to a full length of 10,331 feet. At this length, the runway could accommodate most of the commercial fleet at 100 percent useful load. Only the Boeing 737-700/900 and the Boeing 767-300F require additional length to operate at 100 percent useful load. The parallel runway is planned to a length of 8,000 feet, which can accommodate all but the Boeing 737-900 at 80 percent useful load. The parallel runway width is planned at 150 feet, which meets RDC D-IV design standards, and its pavement strength is planned up to 412,000 pounds DTWL.

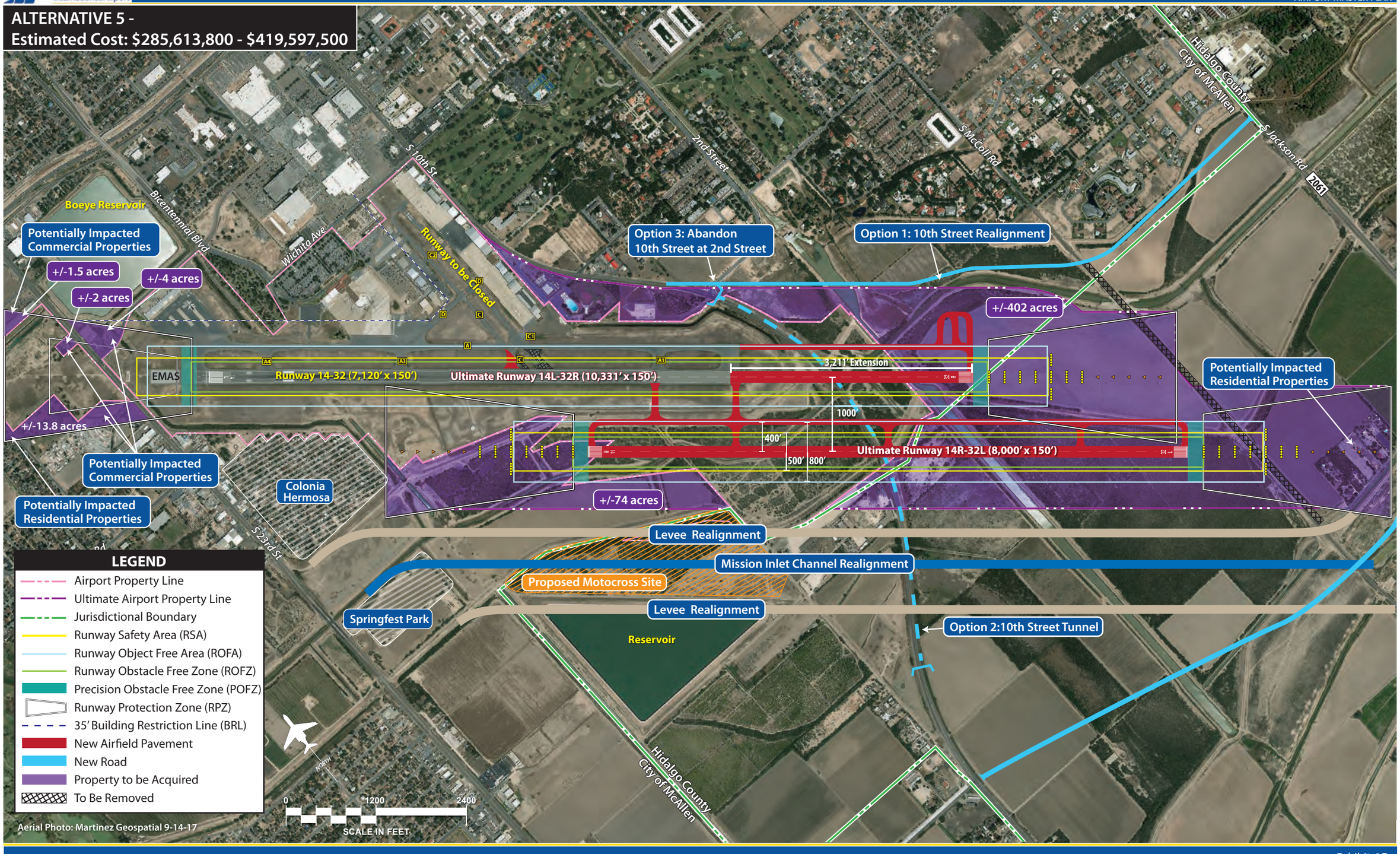
The runway to runway separation distance is 1,000 feet, which like the previous alternative, is sufficient for simultaneous visual takeoff and landing operations but not simultaneous instrument takeoff and landing operations. The parallel runway alignment is shifted to the southeast so that the Colonia Hermosa subdivision is not impacted by the RPZ; however, it will be impacted by overflights to/from the runway.

Connected actions associated with this alternative include:

- Property acquisition in the amount of 497.3 acres is needed to accommodate the expansion of the airfield and to protect the RPZs for both runways.
- South 10th Street will need to be rerouted. Option 1 is to reroute S. 10th Street to the southeast so that it avoids crossing through the ultimate RPZs for Runway 32R and 32L. Option 2 is to reroute S. 10th Street underground and tunnel under the Airport. Option 3 is to abandon S. 10th Street at 2nd Street.
- A portion of McColl Road would be abandoned where it extends through the ultimate Runway 32R and 32L RPZs.
- The Mission Inlet Channel and its associated levees would be realigned to accommodate the growth of the airfield to the southeast.
- For those areas that would be subject to RSA/ROFA standards, existing structures, vegetation, or water handling facilities may need to be removed/relocated or modified to meet grading standards.
- Construction of an aircraft holding bay is planned at the southeast end of Taxiway A. This holding bay allows aircraft to bypass each other if necessary and serves as a location for aircraft to perform pre-flight engine runups.
- Installation of a MALSR approach lighting system to Runways 14R, 32R, and 32L to achieve down to ½ mile instrument approach procedures is needed.
- The VOR and Runway 32R ILS glide slope antenna will need to be relocated.

Alternative Estimated Cost Range: $285,613,800 - $419,597,500. The range in cost is due to the three options to address S. 10th Street, which include realigning the road, tunneling under the airport, and abandoning at 2nd Street.

ALTERNATIVE 5 -
Estimated Cost: $285,613,800 - $419,597,500



LEGEND

- Airport Property Line
- Ultimate Airport Property Line
- Jurisdictional Boundary
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Runway Obstacle Free Zone (ROFZ)
- Precision Obstacle Free Zone (POFZ)
- Runway Protection Zone (RPZ)
- 35' Building Restriction Line (BRL)
- New Airfield Pavement
- New Road
- Property to be Acquired
- To Be Removed

NOISE EXPOSURE ANALYSIS

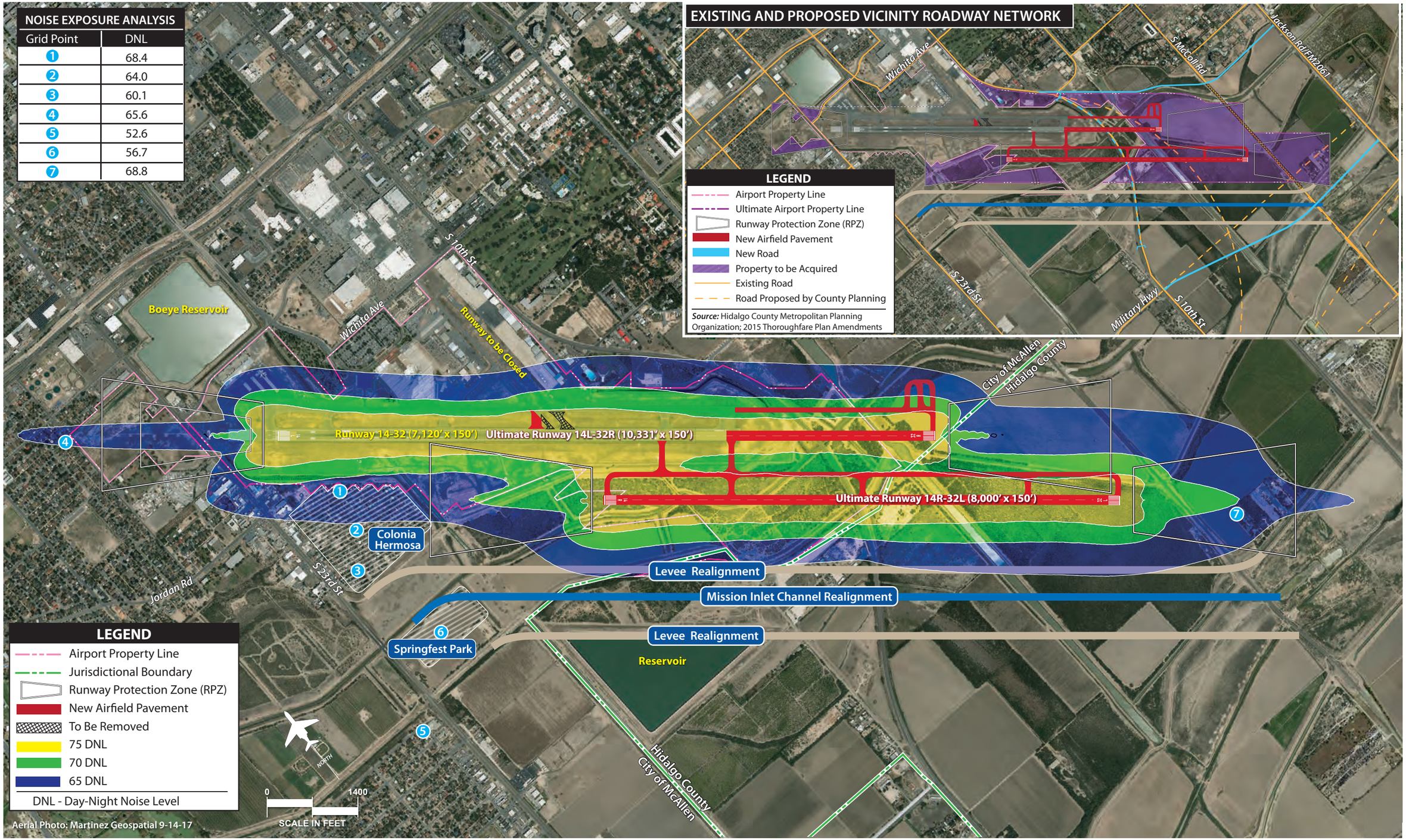
Grid Point	DNL
1	68.4
2	64.0
3	60.1
4	65.6
5	52.6
6	56.7
7	68.8

EXISTING AND PROPOSED VICINITY ROADWAY NETWORK

LEGEND

- Airport Property Line
- Ultimate Airport Property Line
- Runway Protection Zone (RPZ)
- New Airfield Pavement
- New Road
- Property to be Acquired
- Existing Road
- Road Proposed by County Planning

Source: Hidalgo County Metropolitan Planning Organization; 2015 Thoroughfare Plan Amendments



LEGEND

- Airport Property Line
- Jurisdictional Boundary
- Runway Protection Zone (RPZ)
- New Airfield Pavement
- To Be Removed
- 75 DNL
- 70 DNL
- 65 DNL

DNL - Day-Night Noise Level

Aerial Photo: Martinez Geospatial 9-14-17

Advantages:

- Parallel runway alignment allows for simultaneous visual takeoff and landing operations.
- No property acquisition of the Colonia Hermosa subdivision.

Disadvantages:

- While the Colonia Hermosa subdivision is not directly impacted by property acquisition, the alignment of Runway 14R-32L could result in aircraft overflights of the subdivision.
- Springfest Park, the proposed motocross development site, and the unnamed reservoir are potentially impacted by the realignment of the Mission Inlet channel and associated levees.

AIRFIELD ALTERNATIVE 6

Depicted on **Exhibit 4H**, Airfield Alternative 6 considers extending the runway to runway separation distance to 2,500 feet. At this length, the Airport would be able to accommodate simultaneous radar-controlled takeoffs and simultaneous radar-controlled takeoff and landing operations. This configuration makes the Airport more accessible during lower visibility conditions and significantly increases airfield capacity. The two runways are connected via two taxiways extending southwest from the existing and ultimate ends of Runway 32R.

The primary runway is planned for an extension of 2,280 feet for a full length of 9,400 feet. At this length, the runway could accommodate the entire commercial fleet, including the Boeing 737-900 and the Boeing 767-300F, at 90 percent useful load. The parallel runway is planned for a length of 7,200 feet, which accommodates the entire commercial fleet at 70 percent useful load. The parallel runway width is planned at 150 feet, which meets RDC D-IV design standards, and its pavement strength is planned up to 412,000 pounds DTWL.

Connected actions associated with this alternative include:

- Property acquisition in the amount of 677.3 acres is needed to accommodate the expansion of the airfield and to protect the RPZs for both runways.
- South 10th Street will need to be rerouted. Option 1 is to reroute S. 10th Street to the southeast so that it avoids crossing through the ultimate RPZs for Runway 32R and 32L. Option 2 is to reroute S. 10th Street underground and tunnel under the Airport. Option 3 is to abandon S. 10th Street at 2nd Street.
- A portion of McColl Road would be abandoned where it extends through the ultimate Runway 32L RPZ.
- The Mission Inlet Channel and its associated levees would be realigned to accommodate the growth of the airfield to the southeast.
- For those areas that would be subject to RSA/ROFA standards, existing structures, vegetation, or water handling facilities may need to be removed/relocated or modified to meet grading standards.

- Construction of an aircraft holding bay is planned at the southeast end of Taxiway A. This holding bay allows aircraft to bypass each other if necessary and serves as a location for aircraft to perform pre-flight engine runups.
- Installation of a MALSR approach lighting system to Runway 14R, 32R, and 32L to achieve down to ½ mile instrument approach procedures is needed.

Alternative Estimated Cost Range: $310,187,900 - $552,512,600. The range in cost is due to the three options to address S. 10th Street, which include realigning the road, tunneling under the airport, and abandoning at 2nd Street. In addition, the Mission Channel Inlet and levee realignment is more extensive in this alternative, resulting in a higher cost range.

Advantages:

- Parallel runway alignment allows for simultaneous visual and instrument radar-controlled takeoffs and simultaneous visual and instrument radar-controlled takeoff and landing operations.
- No property acquisition of the Colonia Hermosa subdivision.
- Direct overflights of the Colonia Hermosa subdivision are limited by the parallel runway alignment.

Disadvantages:

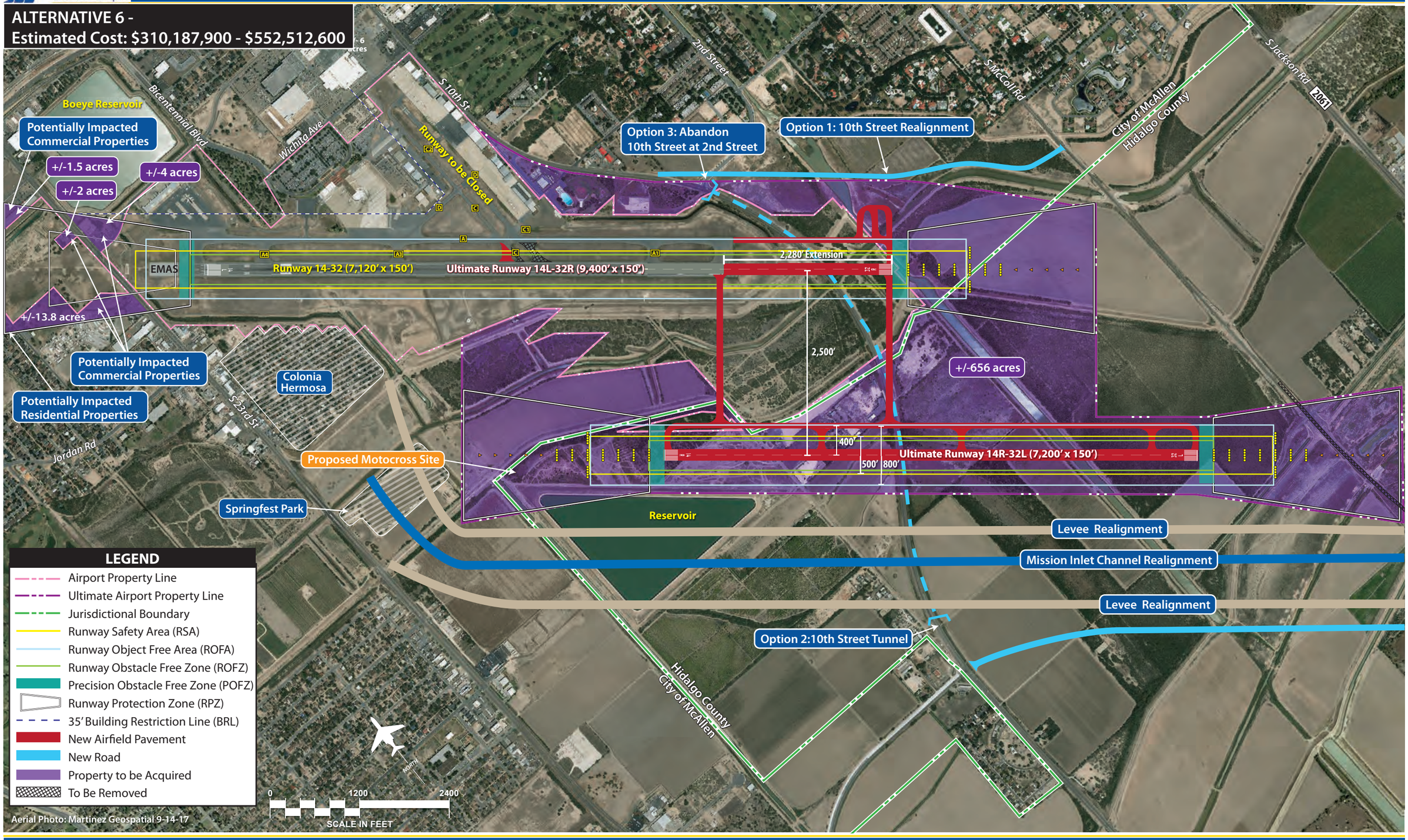
- Aircraft operating to the parallel runway would be subject to extensive taxi times from the airfield to the landside area of the Airport.
- The proposed motocross development site is directly impacted by the alignment of the parallel runway.
- Springfest Park and the unnamed reservoir are potentially impacted by the realignment of the Mission Inlet channel and associated levees.

AIRFIELD ALTERNATIVE 7

Depicted on **Exhibit 4J**, Airfield Alternative 7 considers a parallel runway alignment with a separation distance of 4,300 feet. At this distance, the Airport could accommodate dual simultaneous precision instrument approaches. This layout provides for the greatest capacity improvement and achieves the greatest utility for the parallel runway compared to the other alternatives; however, a major drawback is the significant taxi distances required for aircraft operating on the parallel runway to the landside area.

The primary runway is planned for an extension of 2,880 feet for a full length of 10,000 feet. At this length, the runway could accommodate the entire commercial fleet, including the Boeing 737-900 and the Boeing 767-300F, at 90 percent or greater useful loads. The parallel runway is planned for a length of 7,200 feet, which accommodates the entire commercial fleet at 70 percent useful load. The parallel runway width is planned at 150 feet, which meets RDC D-IV design standards, and its pavement strength is planned up to 412,000 pounds DTWL.

ALTERNATIVE 6 -
Estimated Cost: $310,187,900 - $552,512,600



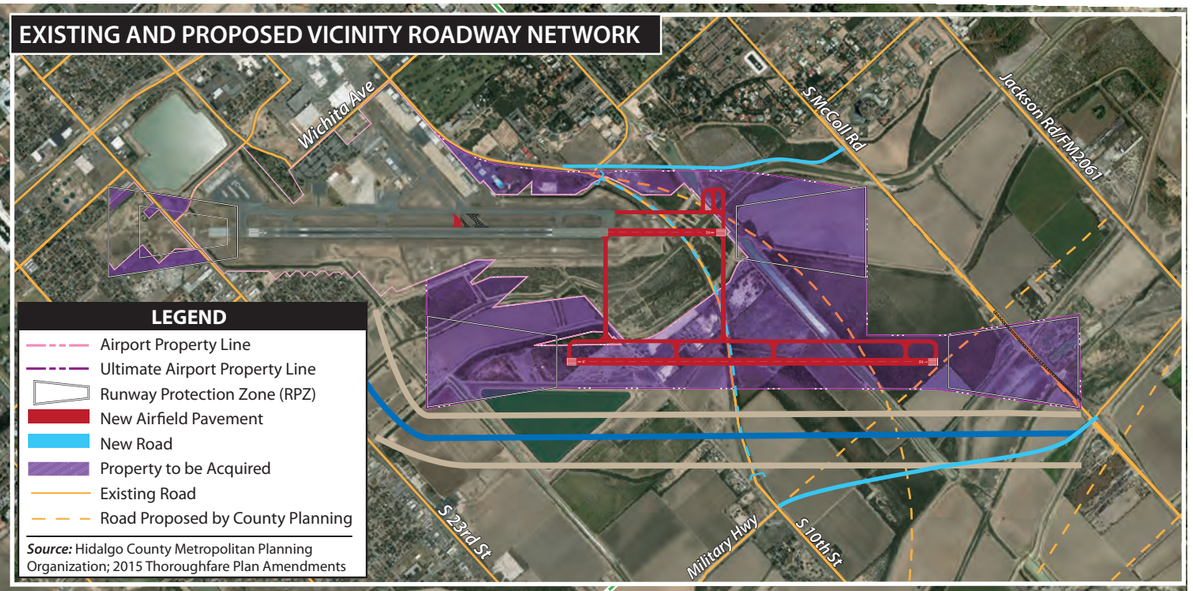
LEGEND

- Airport Property Line
- Ultimate Airport Property Line
- Jurisdictional Boundary
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Runway Obstacle Free Zone (ROFZ)
- Precision Obstacle Free Zone (POFZ)
- Runway Protection Zone (RPZ)
- 35' Building Restriction Line (BRL)
- New Airfield Pavement
- New Road
- Property to be Acquired
- To Be Removed

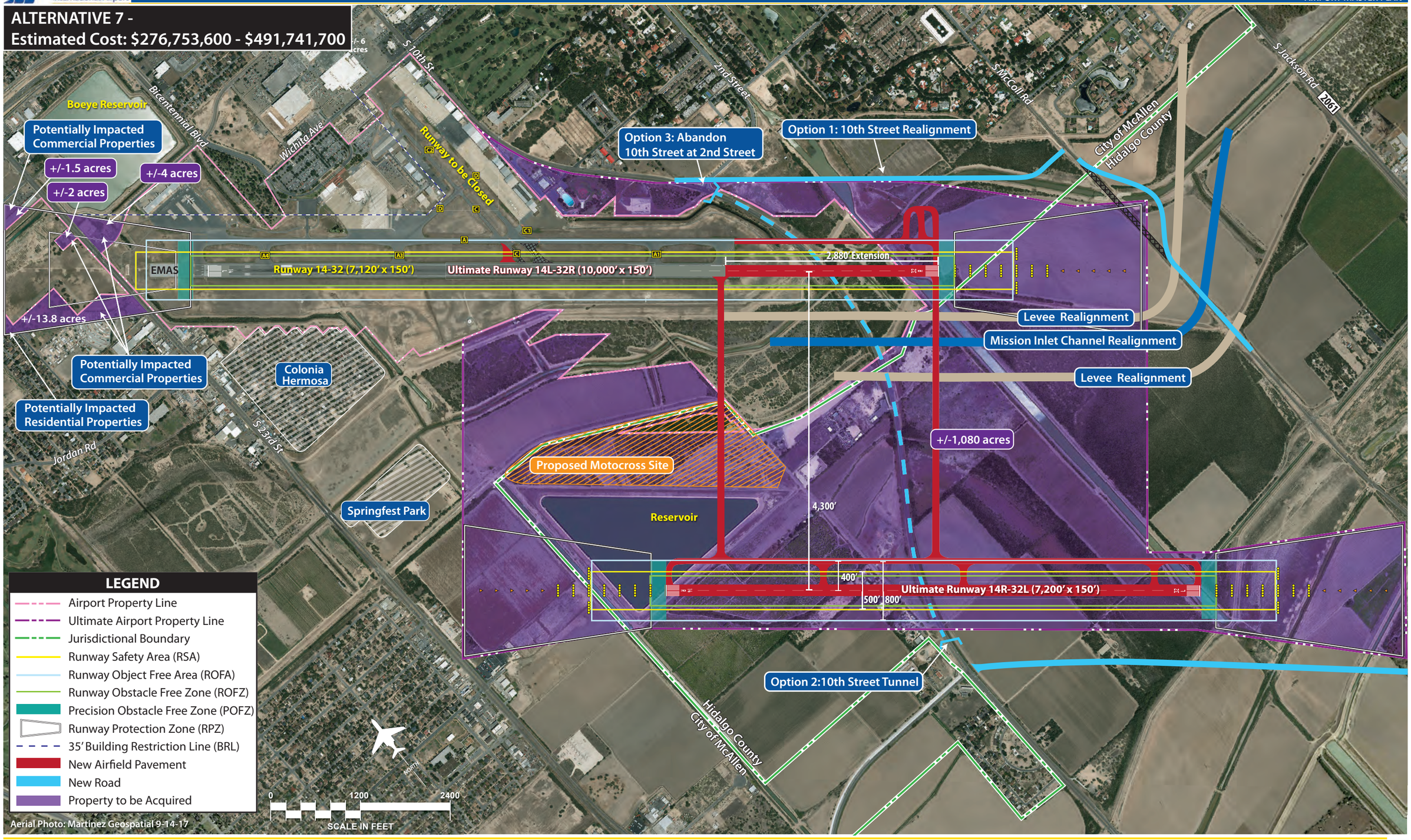
NOISE EXPOSURE ANALYSIS

Grid Point	DNL
1	67.1
2	63.2
3	63.1
4	63.9
5	55.0
6	61.6
7	63.1

EXISTING AND PROPOSED VICINITY ROADWAY NETWORK



ALTERNATIVE 7 -
Estimated Cost: $276,753,600 - $491,741,700



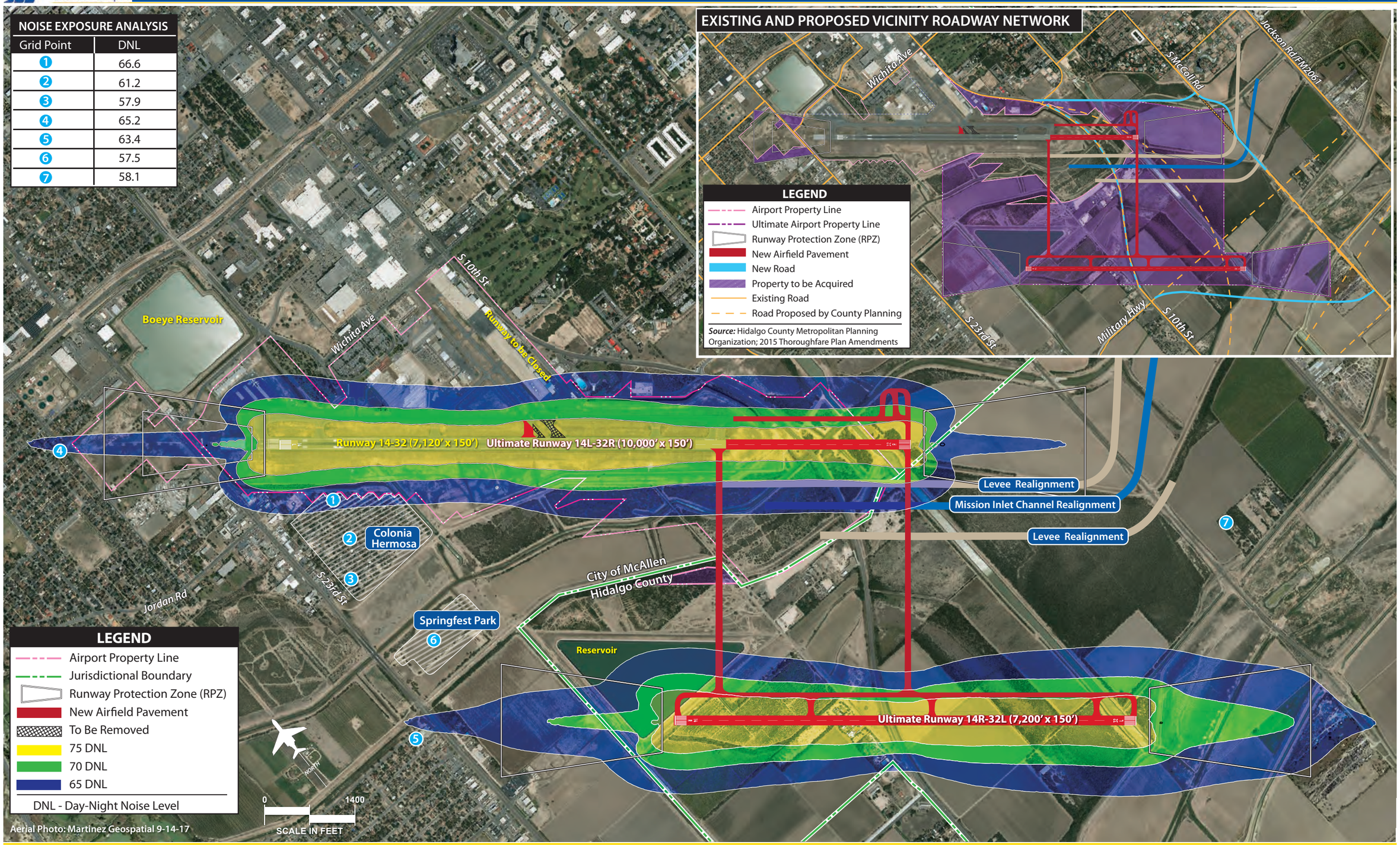
NOISE EXPOSURE ANALYSIS

Grid Point	DNL
1	66.6
2	61.2
3	57.9
4	65.2
5	63.4
6	57.5
7	58.1

EXISTING AND PROPOSED VICINITY ROADWAY NETWORK

LEGEND
- Airport Property Line
- Ultimate Airport Property Line
- Runway Protection Zone (RPZ)
- New Airfield Pavement
- New Road
- Property to be Acquired
- Existing Road
- Road Proposed by County Planning

Source: Hidalgo County Metropolitan Planning Organization; 2015 Thoroughfare Plan Amendments



LEGEND
- Airport Property Line
- Jurisdictional Boundary
- Runway Protection Zone (RPZ)
- New Airfield Pavement
- To Be Removed
- 75 DNL
- 70 DNL
- 65 DNL

DNL - Day-Night Noise Level

Aerial Photo: Martinez Geospatial 9-14-17

Connected actions associated with this alternative include:

- Property acquisition in the amount of 1,101.3 acres is needed to accommodate the expansion of the airfield and to protect the RPZs for both runways.
- South 10th Street will need to be rerouted. Option 1 is to reroute S. 10th Street to the southeast so that it avoids crossing through the ultimate RPZs for Runway 32R and 32L. Option 2 is to reroute S. 10th Street underground and tunnel under the Airport. Option 3 is to abandon S. 10th Street at 2nd Street.
- A portion of McColl Road would be rerouted around the ultimate Runway 32R RPZ. The Mission Inlet Channel and its associated levees would be realigned to accommodate the growth of the airfield to the southeast.
- For those areas that would be subject to RSA/ROFA standards, existing structures, vegetation, or water handling facilities may need to be removed/relocated or modified to meet grading standards.
- Construction of an aircraft holding bay is planned at the southeast end of Taxiway A. This holding bay allows aircraft to bypass each other if necessary and serves as a location for aircraft to perform pre-flight engine runups.
- Installation of a MALSR approach lighting system to Runway 14R, 32R, and 32L to achieve down to ½ mile instrument approach procedures is needed.
- The unnamed reservoir south of the airfield is directly impacted and would need to be modified to allow for the construction of the parallel runway.

Alternative Estimated Cost Range: $276,753,600 - $491,741,700. The range in cost is due to the three options to address S. 10th Street, which include realigning the road, tunneling under the airport, and abandoning at 2nd Street.

Advantages:

- Parallel runway alignment allows for dual simultaneous precision instrument approaches.
- This parallel runway alignment allows for the greatest capacity improvement and utility for a dual runway system.
- No property acquisition of the Colonia Hermosa subdivision.
- Direct overflights of the Colonia Hermosa subdivision are limited by the parallel runway alignment.
- Springfest Park and the proposed motocross site are not physically impacted by this alternative.

Disadvantages:

- Aircraft operating to the parallel runway would be subject to extensive taxi distances from the airfield to the landside area of the Airport.
- Residential properties south of the Colonia Hermosa subdivision and west of S. 23rd Street are directly in-line with the parallel runway alignment and could experience increased noise and aircraft overflights.

AIRFIELD ALTERNATIVE 8

Depicted on **Exhibit 4K**, Airfield Alternative 8 is essentially the same as Alternative 3 except it considers an extension of the primary runway to 10,000 feet. At this length, the runway could accommodate the entire commercial fleet, including the Boeing 737-900 and the Boeing 767-300F, at 90 percent or greater useful loads.

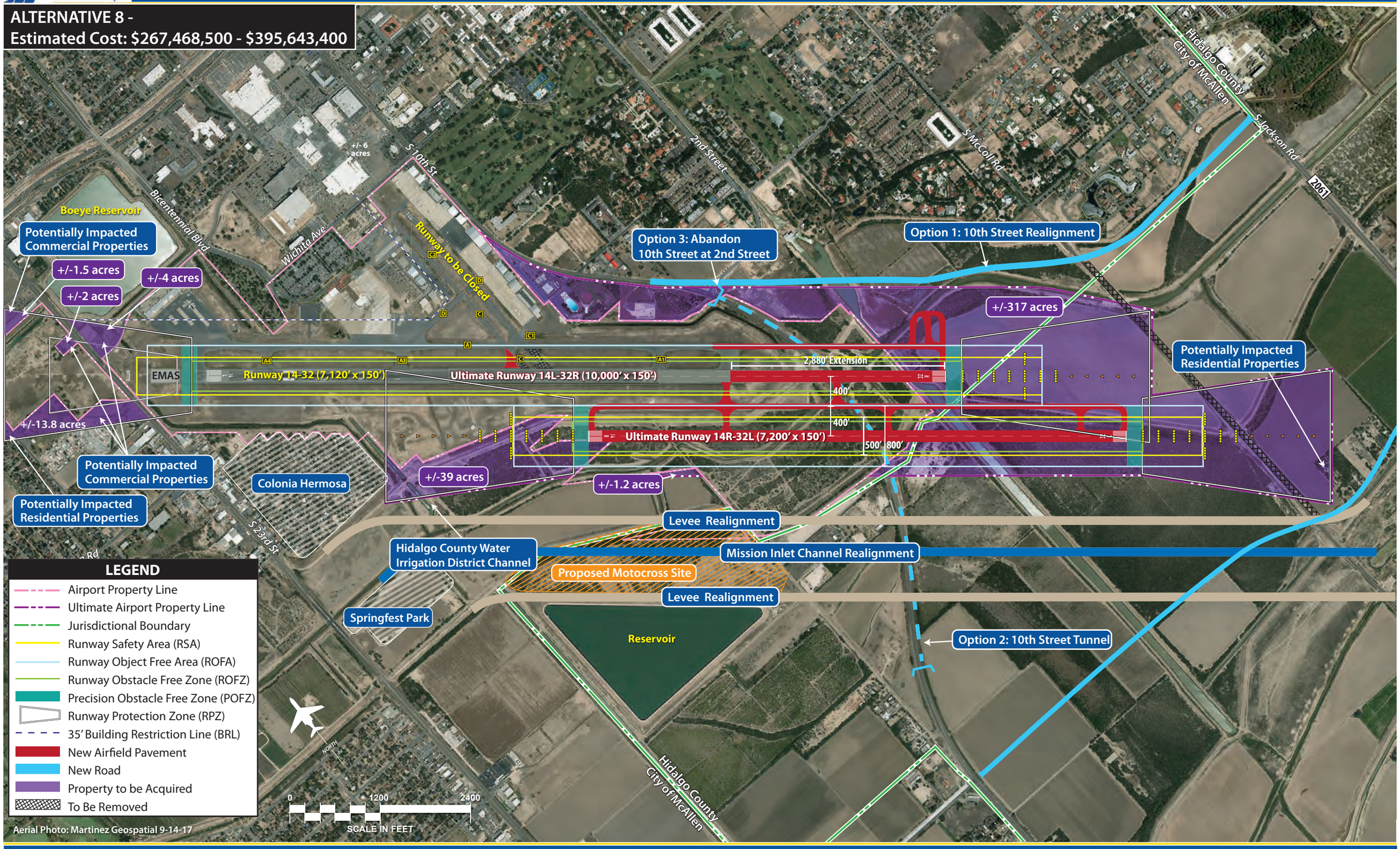
The parallel runway (Runway 14R-32L) is planned at a length of 7,200 feet, which exceeds what is currently available, and can accommodate the entire commercial fleet at 70 percent useful load. The parallel runway width is planned at 150 feet, which meets RDC D-IV design standards, and its pavement strength is planned up to 412,000 pounds DTWL.

The parallel runway configuration is at an 800-foot separation distance from the existing runway centerline. This separation distance allows for the construction of a parallel taxiway between the two runways and exceeds the minimum separation distance of 700 feet required for simultaneous visual flight rules landing and takeoff operations. Runway 14R-32L is planned to be equipped to accommodate instrument approach procedures with visibility minimums down to ½ mile. Runway 14R-32L is offset to the east from the existing runway, situated so that the Runway 14L RPZ does not encompass the Colonia Hermosa subdivision.

Connected actions associated with this alternative include:

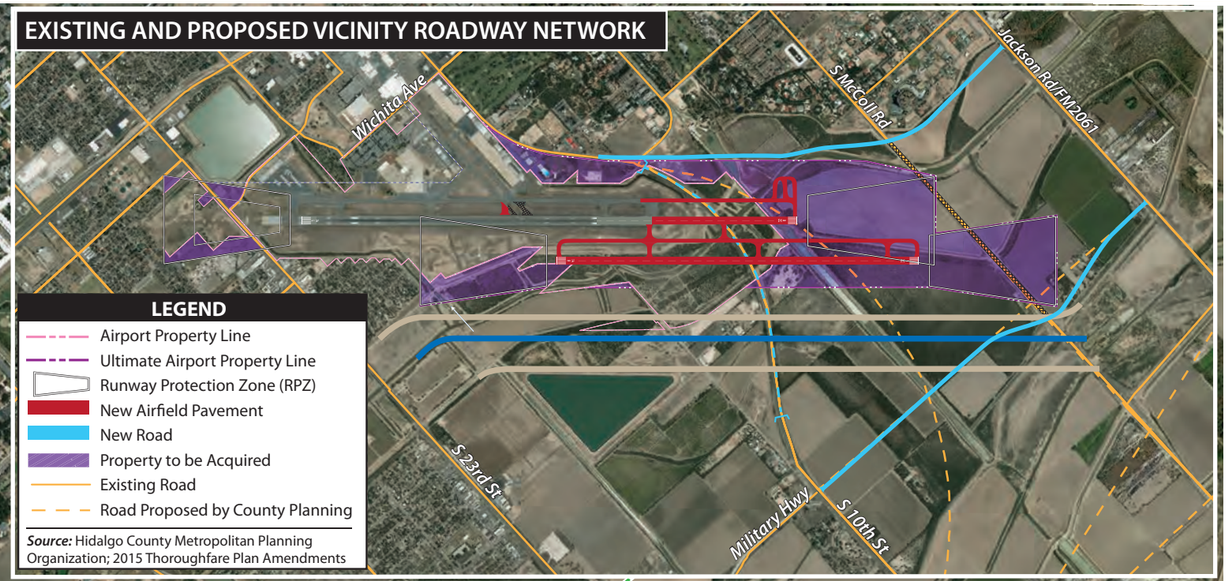
- Property acquisition in the amount of 378.5 acres is needed to accommodate the expansion of the airfield and to protect the RPZs for both runways.
- South 10th Street will need to be rerouted. Option 1 is to reroute S. 10th Street to the southeast so that it avoids crossing through the ultimate RPZs for Runway 32R and 32L. Option 2 is to reroute S. 10th Street underground and tunnel under the Airport. Option 3 is to abandon S. 10th Street at 2nd Street.
- A portion of McColl Road would be abandoned where it extends through the ultimate Runway 32R and 32L RPZs.
- The Mission Inlet Channel and its associated levees would be realigned to accommodate the growth of the airfield to the southeast.
- For those areas that would be subject to RSA/ROFA standards, existing structures, vegetation, or water handling facilities may need to be removed/relocated or modified to meet grading standards.
- Construction of an aircraft holding bay is planned at the southeast end of Taxiway A. This holding bay allows aircraft to bypass each other if necessary and serves as a location for aircraft to perform pre-flight engine runups.
- Installation of a MALSR approach lighting system to Runway 14R, 32R, and 32L to achieve ½ mile visibility minimum instrument approach procedures is needed.
- The VOR and Runway 32R ILS glide slope antenna will need to be relocated.

ALTERNATIVE 8 -
Estimated Cost: $267,468,500 - $395,643,400



NOISE EXPOSURE ANALYSIS	
Grid Point	DNL
1	68.9
2	63.5
3	59.5
4	65.7
5	52.5
6	56.8
7	67.6

EXISTING AND PROPOSED VICINITY ROADWAY NETWORK



LEGEND
- Airport Property Line
- Ultimate Airport Property Line
- Runway Protection Zone (RPZ)
- New Airfield Pavement
- New Road
- Property to be Acquired
- Existing Road
- Road Proposed by County Planning

Source: Hidalgo County Metropolitan Planning Organization; 2015 Thoroughfare Plan Amendments

Boeye Reservoir
S 10th St
Wichita Ave
Runway to be Closed
City of McAllen
Hidalgo County
Runway 14-32 (7,120' x 150')
Ultimate Runway 14L-32R (10,000' x 150')
Ultimate Runway 14R-32L (7,200' x 150')
Colonia Hermosa
S 23rd St
Jordan Rd
Levee Realignment
Mission Inlet Channel Realignment
Levee Realignment
Springfest Park
Reservoir
Hidalgo County
City of McAllen

LEGEND
- Airport Property Line
- Jurisdictional Boundary
- Runway Protection Zone (RPZ)
- New Airfield Pavement
- To Be Removed
- 75 DNL
- 70 DNL
- 65 DNL

DNL - Day-Night Noise Level

NORTH
0 1400
SCALE IN FEET

Aerial Photo: Martinez Geospatial 9-14-17

Alternative Estimated Cost Range: $267,468,500 - $395,643,400. The range in cost is due to the three options to address S. 10th Street, which include realigning the road, tunneling under the airport, and abandoning at 2nd Street.

Advantages:

- Parallel runway alignment allows for simultaneous VFR takeoff and landing operations.
- No property acquisition within the Colonia Hermosa subdivision.
- No physical impacts to Springfest Park or the unnamed reservoir south of the Airport.

Disadvantages:

- Parallel runway alignment does not allow for simultaneous IFR takeoff and landing operations.
- While the Colonia Hermosa subdivision is not directly impacted by property acquisition, the alignment of Runway 14R-32L could result in aircraft overflights of the subdivision.

ALTERNATIVE NOISE EXPOSURE ANALYSIS

The standard methodology for analyzing noise conditions at airports involves the use of a computer simulation model. The Airport Environmental Design Tool, Version 2d (AEDT) is required by the Federal Aviation Administration (FAA) for developing noise exposure contours. AEDT is designed to predict annual average aircraft noise conditions at a given geographic location. The purpose of the noise model is to produce noise exposure contours that are overlain on a map of the airport and vicinity to graphically represent aircraft noise conditions.

Future noise contours for each alternative, except Airfield Alternative 2, were prepared using the yearly day-night level sound level (DNL), which is FAA's primary noise metric. DNL accounts for the increased sensitivity during nighttime hours (10:00 p.m. to 7:00 a.m.). A 10-decibel weighting is applied to noise events occurring at night. DNL is a summation metric which allows for objective analysis and can describe noise exposure comprehensively over a large area. The primary benefit of using the DNL metric is that it accounts for the average community response to noise as determined by the actual number and types of noise events and the time-of-day they occur.

Noise contours for Airfield Alternative 2 were not prepared as this alternative proposes a temporary parallel runway configuration. In this scenario, the parallel runway would only be in use when the primary runway is closed for construction/rehabilitation activities. Once construction/rehabilitation of the primary runway is completed, the temporary Runway 14R-32L would no longer be active. As a result, Airfield Alternative 2 would function identically to Airfield Alternative 1. Therefore, there would be no difference in the long-term noise exposure from Airfield Alternative 1 to Airfield Alternative 2.

To achieve an accurate representation of an airport's noise conditions, the AEDT incorporates a combination of industry standard information and user-supplied inputs specific to the airport. The software provides noise characteristics, standard flight profiles, and manufacturer-supplied flight procedures for aircraft within the U.S. civil and military fleets, including those which commonly operate at MFE. As each

aircraft has different design and operating characteristics (number and type of engines, weight, and thrust levels), each aircraft emits different noise levels. The most common way to spatially represent the noise levels emitted by an aircraft is with a noise exposure contour.

Based on AEDT-provided and user inputs, aircraft sound exposure for the annual average day is calculated for the points in a grid covering the airport and surrounding areas. The grid values, represented with the DNL, at each intersection point on the grid represent a noise level for that geographic location. To create the noise contours, a line linking equal values, like those on a topographic map, is drawn which connects points of the same DNL noise value. In the same way that a topographic contour represents the same elevation, the noise contour identifies equal noise exposure. The resulting future (2036) 65, 70, and 75 DNL noise contours for each of the Airfield Alternatives, except for Airfield Alternative 2, are shown on the back side of each Airfield Alternative exhibit (**Exhibits 4C and 4E through 4K**).

Airport-specific information, including runway configuration, flight paths, aircraft fleet mix, runway use distribution, elevation, atmospheric conditions, and numbers of daytime and nighttime operations, are also used as modeling inputs. Specific modeling assumptions for MFE are discussed in the following sections.

Aircraft Fleet Mix and Operations

Database Selection

Table 4C lists the 20-year forecast operations by aircraft type for MFE. The aircraft types were projected based upon forecasted operations (see Chapter 2) and by reviewing the FAA's Traffic Flow Management System Counts (TFMSC), which provides a sampling of the fleet mix of aircraft operating at the Airport.

Time-of-Day

The time-of-day which aircraft operations occur is important as input to the AEDT due to the 10-decibel nighttime (10:00 p.m. to 7:00 a.m.) weighting of flights. In calculating airport noise exposure, one operation at night has the same noise emission value as 10 operations during the day by the same aircraft.

Time-of-day information was estimated based upon analysis conducted as part of the master planning process. For the purposes of this analysis, it is assumed that seven percent of general aviation operations occur during the DNL nighttime hours. Additionally, based on tower records and airline flight schedules, it is assumed 26 percent of commercial operations occur during the DNL nighttime hours.

TABLE 4C
Aircraft Fleet Mix and Operations
McAllen International Airport

	AEDT Designator	Future (2036) Operations
Itinerant Fleet Mix		
Single-Engine	CNA208	15,115
Single-Engine	GASEPF	141
Multi-Engine Piston	BEC58P	7,115
Single-Engine Turboprop	PC-12	1,415
Multi-Engine Turboprop	DHC6	4,205
Multi-Engine Turboprop	DHC8	1,260
Business Jet - Small	EMB120	4,995
Business Jet - Small	CNA510	1,233
Business Jet - Small	ECLIPSE500	191
Business Jet - Medium	CNA500	354
Business Jet - Medium	CNA55B	2,830
Business Jet - Medium	CNA560U	354
Business Jet - Medium	IA1125	849
Business Jet - Medium	LEAR35	1,033
Business Jet – Large	CNA750	778
Business Jet - Large	GV	538
Business Jet - Large	CL600	637
Business Jet - Large	EMB145	0
Commercial/Cargo Jet	CRJ9-LR	1,500
Commercial/Cargo Jet	EMB170	1,000
Commercial/Cargo Jet	MD82	21
Commercial/Cargo Jet	A321-232	5,240
Commercial/Cargo Jet	737700	3,700
Commercial/Cargo Jet	757PW	520
Commercial/Cargo Jet	767300	208
Military Jet Trainer	T-38A	1,095
Military Turboprop	C130	12
Helicopter Piston	B206L	1,100
Helicopter Turboprop	S70	2,200
Itinerant Subtotal		**59,640**
Touch-and-Go Fleet Mix		
Single-Engine	CNA208	11,100
Total Operations		**70,740**

Source: Coffman Associates analysis

Runway and Helipad Use

Runway use indicates the typical paths aircraft fly when arriving or departing from the airport. **Table 4D** summarizes the runway use assumptions used in this analysis. Since no parallel runway is planned for Airfield Alternative 1, this scenario includes the continued use of Runway 18-36 for one percent of general aviation operations. For Airfield Alternatives 3 through 8, the runway use assumptions are the same regardless of the location of the parallel runway and assume the closure of Runway 18-36.

TABLE 4D
Runway Use Percentages
McAllen International Airport

Runway	Large Jet	Turboprop	General Aviation	Local Fixed Wing
Airfield Alternatives 1				
14	70%	70%	70%	70%
32	30%	30%	29%	30%
18	0%	0%	1%	0%
36	0%	0%	1%	0%
Airfield Alternatives 3-8				
14R	35%	35%	35%	35%
32L	15%	15%	15%	15%
14L	35%	35%	35%	35%
32R	15%	15%	15%	15%

Note: Noise contours were not prepared for Airfield Alternative 2.
Source: Coffman Associates analysis

Flight Tracks

Flight patterns can be categorized within the following types: arrivals, departures, and local or touch-and-go. Arrivals and departures correspond to itinerant traffic traveling to or from the Airport, while local operations represent those operations conducted within the local traffic pattern. The touch-and-go nomenclature refers to an aircraft landing briefly on the runway and then resuming flight. These paths are included in the model to indicate where each aircraft type operates. The AEDT arrival, departure, and local flight tracks and operations distribution for this report are based on a review of published traffic patterns and industry standard flight path assumptions.

Flight Profiles

The standard arrival profile used in the AEDT program is a three-degree approach. Therefore, the standard approach was included in the model as representative of local operating conditions.

Grid Points

In addition to calculating noise contours, AEDT has the capability to calculate noise values at a specific geographic location, known as a grid point, based on the assumptions described above. For comparative purposes among the various runway configuration alternatives, seven grid points were identified within the vicinity of the airport. The grid point sites were selected to identify the resulting noise exposure for each alternative within certain noise-sensitive areas near the airport, including residential neighborhoods and a public park. The results of the grid point calculations are shown in **Table 4E**.

It should be noted that funding for noise mitigation projects is not available through an airport master plan. Funding for noise mitigation projects is typically the result of a recommendation of a Part 150

study or a *National Environmental Policy Act* (NEPA) Environmental Assessment for a specific airport project.

TABLE 4E
Airfield Alternative Grid Point Analysis (DNL)
McAllen International Airport

	Airfield Alternatives*						
Grid Point	**1**	**3**	**4**	**5**	**6**	**7**	**8**
1	70.0	69.1	70.5	68.4	67.1	66.6	68.9
2	63.8	63.5	66.5	64	63.2	61.2	63.5
3	59.9	60	62.2	60.1	63.1	57.9	59.5
4	69.5	65.9	65.8	65.6	63.9	65.2	65.7
5	50.1	52.4	53.2	52.6	55	63.4	52.5
6	53.7	56.6	59.1	56.7	61.6	57.5	56.8
7	59.1	67.6	63.8	68.8	63.1	58.1	67.6

* A grid point analysis and noise contours for Airfield Alternative 2 were not prepared as this alternative proposes a temporary parallel runway condition. As such, Airfield Alternative 2 would not result in a permanent change in the airport's noise exposure as compared to Airfield Alternative 1.
Source: Coffman Associates analysis.
DNL- day-night average sound level
Note: Funding for noise mitigation projects is not available through an airport master plan. Funding for noise mitigation projects is typically the result of a recommendation of a Part 150 study or a *National Environmental Policy Act* (NEPA) Environmental Assessment for a specific airport project.

AIRFIELD ALTERNATIVES SUMMARY

Each of the airfield alternatives, including the do-nothing alternative, are summarized and compared in **Table 4F**. Unsurprisingly, the alternatives that involve the largest amount of property acquisition, the largest impact on the Mission Inlet Channel, or the most relocated residential properties are estimated to have higher capital costs.

Alternative 1 has no impact on airfield capacity but would mitigate the ROFA incompatibility at the Runway 32 end by incorporating a new EMAS bed, thereby allowing the Airport to continue to function much in the same way it does currently. Alternative 2 considers a new full-length parallel taxiway on the south side of the runway built to runway standards that can be used on a temporary basis during periods that the runway is closed for maintenance. Alternatives 3, 4, 5, and 8 add a parallel runway that can be used for simultaneous visual (VFR) operations and considers various runway lengths and impacts to the Colonia Hermosa subdivision. Alternatives 6 and 7 consider farther parallel runway separation distances to allow for simultaneous instrument (IFR) and precision approach operations, respectively. Alternatives 6 and 7 provide for the greatest airfield capacity benefit but also have the highest potential cost range.

While several alternatives have a smaller impact with regard to the number of residential properties that would need to be relocated, the analysis also considered potential overflight and noise impacts to residential areas. Alternative 4, which shifts the parallel runway so that its RPZ overlaps the Colonia Hermosa subdivision, is the most impactful to residential properties. Despite having a small number of residential properties to be relocated, Alternatives 3, 5, 7, and 8 could increase the number of overflights in surrounding neighborhoods, which can lead to increased noise complaints.

Striking a balance between providing the most benefit to airfield safety and capacity and impacts to the surrounding community is the challenge for any airfield alternatives discussion. No single alternative may satisfy all stakeholder needs; however, finding a compromise that allows the airport to continue to meet the needs of its users and grow as an economic engine while minimizing negative impacts to the community is the goal. Input from the Airport Advisory Board and public is integral to determining the appropriate vision for future development of the airfield.

TABLE 4F
Airfield Alternatives Summary
McAllen International Airport

Alternative	Primary Runway Length	Parallel Runway Length	VFR Ops[1]?	IFR Ops[1]?	Precision Ops[1]?	Property Acquisition (acres)	Impacted Residential Properties	Full RSA/ROFA/ RPZ Standards Met?	Cost Range
Do Nothing	7,120′	--	No	No	No	--	--	No	--
Alternative 1	7,120′	--	No	No	No	22.3	7	Yes	$25,469,900
Alternative 2	7,120′	7,120′	No	No	No	36.7	33	Yes	$97,975,800
Alternative 3	8,600′	7,200′	Yes	No	No	346.5	11	Yes	$259,036,400-$383,459,100
Alternative 4	9,400′	7,200′	Yes	No	No	353.3	199	Yes	$281,696,600-$429,244,200
Alternative 5	10,331′	8,000′	Yes	No	No	497.3	14	Yes	$285,613,800-$419,597,500
Alternative 6	9,400′	7,200′	Yes	Yes	No	677.3	7	Yes	$310,187,900-$552,512,600
Alternative 7	10,000′	7,200′	Yes	Yes	Yes	1,101.3	7	Yes	$276,753,600-$491,741,700
Alternative 8	10,000′	7,200′	Yes	No	No	378.5	11	Yes	$267,468,500-$395,643,400

[1] Simultaneous operations.
VFR – Visual Flight Rules
IFR – Instrument Flight Rules
Source: Coffman Associates analysis.

LANDSIDE PLANNING CONSIDERATIONS

Landside development alternatives include consideration of the passenger terminal facility, general aviation services, and support areas, as well as potential revenue enhancement opportunities. Landside considerations for MFE are summarized on **Exhibit 4B**.

The alternatives to follow focus on maximizing the development potential of existing Airport property, including the potential landside development of Runway 18-36 once it is closed, but also considers growth potential beyond the existing property boundary. Each alternative meets FAA design standards and satisfies long-term horizon facility demand identified in the previous chapter. The landside element of the recommended Master Plan concept, to be presented in the next chapter, may be one of these alternatives or, more likely, is a combination of elements from each of them.

TERMINAL COMPLEX

As outlined in the facility requirements chapter, the existing terminal building with a gross building area of 148,200 sf, is adequately sized to accommodate the long-term passenger demand; however, individual functional areas within the terminal were found to be undersized. Most notably, the concourse areas including the holdroom space, number of gates, and circulation areas are undersized to accommodate long-term passenger demand. Additional space is also needed for the baggage claim lobby, security

screening, ticketing area, and public spaces including restrooms and concessions. In total, if no other adjustments are made to existing functional areas, long-term demand calls for an additional 24,000 sf of terminal space, most of which is needed within the concourse areas, and a need for nine total gates.

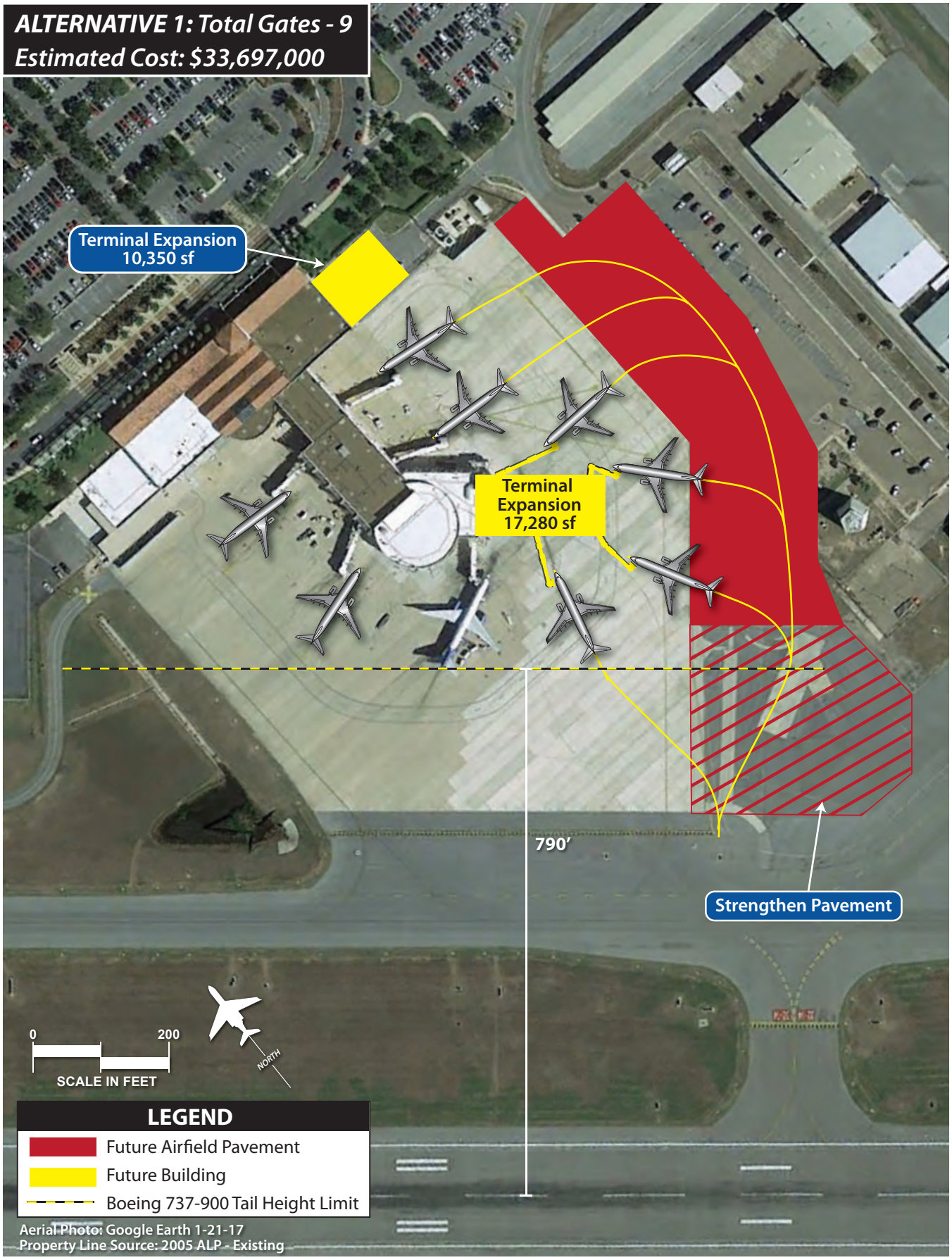
Three alternatives have been developed that consider expanding the existing terminal building to add more space for these various functional areas. Since most of these functional areas are fixed by function, alternatives are limited on how the building can be expanded. Several options are available to expand the concourse area and associated jet bridges. The following alternatives, shown on **Exhibits 4K**, **4L**, and **4M**, depict options for enlarging the terminal and alternate layouts for the concourse expansion.

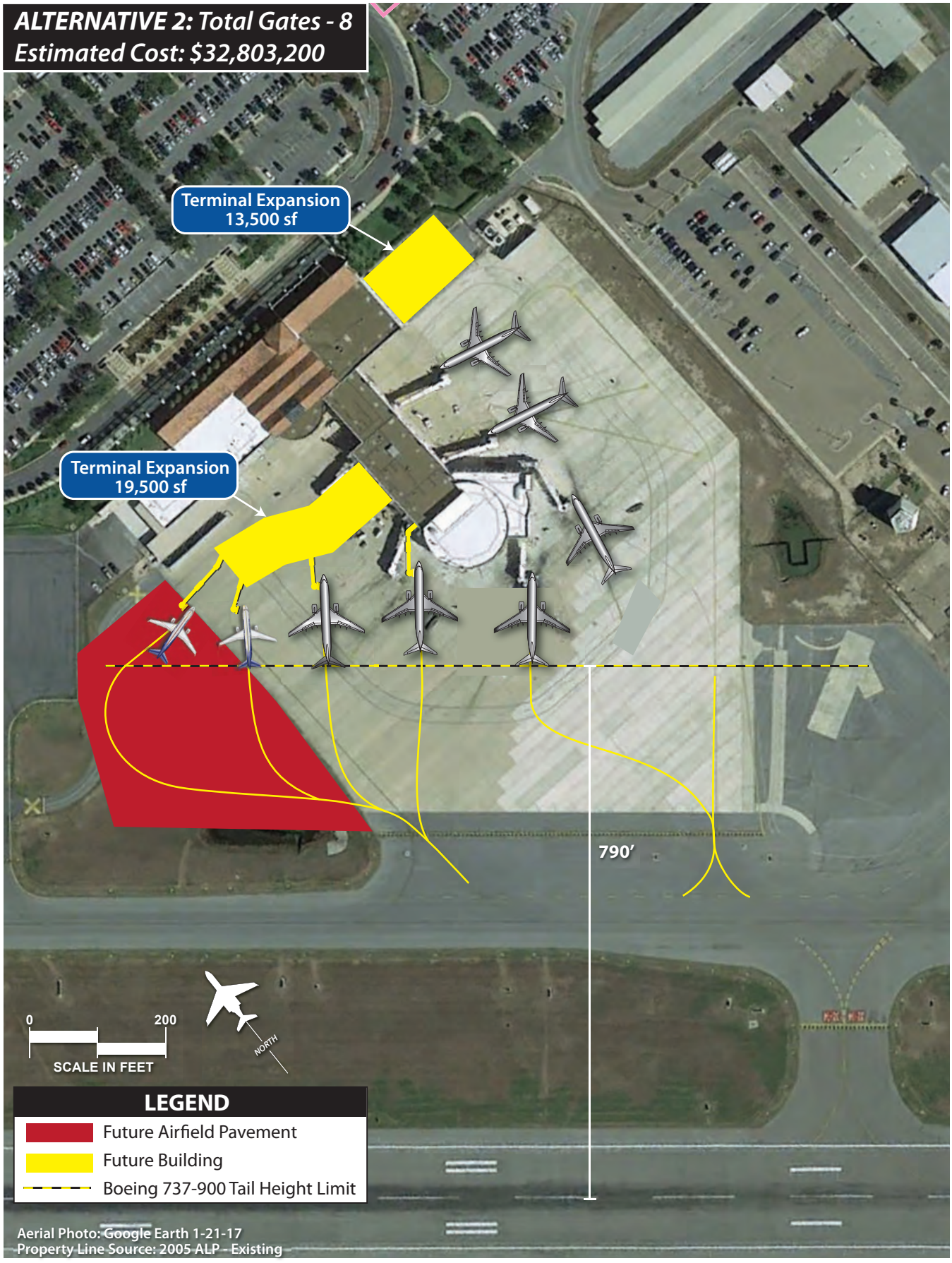
Terminal Alternative 1 – depicted on **Exhibit 4L**, proposes two expansions of the terminal building. Expansion of the main terminal complex consists of a 10,350-sf addition in the area that would allow for expanded baggage handling and claim area as well as additional public and office spaces. A concourse addition totaling 17,280 sf would provide an additional three gates for a total of nine gates. To allow for this concourse expansion, the terminal apron needs to be expanded to encompass a portion of the existing vehicle parking lot adjacent to the airport traffic control tower (ATCT) and results in the need to relocate an existing drainage basin. In addition, a portion of the existing terminal apron that is constructed of asphalt would need to be strengthened to accommodate the heavier commercial aircraft taxiing to the gate area. Each gate area in this alternative allows for a Boeing 737-900 aircraft to park without the tail penetrating the runway's Part 77 transitional surface.

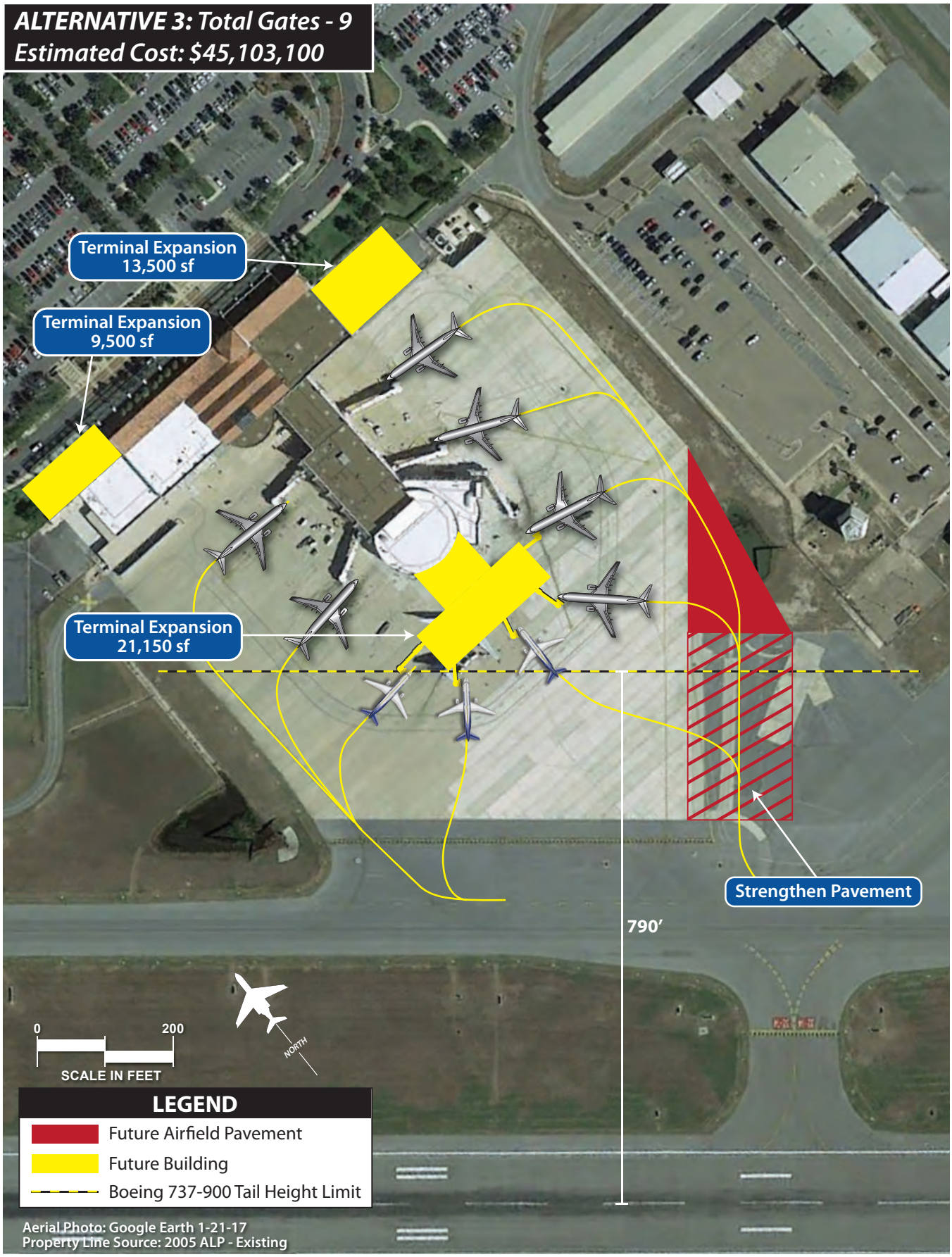
The concourse configuration proposed in this alternative is already depicted on the Airport's current ALP. In total, this alternative adds 27,630 sf of terminal space and results in nine total gates. The total estimated cost of this alternative is $33,697,000.

Terminal Alternative 2 – depicted on **Exhibit 4M**, considers a larger terminal expansion of 13,500 sf to accommodate baggage handling and claim spaces and public spaces including concessions. The larger addition could also allow for the reconfiguration of interior functional areas to provide additional security checkpoint space and other functional areas as necessary. The concourse expansion in this alternative adds 19,500 sf but only results in a net gain of two gates for a total of eight gates. This configuration would eliminate access to existing Gate 2, rendering it unusable. Two of the new gate positions would also not allow for a Boeing 737-900 to park without its tail penetrating the Part 77 transitional surface or, due to limited apron space available, for aircraft to push back from the gate. Therefore, these gates could only be used by smaller regional jet airplanes. To make the new concourse areas accessible to aircraft, the terminal apron would need to be expanded, which also results in the need to relocate an existing drainage basin.

The concourse configuration proposed in this alternative is already depicted on the Airport's current ALP. In total, this alternative adds 33,000 sf of terminal space and results in eight total gates. This alternative meets the need for seven gates by the intermediate-term; however, if additional gates are needed, it would need to be combined with another expansion alternative. The total estimated cost of this alternative is $32,803,200.


ALTERNATIVE 1: Total Gates - 9
Estimated Cost: $33,697,000
Terminal Expansion 10,350 sf
Terminal Expansion 17,280 sf
790'
Strengthen Pavement
0
200
SCALE IN FEET
NORTH
LEGEND
Future Airfield Pavement
Future Building
Boeing 737-900 Tail Height Limit
Aerial Photo: Google Earth 1-21-17
Property Line Source: 2005 ALP - Existing


ALTERNATIVE 2: Total Gates - 8
Estimated Cost: $32,803,200
Terminal Expansion
13,500 sf
Terminal Expansion
19,500 sf
790'
0
200
SCALE IN FEET
NORTH
LEGEND
Future Airfield Pavement
Future Building
Boeing 737-900 Tail Height Limit
Aerial Photo: Google Earth 1-21-17
Property Line Source: 2005 ALP - Existing


ALTERNATIVE 3: Total Gates - 9
Estimated Cost: $45,103,100
Terminal Expansion 13,500 sf
Terminal Expansion 9,500 sf
Terminal Expansion 21,150 sf
Strengthen Pavement
790'
0
200
SCALE IN FEET
NORTH
LEGEND
Future Airfield Pavement
Future Building
Boeing 737-900 Tail Height Limit
Aerial Photo: Google Earth 1-21-17
Property Line Source: 2005 ALP - Existing

Terminal Alternative 3 – depicted on **Exhibit 4N**, this alternative proposes the largest scale expansion of the terminal including: 13,500 sf for added baggage handling, public spaces, and concessions; 9,500 sf for added ticketing spaces and other office spaces. These additions could also allow for reconfiguration of interior spaces to allow for added security checkpoint area and other spaces as necessary.

The concourse expansion proposed in this alternative extends out towards the runway in a t-shape consisting of 21,150 sf of added space and five gates. One existing gate (Gate 5) would be eliminated in this alternative, leaving a net total of nine gates provided in this alternative. A result of expanding towards the runway is that three of the new gates are positioned such that the larger aircraft, such as the Boeing 737-900, cannot park at the gate without tail penetrations to the Part 77 transitional surface. As a result, these gates could only be used by smaller aircraft with shorter tail heights. This alternative would also require the expansion of the terminal apron and strengthening of a portion of the existing apron to allow for aircraft access to the gate area.

In total, this alternative adds 44,150 sf of terminal space and results in nine total gates. The total estimated cost of this alternative is $45,103,100.

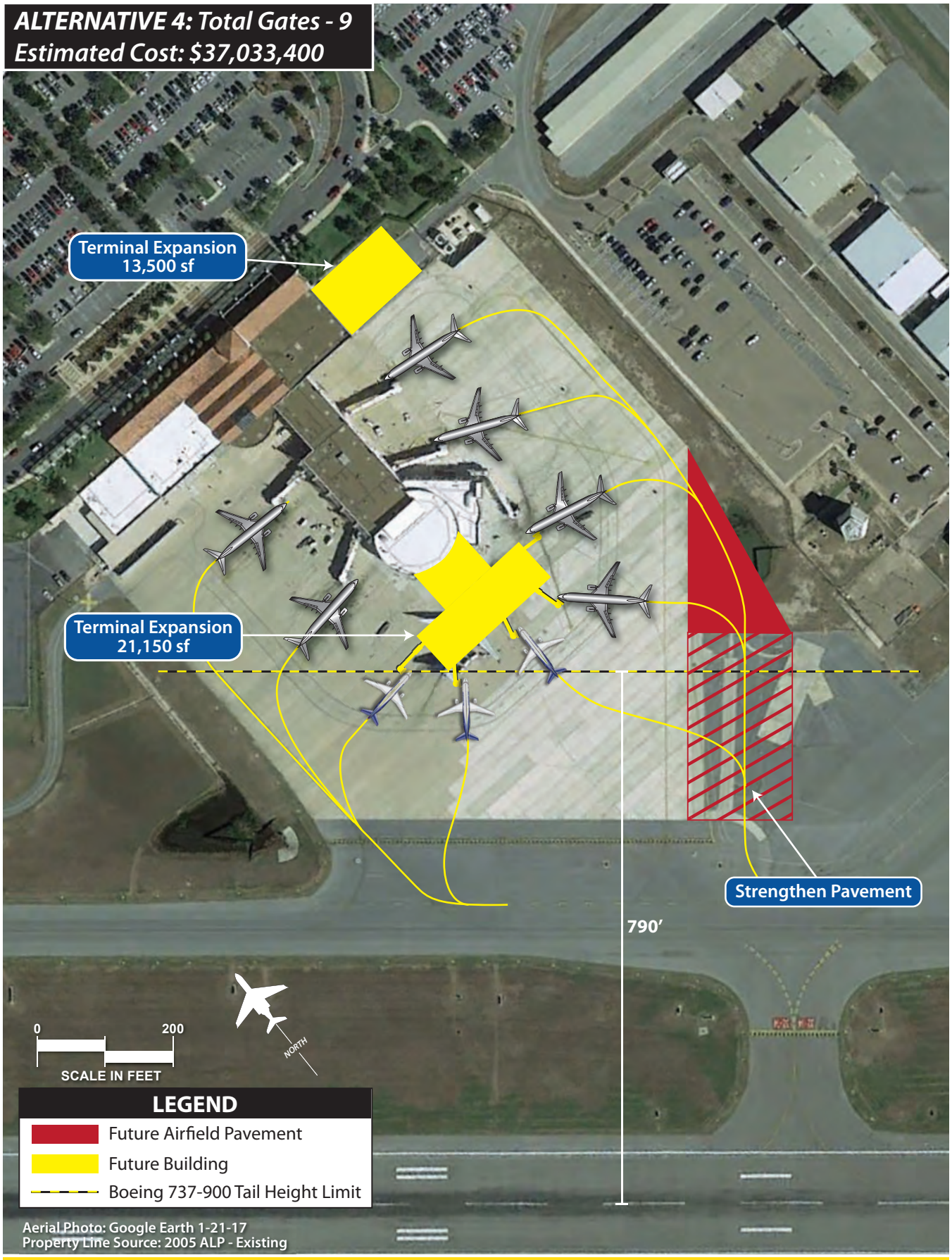
Terminal Alternative 4 – depicted on **Exhibit 4P**, is essentially the same layout as Alternative 3 without the 9,500-sf terminal expansion on the west side of the building for added ticketing and office spaces. The concourse expansion proposed in this alternative extends out towards the runway in a t-shape consisting of 21,150 sf of added space and five gates. One existing gate (Gate 5) would be eliminated in this alternative, so there is a net total of nine gates provided with this option. A result of expanding towards the runway is that three of the new gates are positioned such that the larger aircraft, such as the Boeing 737-900, cannot park at the gate without tail penetrations to the Part 77 transitional surface. As a result, these gates could only be used by smaller aircraft with shorter tail heights. This alternative would also require the expansion of the terminal apron and strengthening of a portion of the existing apron to allow for aircraft access to the gate area.

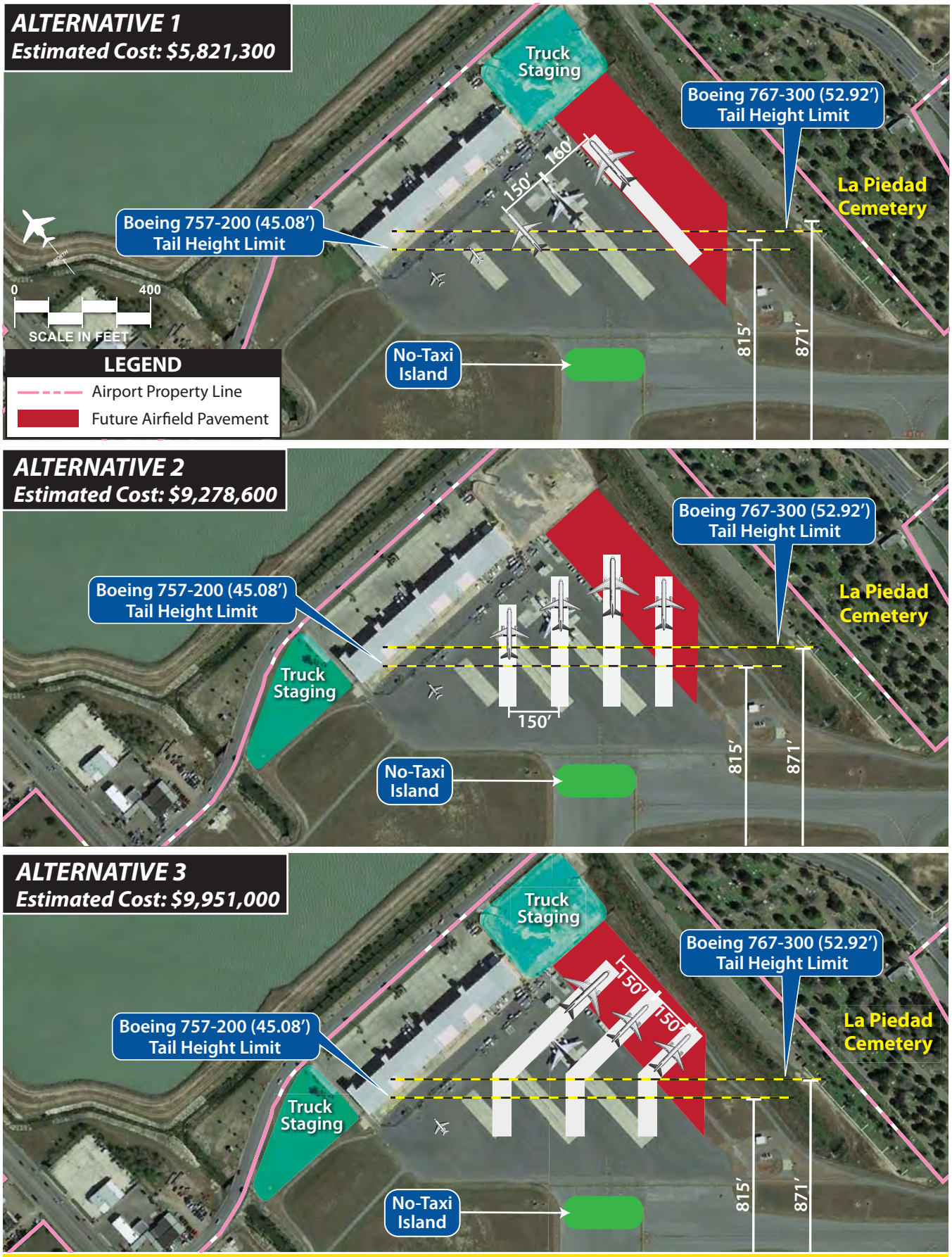
In total, this alternative adds 34,650 sf of terminal space and results in nine total gates. The total estimated cost of this alternative is $37,033,400.

AIR CARGO

The evaluation of air cargo facilities in the previous chapter identified a need for additional cargo apron space and noted that the configuration of the existing aircraft parking positions was restricted by tail height limitations for the Boeing 757-200 and the Boeing 767-300F. In its current configuration, the position farthest from the runway centerline is the only position capable of having a parked Boeing 757-200 or 767-300F without the tail penetrating the Part 77 transitional surface.

Three alternatives have been prepared that examine a possible expansion of the air cargo apron and the reconfiguration of aircraft parking. These air cargo alternatives are presented on **Exhibit 4Q**. None of the presented alternatives provide more than five aircraft parking positions, which is less than what has


ALTERNATIVE 4: Total Gates - 9
Estimated Cost: $37,033,400
Terminal Expansion
13,500 sf
Terminal Expansion
21,150 sf
Strengthen Pavement
790'
0
200
SCALE IN FEET
NORTH
LEGEND
Future Airfield Pavement
Future Building
Boeing 737-900 Tail Height Limit
Aerial Photo: Google Earth 1-21-17
Property Line Source: 2005 ALP - Existing


ALTERNATIVE 1
Estimated Cost: $5,821,300
Truck Staging
Boeing 767-300 (52.92')
Tail Height Limit
La Piedad Cemetery
Boeing 757-200 (45.08')
Tail Height Limit
160'
150'
0
400
SCALE IN FEET
LEGEND
Airport Property Line
Future Airfield Pavement
No-Taxi Island
815'
871'
ALTERNATIVE 2
Estimated Cost: $9,278,600
Boeing 767-300 (52.92')
Tail Height Limit
La Piedad Cemetery
Boeing 757-200 (45.08')
Tail Height Limit
Truck Staging
150'
No-Taxi Island
815'
871'
ALTERNATIVE 3
Estimated Cost: $9,951,000
Truck Staging
Boeing 767-300 (52.92')
Tail Height Limit
150'
150'
La Piedad Cemetery
Boeing 757-200 (45.08')
Tail Height Limit
Truck Staging
No-Taxi Island
815'
871'

been identified as the long-term need (eight total aircraft parking positions are needed in the long-term). Due to its location on the airfield and considering development constraints including La Piedad Cemetery to the east, Uvalde Avenue to the north, and S. 23rd Street to the west, additional parking positions cannot be accomplished. If additional spaces become necessary in the future, new cargo facilities in the general aviation (GA) areas of the airport can be considered. The GA alternatives to follow in the next section present options for new buildings and apron spaces that could accommodate new air cargo facilities.

Air Cargo Alternative 1 – considers maintaining the current aircraft parking layout along with the addition of approximately 15,000 sy of apron space. This addition would allow for an additional parking lane capable of accommodating a Boeing 767-300F or similar airplane. This alternative provides capacity for up to two Boeing 767-300F aircraft at the same time and five total parking positions. Added truck staging/parking area is also added to the east side of the air cargo building. This site currently has a natural gas compressor station on it that would need to be removed/relocated.

The total estimated cost of this alternative is $5,821,300.

Air Cargo Alternative 2 – includes the addition of approximately 15,000 sy of apron space as well as the realignment of aircraft parking positions to be perpendicular with the runway. This alignment provides for up to four positions that would allow for the Boeing 757-200 and Boeing 767-300F airplanes without tail height penetrations of the transitional surface. A fifth position would allow for parking of smaller air cargo airplanes. This alternative also considers the addition of truck staging/parking area on the west side of the air cargo building.

The total estimated cost of this alternative is $9,278,600.

Air Cargo Alternative 3 – includes the addition of approximately 15,000 sy of apron space and the realignment of aircraft parking positions so the planes face east. This alignment allows for one Boeing 767-300F, two Boeing 757-200 positions, and one position for a small air cargo airplane for a total of four positions. This alternative combines the added truck staging/parking areas proposed in the previous alternatives on the east and west sides of the air cargo building. Again, the site to the east of the air cargo building has a natural gas compressor station on it that would need to be removed/relocated.

The total estimated cost of this alternative is $9,951,000.

GENERAL AVIATION AND VEHICLE PARKING

The existing GA facilities are located primarily to the east of the terminal area along Runway 18-36. The GA area consists of large aprons, hangars, and vehicle access roads and parking lots. GA needs identified

in the previous chapter focus on additional GA terminal services area and aircraft storage hangar capacity. It should be noted that any future development of GA facilities, especially hangars, should only be undertaken when a need exists.

The landside alternatives to follow focus on redeveloping the Runway 18-36 area when the runway is decommissioned. It also examines the possibility of expanding GA facilities to the land along the Runway 14-32 flight line along S. 10th Street where Cascade Park is located. This area is separated from the airfield by a drainage canal, so any aviation-related development in this area would require enclosing or rerouting the drainage canal.

An additional consideration on the landside area is expansion of vehicle parking capacity including the development of a consolidated rental car (CONRAC) facility. A CONRAC facility has many benefits including freeing up space in the terminal for other uses, decongesting the terminal loop road and curb of rental car vehicles, and improved customer experience in a newly expanded facility. The facility requirements identified a need for expanded rental car ready/return spaces, and the current rental car lot cannot be readily expanded in its current location. Furthermore, previous terminal expansion alternatives could potentially impact the existing ATCT parking lot, reducing available capacity.

Finally, the existing Aircraft Rescue and Fire Fighting (ARFF) building is an older facility located approximately 1,475 feet laterally from the existing runway. A new facility in a location on the airfield that would allow for quicker response times to aircraft emergencies will be considered in the landside alternatives. The current ARFF station responds to both city and Airport emergencies. A new ARFF station would be a dedicated ARFF facility responding only to on-airport emergencies.

Landside Alternative 1 – depicted on **Exhibit 4R**, this alternative focuses on the redevelopment of Runway 18-36 and the acquisition and redevelopment of the U.S. Customs and Border Patrol facility along Wichita Avenue. A variety of hangar types are planned to include smaller executive-style hangars with a storage capacity of 3,600 sf, larger 12,000 sf conventional hangars that could be developed for specialty aviation service operators (SASOs), and 30,000 sf conventional hangars for large-scale maintenance/repair/overhaul (MRO) operators or fixed base operators (FBOs). The taxiway islands between Taxiway C and the west GA apron are planned to be paved, creating a unified apron for the existing and proposed hangars. Taxiway C is also planned to be widened to 50 feet to meet TDG 4 standards, which will accommodate most aircraft in the national GA fleet. Public vehicle access to the hangars is planned to extend from the existing hangar access road stemming from Wichita Avenue. In total, this alternative expands hangar storage capacity by 220,800 sf.

A new ARFF station is planned to be located between Taxiways A and D. This site has advantages over the existing facility as it is in closer proximity to the terminal and terminal apron and closer to the midpoint of the primary runway with direct access to both Taxiways A and D.

Vehicle parking capacity is planned in this alternative to include the addition of a parking garage over the existing short- and long-term parking lots at the terminal. The parking garage would also be utilized as a CONRAC. This is an ideal location for a CONRAC as it is a short walking distance from the terminal, so no shuttle buses are needed to transport passengers to/from the facility. The existing rental car lot

could then be converted over to additional short-term parking. A disadvantage of developing a parking garage over the existing parking lot is that a significant number of parking spaces would be displaced during construction. This would result in increased congestion of the lots remaining open and possibly the need to identify temporary offsite overflow parking lots and the use of shuttle buses to transport passengers.

The total estimated cost of this alternative is $38,290,600. The cost estimate excludes hangar construction, which is assumed to be funded by private developers.

Landside Alternative 2 – depicted on **Exhibit 4S**, this alternative considers the potential of GA development outside of the Runway 18-36 redevelopment area and focuses on a 20-acre area along Taxiway A and S. 10th Street. Development in this area would require acquisition of the property and the demolition of Cascade Park, as well as the potential removal/relocation of a natural gas compressor station. Planned development includes a new aircraft parking apron serving three 40,000 sf conventional hangars that could be developed for large-scale operations including MRO, FBO, or expanded air cargo operations. Smaller executive hangars are planned east of this area, with vehicle access stemming from S. 10th Street and Bales Road and taxilane access to the new apron. In this alternative, once Runway 18-36 is closed, it would be converted to a taxiway (Taxiway E) allowing for greater aircraft circulation in the existing GA areas. In total, this alternative expands hangar storage capacity by 177,600 sf.

A new ARFF station is planned to be located adjacent to the planned hangar development area on what is currently Cascade Park. This site is near the existing ARFF station, so it would provide only marginal advantage over the current facility in terms of improved response times.

The U.S. Customs and Border Patrol facility in this alternative is planned to be acquired and redeveloped as a parking garage and CONRAC. This location is also conveniently located within walking distance from the terminal, so shuttle buses would not be needed. Development of a parking garage and CONRAC in this location also allows for uninterrupted use of the existing short- and long-term lots during construction, so no temporary parking lots would be needed.

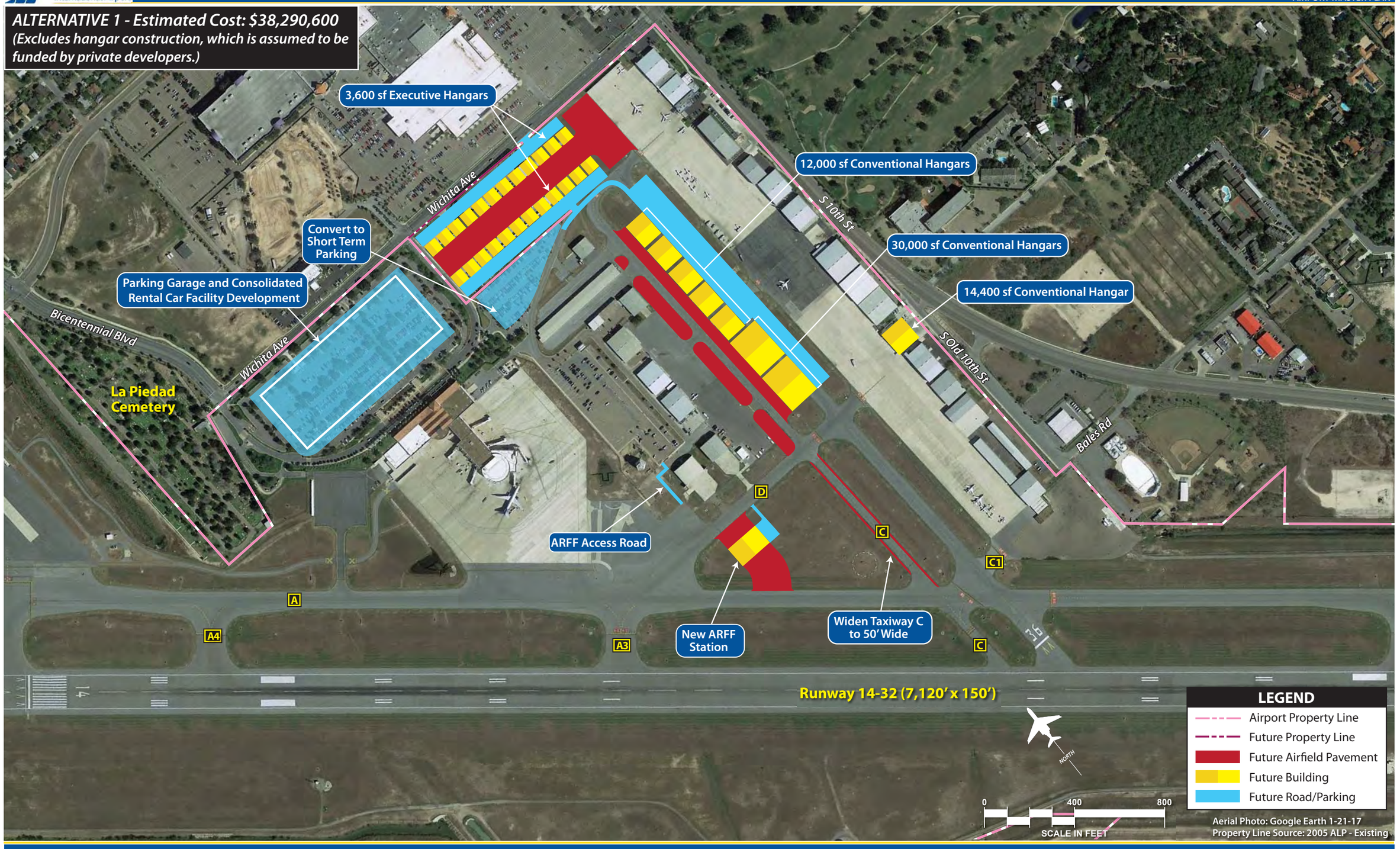
A triangle-shaped property bordered by S. 10th Street and S. Old 10th Street and Bales Road is also planned to be acquired by the Airport. This property consists of approximately five acres that has a building occupied by Southwest Key Programs and a trucking operation. This site has frontage with S. 10th Street but is currently inaccessible to the airfield. Therefore, this alternative considers acquiring this property as an opportunity to expand non-aviation revenues for the Airport by promoting the property's redevelopment for new commercial/industrial uses.

The total estimated cost of this alternative is $36,918,500. The cost estimate excludes hangar construction, which is assumed to be funded by private developers.

Landside Alternative 3 – depicted on **Exhibit 4T**, considers additional GA development in the triangle-shaped infield area between Taxiways D and A and the east GA apron, and redevelopment of the U.S.

ALTERNATIVE 1 - Estimated Cost: $38,290,600

(Excludes hangar construction, which is assumed to be funded by private developers.)



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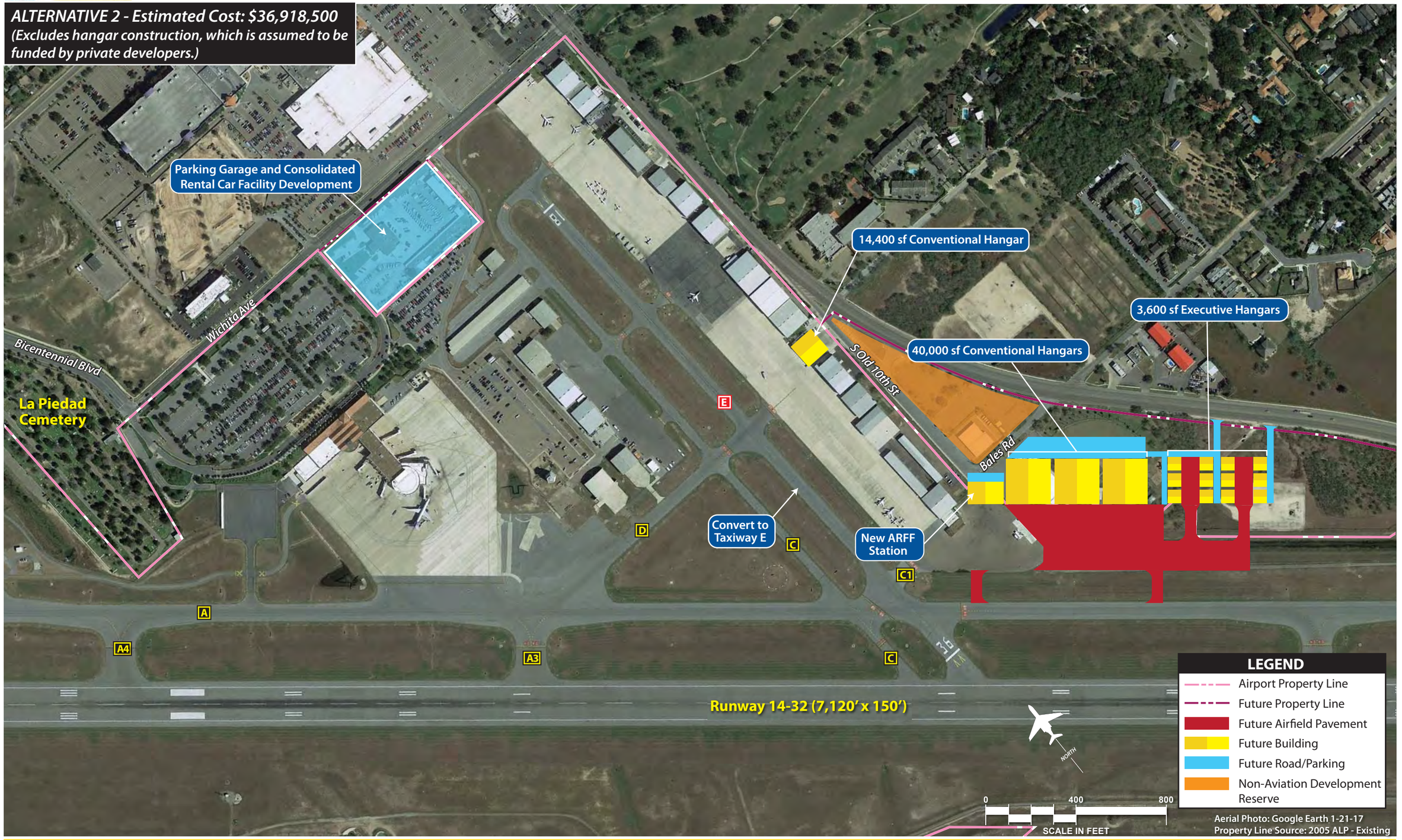
ALTERNATIVE 2 - Estimated Cost: $36,918,500

(Excludes hangar construction, which is assumed to be funded by private developers.)



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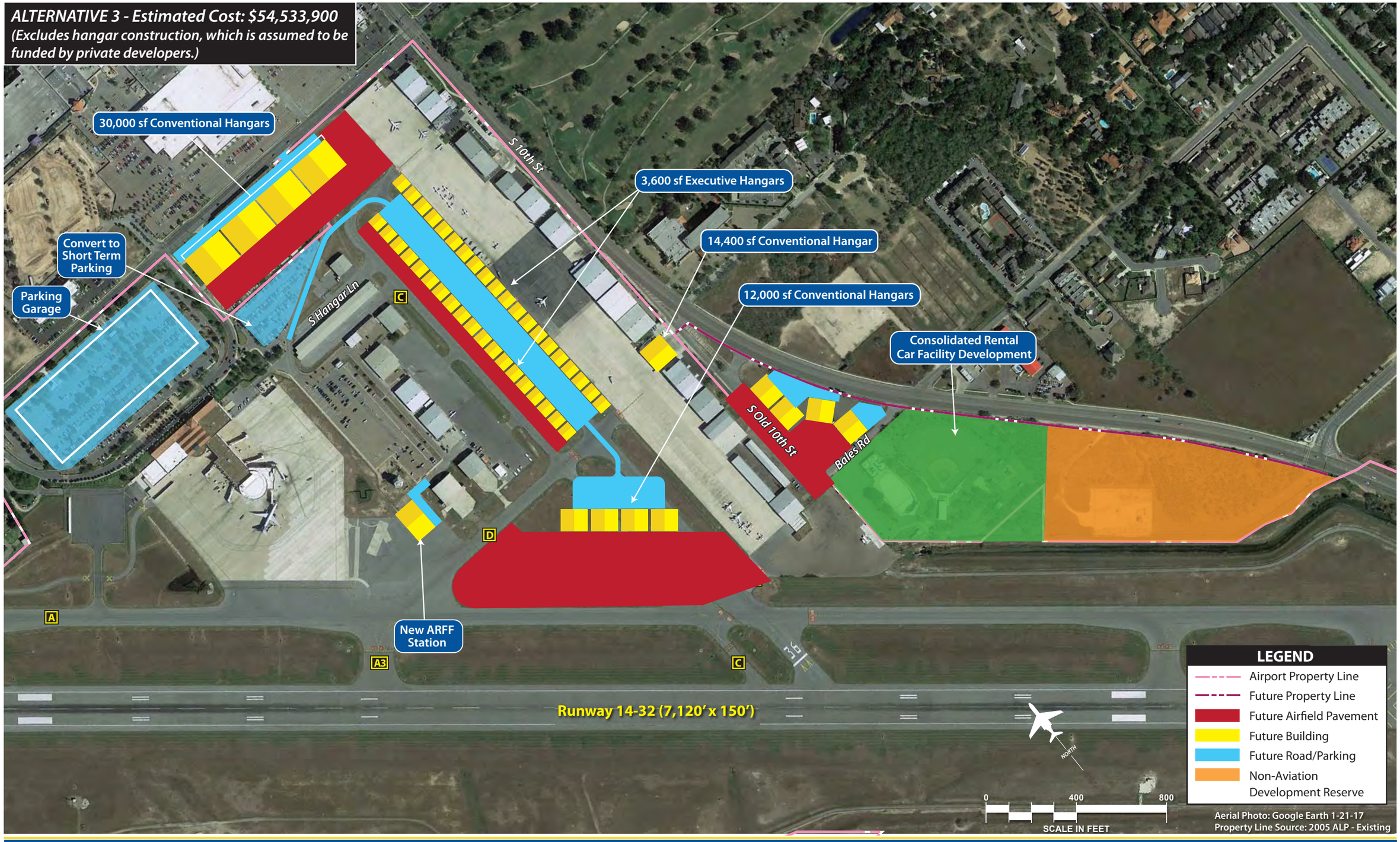
ALTERNATIVE 3 - Estimated Cost: $54,533,900

(Excludes hangar construction, which is assumed to be funded by private developers.)



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Customs and Border Patrol site along Wichita Avenue. GA development includes new 12,000 sf conventional hangars for FBO/SASO development along Taxiway A and the Runway 14-32 flight line as well as 30,000 sf conventional hangars along Wichita Avenue for a large-scale SASO/MRO operation. Small executive hangars lined up along Taxiway C and the east GA apron is also included. Public vehicle access to these new hangars would stem from an existing hangar area access road and Wichita Avenue. A set of four 12,000 sf conventional hangars is also considered in the triangle parcel bordered by S. 10th Street, S. Old 10th Street, and Bales Road. To gain airfield access to this area, a portion of Bales Road would need to be abandoned to allow for taxilane construction. The planned taxilane width would allow access by aircraft within ADG II and below. In total, this alternative expands hangar storage capacity by 370,000 sf.

A new ARFF station is planned to be located adjacent to the ATCT. This site is more accessible to ground vehicles compared to the site proposed in Landside Alternative 1 and also benefits from its proximity to the terminal and terminal apron. Quick access to the airfield can also be gained via Taxiway A and A3.

A parking garage structure is planned to be constructed in this alternative over the existing short- and long-term lots. This is a convenient location that is easily walkable from the terminal building. Again, a disadvantage of developing a parking garage over the existing parking lot is that a significant number of spaces will be displaced during construction and temporary off-site parking may need to be set up with shuttle bus transportation for passengers. Rental car parking is planned to be relocated to a CONRAC on the 20-acre area along S 10th Street in the Cascade Park redevelopment area. In this area, the Airport would need to employ shuttle buses to transport passengers to/from the CONRAC, which adds significant costs to the operation of the facility.

The remaining portion of the 20-acre property along S. 10th Street is planned for non-aviation development reserve. This area is segregated from the airfield by a drainage channel, which could make constructing airfield access difficult and expensive. Since the land would be planned for non-aviation uses and is not owned by the Airport, it would need to be acquired using local funds as this type of land acquisition would not be eligible for federal funding. This land then could be developed to provide an additional revenue stream for the Airport. Depending on the type of development, the existing natural gas compressor station in this area may need to be removed/relocated.

The total estimated cost of this alternative is $54,533,900. The cost estimate excludes hangar construction, which is assumed to be funded by private developers.

ALTERNATIVES SUMMARY

The process utilized in assessing airside, terminal, and GA development alternatives involved a detailed analysis of short- and long-term requirements, as well as future growth potential. Current airport design standards were considered at each stage of development.

Several development alternatives related to both the airside and the landside have been presented. On the airside, the major considerations involve extending Runway 14-32, constructing a new parallel runway, and ensuring the airfield meets FAA design standards. Numerous constraints to airfield growth have been outlined and impacts of the various alternatives weighed, including impacts to residential properties in the vicinity of the Airport.

On the landside, alternatives were presented to consider the expansion of the terminal building and its concourse, expansion of the air cargo facilities, adding new aircraft storage hangar capacity, and the development of new vehicle parking facilities and a potential CONRAC.

After review by the Airport Advisory Board and public, a recommended concept will be presented in the next chapter. The resulting plan will represent an airside facility that fulfills safety and design standards and a terminal facility and landside complex that can be developed as demand dictates.

McAllen International Airport

Chapter 5

Recommended Master Plan Concept

CHAPTER FIVE

Recommended Master Plan Concept

The airport master plan for McAllen International Airport (MFE or Airport) has progressed through a systematic and logical process with a goal of formulating a recommended 20-year development plan. The process began with an evaluation of existing and future operational demand which aided in creating an assessment of future facility needs. Those needs were then used to develop alternative facility plans to meet projected needs. Each of those steps in the planning process has included the development of draft working papers which were presented and discussed at previous Airport Advisory Board (AAB) meetings.

In the previous chapter, several development alternatives were analyzed to explore options for the future growth and development of MFE. The development alternatives have been refined into a single recommended concept for the master plan. This chapter describes, in narrative and graphic form, the recommended direction for the future use and development of MFE.

The recommended concept provides the ability to meet the disparate needs of the array of airport operators, including commercial airlines, air cargo, and general aviation. The goal of this plan is to ensure the Airport can continue to serve, and even improve, in the primary role of serving as the Rio Grande Valley's premiere commercial passenger service platform. The role also includes serving all other aviation segments, such as commercial air cargo and general aviation users. The plan has also been specifically tailored to support existing and future growth of all forms of potential aviation activity as the demand materializes.

The recommended master plan concept, as shown on **Exhibit 5A**, presents a long-term configuration for the Airport, which preserves and enhances the role of the Airport while meeting FAA design standards. The phased implementation of the recommended development concept will be presented in Chapter Six. The following subsections describe the key details of the recommended master plan concept.

AIRSIDE CONCEPT

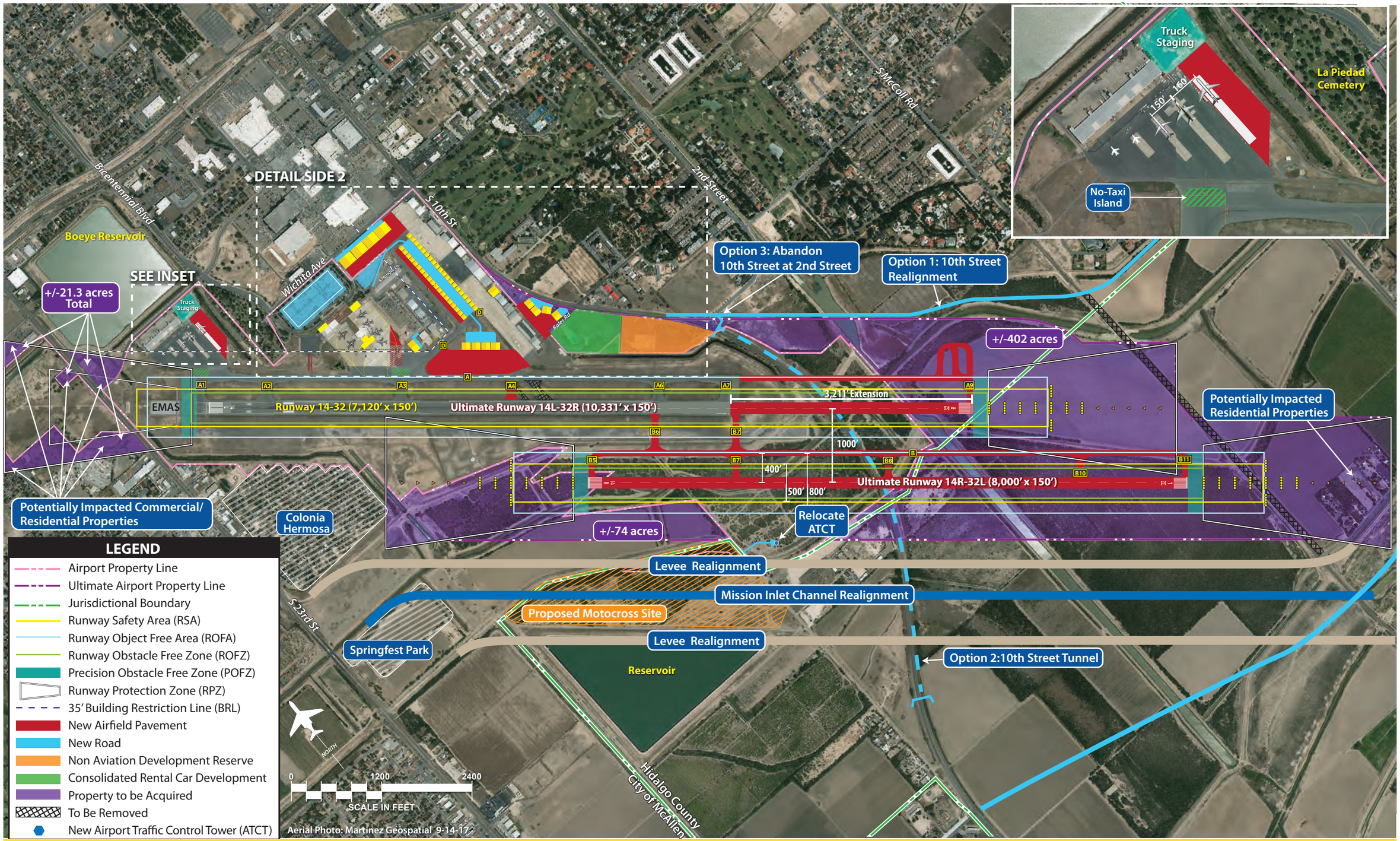
The airside plan generally considers those improvements related to the runway and taxiway system. MFE is currently served by a crosswind runway configuration. These two pavement surfaces position the Airport to attract and support a variety of aviation operations. Crosswind Runway 18-36 is limited in its utility by its dimensions (2,639 x 60 feet) and cannot be readily improved to meet higher design standards; therefore, Runway 18-36 is planned to be closed. From a capacity standpoint, MFE's airfield functions as a single-runway airfield, with primary Runway 14-32 measuring 7,120 feet by 150 feet. As a primary commercial service airport operating with a single runway, MFE risks losing its commercial passenger and cargo operators to other regional airports when the primary runway is shut down for major pavement rehabilitation work. For this reason, the master plan carries forward previous plans to construct a parallel runway.

DESIGN STANDARDS

The FAA has established design criteria to define the physical dimensions of runways and taxiways, as well as the imaginary surfaces surrounding them, to enhance the safe operation of aircraft at airports. These design standards also define the separation criteria for the placement of landside facilities.

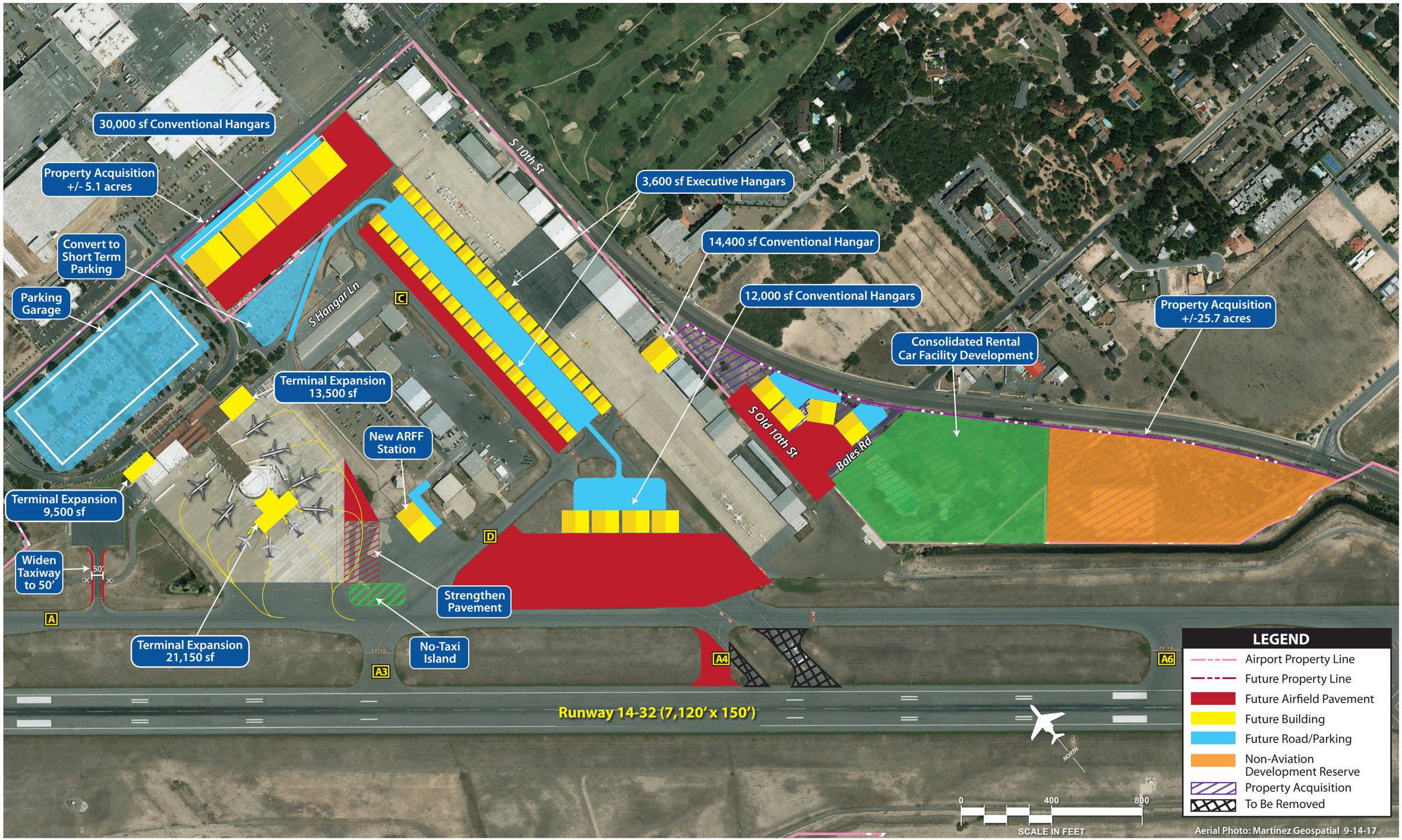
As discussed previously, the design criteria primarily center on the airport's critical design aircraft. The critical aircraft is the most demanding aircraft, or family of aircraft, which currently, or are projected to, conduct 500 or more operations (takeoffs and landings) per year at the airport. Factors included in airport design are an aircraft's wingspan, approach speed, tail height and, in some cases, the instrument approach visibility minimums for each runway. The FAA has established the Runway Design Code (RDC) to relate these design aircraft factors to airfield design standards. The most restrictive RDC is also considered the overall Airport Reference Code (ARC).

While airfield elements, such as safety areas, must meet design standards associated with the applicable RDC, landside elements can be designed to accommodate specific categories of aircraft. For example, an airside taxiway must meet taxiway object free area (TOFA) for all aircraft types using the taxiway,



LEGEND

- Airport Property Line
- Ultimate Airport Property Line
- Jurisdictional Boundary
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Runway Obstacle Free Zone (ROFZ)
- Precision Obstacle Free Zone (POFZ)
- Runway Protection Zone (RPZ)
- 35' Building Restriction Line (BRL)
- New Airfield Pavement
- New Road
- Non Aviation Development Reserve
- Consolidated Rental Car Development
- Property to be Acquired
- To Be Removed
- New Airport Traffic Control Tower (ATCT)


30,000 sf Conventional Hangars
Property Acquisition +/- 5.1 acres
Convert to Short Term Parking
Parking Garage
S 10th St
3,600 sf Executive Hangars
14,400 sf Conventional Hangar
12,000 sf Conventional Hangars
S Hangar Ln
C
Terminal Expansion 13,500 sf
New ARFF Station
S Old 10th St
Bales Rd
Consolidated Rental Car Facility Development
Property Acquisition +/-25.7 acres
Terminal Expansion 9,500 sf
Widen Taxiway to 50'
50'
A
D
Strengthen Pavement
Terminal Expansion 21,150 sf
No-Taxi Island
A3
A4
A6
Runway 14-32 (7,120' x 150')
NORTH
0
400
800
SCALE IN FEET
LEGEND
Airport Property Line
Future Property Line
Future Airfield Pavement
Future Building
Future Road/Parking
Non-Aviation Development Reserve
Property Acquisition
To Be Removed
Aerial Photo: Martinez Geospatial 9-14-17

while the taxilane to a T-hangar area only needs to meet width standards for smaller single and multi-engine piston aircraft expected to utilize the taxilane.

The applicable RDC and critical design aircraft for each runway at MFE in the existing and future conditions, as established in Chapter Two, are summarized in **Table 5A**.

TABLE 5A
Airfield Design Parameters
McAllen International Airport

Runway	Critical Design Aircraft	RDC	APRC	DPRC	TDG
Existing					
14-32	Boeing 737-800/900; 757-200	D-IV-2400	D/IV/2400 D/V/2400	D/IV D/V	4
18-36	Cessna 172	A-I(S)-VIS	B/I(S)/VIS	B/I(S)	1A
Future					
14L-32R	Boeing 737-800/900; 767-300	D-IV-2400	D/IV/2400 D/V/2400	D/IV D/V	5
14R-32L	Boeing 737-800/900; 767-300	D-IV-2400	D/IV/2400 D/V/2400	D/IV D/V	5
18-36	Runway to be closed				

RDC – Runway Design Code
APRC – Approach Reference Code
DPRC – Departure Reference Code
TDG – Taxiway Design Group
Source: FAA AC 150/5300-13A, Change 1, *Airport Design*

PRIMARY RUNWAY 14-32 (FUTURE RUNWAY 14L-32R)

- **Runway Dimensions** - The primary runway is currently 7,120 feet long and 150 feet wide. While the pavement width meets existing and future design standards, the alternatives chapter considered extensions to more safely accommodate commercial aircraft that operate at higher useful loads particularly during the hotter summer months. Extensions of between 1,480 and 3,211 feet were considered for full lengths between 8,600 feet and 10,331 feet. Each alternative considered extensions to the southeast as an extension to the northwest would significantly impact established residential neighborhoods. Ultimately, an extension of 3,211 feet to the southeast for a full length of 10,331 feet was selected for inclusion in the master plan concept. At this length, the primary runway at MFE would be capable of accommodating all commercial service aircraft currently using and forecasted to use the Airport at useful loads, allowing for longer routes. A longer runway also opens the potential for new commercial markets and business ventures.

- **Pavement Strength** – Runway 14-32 is currently strength rated for up to 90,000 pounds for single wheel loading aircraft (SWL), 190,000 pounds for dual wheel loading aircraft (DWL), and 280,000 pounds for dual tandem wheel loading aircraft (DTWL). These strengths are adequate for most aircraft using the Airport; however, the future critical design aircraft (Boeing 767-300) has a maximum takeoff weight of 412,000 pounds on DTWL main gear. Therefore, the plan includes strengthening the primary runway to this rating.

- **S. 10th Street** - Regardless of the length, any extension of Runway 14-32 to the east would require the realignment, tunneling, or abandonment of S. 10th Street. These three options for S. 10th Street are depicted on **Figure 5A**. A decision on the selected option will be made during the environmental review process so all environmental impacts of each option can be weighed.

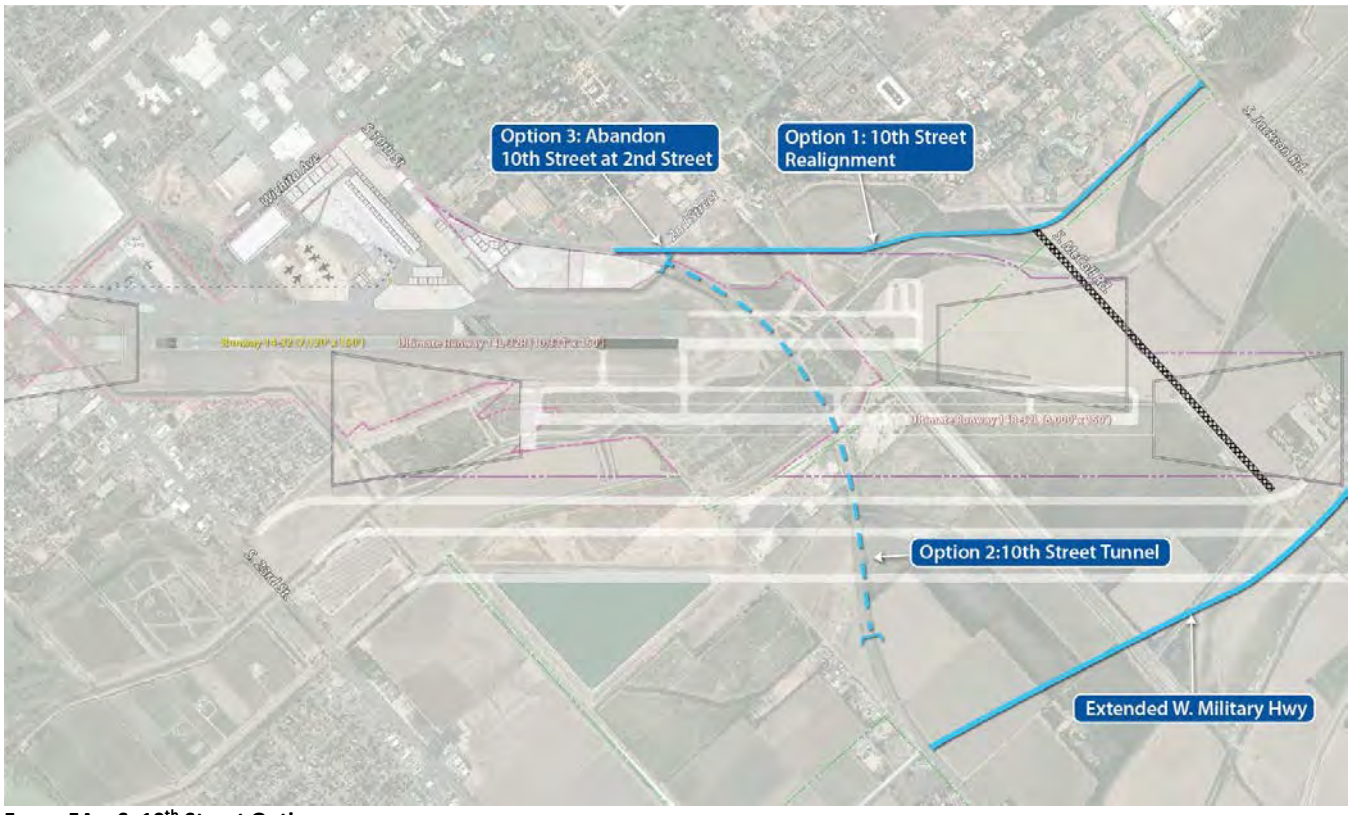


FIGURE 5A – S. 10th Street Options

- **Instrument Approach Procedures** – Runways 14 and 32 are both equipped with instrument landing system (ILS) approaches. Runway 14 has a Category I (CAT I) ILS with minimums down to 200-foot cloud ceilings and visibility down to ½-mile. Runway 32's ILS minimums are also set at 200-foot cloud ceilings, but visibility is at ¾-mile due to the lack of an approach lighting system (ALS). The master plan concept includes the installation of a medium intensity approach lighting system with runway alignment indicator lights (MALSR) to the future end of Runway 32, which would allow for CAT I minimums.

- **Runway Protection Zones (RPZs)** – The Runway 14 approach RPZ encompasses 78.914 acres, 21.3 acres of which is property either uncontrolled by the Airport or controlled by avigation easement. Development within these 21.3 acres includes residential and commercial properties that are incompatible with the RPZ. The plan includes the gradual acquisition of these 21.3 acres as they become available so the incompatibilities can be cleared. The Runway 32 approach RPZ ultimately would be traversed by S. McColl Road, a public roadway. Public roadways are considered an incompatible land use within RPZs; therefore, the plan includes the closure of S. McColl Road from where it would traverse through the future RPZs.

- **Holding Bay** – Holding bays are typically located near the end of a runway allowing aircraft to bypass each other and for aircraft to perform pre-flight engine run-ups. A holding bay is planned at the future end of Runway 32 along the extended Taxiway A.

- **Visual Approach Aids/Lighting** – Runway 32 is equipped with a visual approach slope indicator (VASI-2) system. The VASI-2 system is antiquated and should be replaced with a precision approach path indicator (PAPI-4). Runway 14 does not have a visual approach aid and is planned for a PAPI-4. The extension of the runway includes the expansion of the high intensity runway lighting (HIRL) system currently serving the runway.

FUTURE PARALLEL RUNWAY 14R-32L

- **Runway Dimensions** – The planned parallel runway measures 8,000 feet long and 150 feet wide. At these dimensions, the parallel runway will be capable of safely accommodating all commercial aircraft currently and forecasted to operate at MFE at 70 percent useful loads. These dimensions provide an adequate level of redundancy to ensure the Airport remains open to all operations during periods the primary runway is closed for maintenance.

- **Runway Orientation** – As previously discussed, the northwest/southeast orientation of the existing primary and future parallel runways provides for 95 percent or greater crosswind coverage, meaning a crosswind runway is not necessary. The future parallel runway is planned at a separation distance of 1,000 feet south of the existing primary runway. This separation allows for the construction of a full-length parallel taxiway between the two runways. The runway is staggered to the southeast so the Runway 14R approach RPZ does not overlap the Colonia Hermosa residential neighborhood.

- **Pavement Strength** – To ensure airfield redundancy, the parallel runway is planned for a strength rating up to 412,000 pounds DTWL, which would allow it to be used on a regular basis by the heaviest aircraft in MFE's commercial fleet.

- **Instrument Approach Procedures** – With a goal of establishing true airfield redundancy, both ends of the parallel runway are planned for CAT I ILS approaches equipped with glide slope antennas, localizer antennas, and MALSRs.

- **Visual Approach Aids/Lighting** – Each end of the parallel runway is planned to be equipped with a PAPI-4 system. The runway pavement edge is planned for HIRL.

- **Pavement Markings** – To support CAT I ILS approaches to both ends of the runway, the parallel runway is planned for precision runway markings, which include the runway designation, centerline, threshold markings, aiming points, touchdown zone, and edge markings.

RUNWAY 18-36

As previously discussed, crosswind Runway 18-36 is limited in its utility due to its short length. It is estimated that it is used for only one percent of total annual aircraft operations. Improving the crosswind to higher standards would require significant impacts to existing on- and off-airport facilities. Furthermore, the orientation of Runway 14-32 exceeds the 95 percent wind coverage for all-weather and instrument flight rule (IFR) crosswind conditions, making a crosswind runway unnecessary. The facility requirements evaluation of this master plan also identified several non-standard taxiway geometry conditions associated with Runway 18-36 that increase the possibility of runway incursions. Closing Runway 18-36 would eliminate these non-standard conditions. For these reasons, the plan carries forward previous plans to ultimately close Runway 18-36. The timeline for closure would coincide with the development of a new parallel runway.

TAXIWAYS

The critical design aircraft associated with primary Runway 14-32 and the future parallel dictate that the taxiway system at MFE should meet taxiway design group (TDG) 4 standards currently and TDG 5 standards in the future condition. Taxiway A and its associated connectors currently meet or exceed TDG 5 standards, which sets a taxiway width standard of 75 feet. Taxiways accommodating airport design group (ADG) IV aircraft (such as the Boeing 757-200 and 767-300) should be equipped with paved shoulders to prevent against soil erosion. TDG 4 standards require a 20-foot shoulder, while TDG 5 standards require a 30-foot shoulder. When the Airport undergoes resurfacing or rehabilitation of Taxiway A and its connectors, paved shoulders should be added.

The facility requirements evaluation also identified two non-standard geometry conditions associated with Taxiway A. These included direct-access points from the air cargo apron via Taxiway A and the terminal apron via Taxiway A3 to the runway. The plan includes implementing no-taxi islands where Taxiway A meets the air cargo apron and at A3 so that aircraft are forced to make turns prior to entering the runway. The purpose is to make pilots more aware of their location on the airfield to reduce the potential for runway incursions.

Taxiway A is planned to be extended by 3,211 feet along with the primary runway to the southeast. The new taxiway pavement is planned at TDG 5 standards and includes medium intensity taxiway lighting (MITL) and airfield signage. The future parallel runway is planned to include an associated parallel taxiway between the two runways. The future parallel has a separation distance of 400 feet from the parallel runway centerline and at a width of 75 feet, meeting TDG 5 standards.

Taxiway C intersects with the primary runway at a non-standard acute angle. The plan includes reconstructing Taxiway C at a right-angle with the runway.

An increasing number of aircraft within TDG 3 are utilizing the U.S. Customs apron at MFE. The connecting taxiway to this apron from Taxiway A has a width of 35 feet currently, which satisfies TDG 2. The plan includes widening this taxiway to 50 feet to more safely accommodate the larger aircraft within TDG 3.

HOLDING POSITION MARKINGS

The holding position markings on taxiways serving the primary runway are currently located 250 feet from the runway centerline. In order to meet RDC D-IV design standards, holding position markings should be relocated to 251 feet form the runway centerline. This distance is established by a standard separation of 250 feet plus one additional foot for each 100 feet above mean sea level (MSL). MFE is situated at 107.2 feet MSL, so the holding position markings for the primary and future parallel runways should be set at 251 feet.

AIRFIELD LIGHTING UPGRADES

Future planning includes replacing the existing incandescent airfield lighting and signage systems with LED equipment. LED systems reduce operating costs via lower energy consumption, reduce maintenance requirements and expenses, and provide a more efficient airfield electrical system.

PROPERTY ACQUISITION

The master plan concept identifies approximately 502.4 acres of property acquisition to occur through the planning period of this study (or beyond) in order to meet the demands of airside and landside development potential. This includes property for the construction of the primary runway extension and the proposed parallel runway, as well as the protection of associated safety areas and RPZs of both runways.

As discussed previously, approximately 21.3 acres of property is proposed to be acquired within the Runway 14 approach RPZ to eliminate incompatible commercial and residential land uses. These parcels within the RPZ are planned to be acquired as they become available at such a time that the FAA determines it necessary.

An additional 376.3 acres of property is planned for acquisition to accommodate the primary runway extension and construction of the parallel runway. Most of the 376.3 acres is zoned for agriculture use with smaller areas of commercial and residential uses. An additional 25.7 acres between S. 10th Street and S. Old 10th Street, including Cascade Park, is planned for acquisition for the development of landside facilities, a consolidated rental car center (CONRAC), and for other revenue enhancement opportunities. Finally, a 5.1-acres parcel is planned to be acquired to the development of additional general aviation hangar and apron facilities along Wichita Avenue.

MISSION INLET CHANNEL REALIGNMENT

The Mission Inlet channel and associated levees located immediately south of the Airport are planned to be realigned to allow for the construction of the primary runway extension and the parallel runway. According to the *Mission Inlet Recertification Project*[1], the Mission Inlet was constructed by Hidalgo

[1] *Mission Inlet Recertification Project*, April 2014, Prepared for: Hidalgo County Drainage District No. 1. Prepared by: Civil System Engineering, Inc. in cooperation with L&G Consulting Engineers, Inc.

County, in cooperation with Cameron County, as an important component of the first flood protection system in the valley during 1925 and 1926, to protect its communities against overflow floods along the Rio Grande River. The Mission Inlet channel is approximately 12.5 miles in length and discharges into the International Boundary & Water Commission (IBWC) Main Floodway. The IBWC operates and maintains the levee and floodway systems; however, improvements (in this case, a realignment) to the floodway require approval from the Commissioners' Courts of the affected counties. There are also agreements regarding the operation of the system between the counties, landowners, irrigation districts, urban municipalities, and the IBWC.

Figure 5B depicts the location of the Mission Inlet channel and IBWC Main Floodway as they exist currently, along with the realignment proposed in this master plan. The depicted realignment of the Mission Inlet channel is conceptual and not based on engineering design, and it has not been approved by any Commissioners' Courts. Previous MFE planning included a similar realignment of the Mission Inlet channel, with discussions held with the U.S. Army Corps of Engineers (USACE) and the Hidalgo County Drainage Distract Number One (HCDD). Continued coordination with these groups as well as the IBWC and the affected Commissioners' Courts will be necessary to determine the ultimate realignment route of the channel.

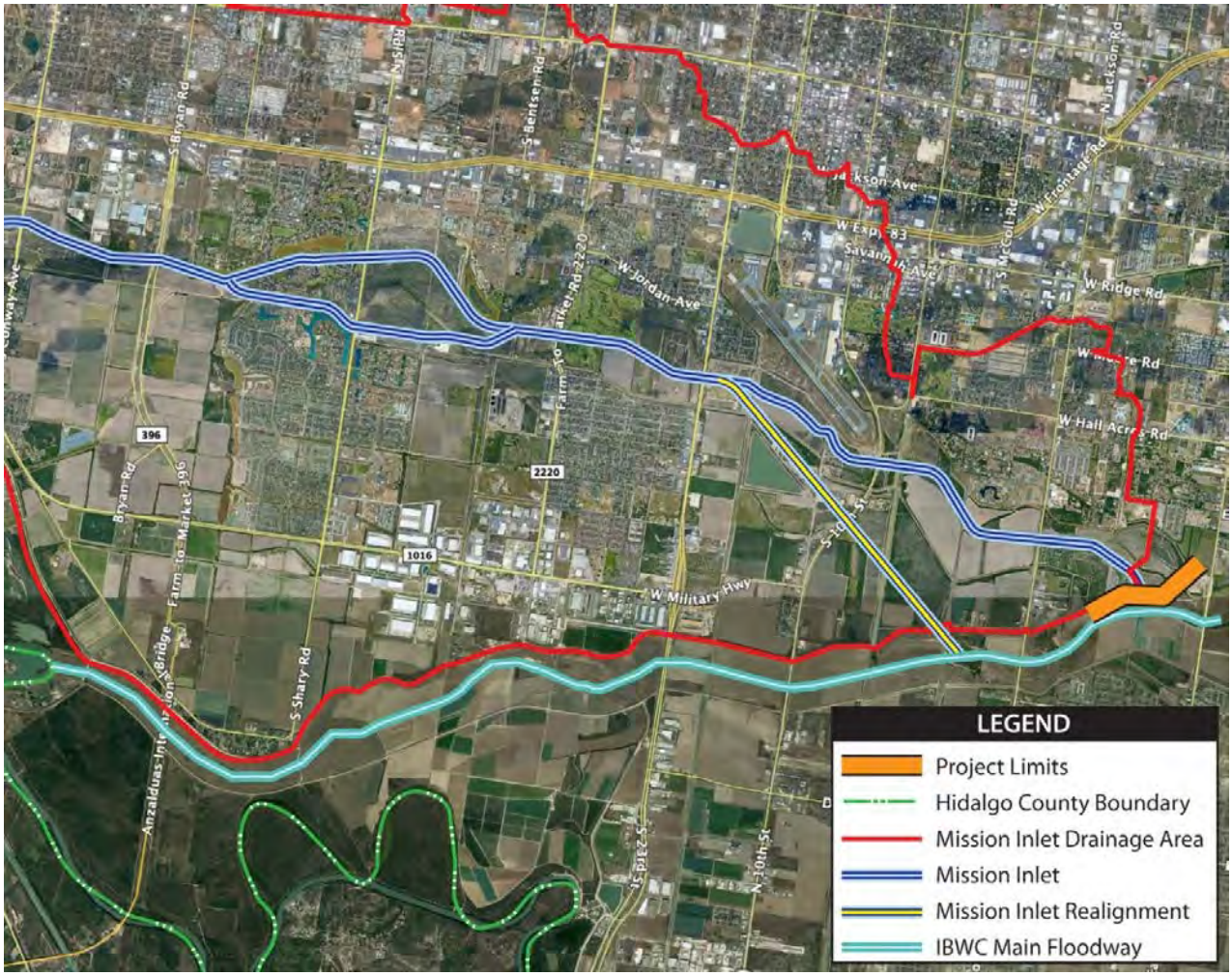


FIGURE 5B – Conceptual Mission Inlet Channel Realignment

AIRPORT TRAFFIC CONTROL TOWER (ATCT)

The existing ATCT at MFE is located adjacent to the terminal apron. In this location, tower controllers have unobstructed views to all areas of the existing airfield; however, views of the airfield are primarily to the south. A south view orientation results in a direct sun glare impact, which can impede controller vision of the airfield. In addition, as airfield facilities are expanded to include a longer primary runway and a new parallel runway, and as landside facilities are developed, line-of-sight to all areas of the airfield from the existing ATCT may become restricted. Therefore, the master plan includes a proposed site for a new ATCT that would be more centrally located on the south side of the future airfield, resulting in a north view orientation (north views are the preferred orientation as it results in the least amount of direct sun glare impact). The proposed ATCT site is along S. Old 10th Street on the south side of the airfield. A vehicle access road and parking lot accompany the new ATCT facility.

LANDSIDE CONCEPT

The primary goal of landside facility planning is to provide adequate space to meet reasonably anticipated passenger general aviation needs, while also optimizing operational efficiency and land use. Achieving these goals yields a development scheme which segregates functional uses while maximizing the Airport's revenue potential. The back of **Exhibit 5A** presents the planned landside developments for the Airport.

Several potential layouts were presented in the previous chapter; however, the recommended layout depicted is a compilation of the alternatives presented.

PASSENGER TERMINAL BUILDING

The existing terminal building has an approximate gross area of 148,200 square feet (sf) made up of functional areas serving airline ticketing and operations, security screening, post-security passenger holdrooms, baggage handling and claim and rental car counters, concessions, pre-security public circulation areas, and HVAC/mechanical spaces. Terminal space needs were determined based upon anticipated growth in passenger enplanements, which also considers the potential for expanded and/or new airline service. Recommended terminal facility expansions are based upon this potential growth in demand; however, if this demand does not materialize, the existing terminal facility could continue to adequately serve the Airport for many years.

While the building itself is adequately sized to meet long-term demand, some functional areas may experience a lower level of service (LOS) as enplanement levels grow. In particular, the concourse areas including the holdroom space, number of gates, and circulation need to be expanded over time. There is a slight need for additional baggage claim, security screening, ticketing, and public spaces over time as well.

The recommended plan, shown in **Figure 5C**, illustrates the ability to add five new gates and 21,150 sf of concourse space to the south. Existing Gate 5 is planned to be eliminated, resulting in a total of nine

gates. The plan also includes pre-security building expansions of 13,500 sf to the east and 9,500 sf to the west to provide additional baggage claim, ticketing, security screening, and public space. The terminal apron is planned to be expanded over an existing drainage basin, which would need to be relocated, and existing apron pavement is planned to be strengthened to accommodate the heavier commercial aircraft accessing the new gates. These improvements would be driven by demand and only pursued if passenger enplanements reach and exceed the projected long-term levels.

FIGURE 5C – Terminal Area Recommendations

TERMINAL VEHICLE PARKING

There are 1,538 total vehicle parking spaces in the terminal area currently, including the short-term lot, long-term lot, employee/overflow lot, and rental car ready/return lot. The facility requirements analysis determined that additional parking spaces would be needed particularly for short-term parking and for rental car ready/return over the planning period. As a result, the master plan concept includes the construction of a vehicle parking garage over the existing short-term and long-term lots at the terminal. The parking garage is planned for 1,200 total vehicle parking spaces and would consolidate short-term, long-term, and employee/overflow parking. The plan also includes the development of a consolidated rental car facility (CONRAC) along S. 10th Street at the intersection with Bales Road on what is currently Cascade

Park. In addition to covered vehicle parking spaces and rental car counters and office spaces, the CONRAC will include a car washing system, fuel storage and pumping systems, and a vehicle maintenance facility. A CONRAC will relocate the rental car operators from the terminal, making those spaces available for other revenue-generating opportunities. It will also eliminate rental car traffic from the terminal loop road and offer an improved customer experience and service. Once a CONRAC is developed, the airport/rental car operators would need to begin shuttle services for customers. The existing rental car ready/return lot is to be transitioned to additional short-term parking.

COMMERCIAL AIR CARGO

The recommended concept for air cargo apron and truck staging facilities is illustrated on **Figure 5D**. Recommended improvements include expanding the apron to provide an additional aircraft staging position with a separation distance that would accommodate the Boeing 767-300F aircraft, which is the future critical design aircraft. While the cargo building itself is not planned to be expanded, a larger truck staging area is planned on the east side of the building. A natural gas compressor station in this area is planned to be removed or relocated.

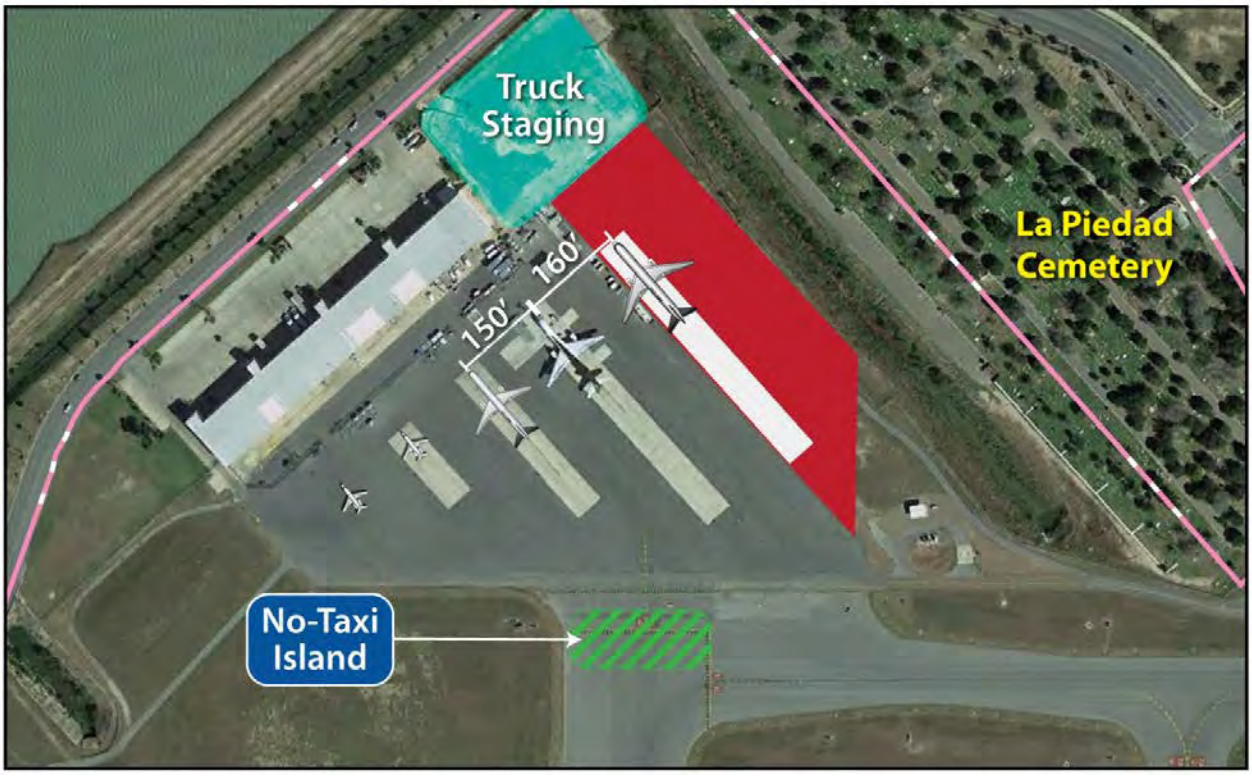


FIGURE 5D – Air Cargo Recommendations

AIRCRAFT RESCUE AND FIREFIGHTING (ARFF) STATION

The existing ARFF station, located on the general aviation ramp east of Runway 18-36, is planned to be relocated to a new site adjacent to the existing ATCT. A new ARFF station will provide adequate storage

of all ARFF equipment and modern features and amenities for staff. The proposed site for the new ARFF station will reduce response times to terminal emergencies while providing quick access to the airfield via Taxiways A/A3.

GENERAL AVIATION

While MFE is a commercial service airport, a substantial portion of its aircraft operations and based aircraft are associated with general aviation (GA) activities. The recommended concept accommodates growth in GA activities with new hangar and apron developments focused on the area of Runway 18-36, which is slated for closure.

GA facilities include four 12,000 sf conventional hangars for fixed base operator (FBO) or specialty aviation service operator (SASO) use along Taxiway A and the Runway 14-32 flight line. A new GA apron extending from Taxiway D to the east GA apron would create a substantial frontage with great airfield visibility for existing and future FBO/SASO activities. A new vehicle access road and parking lot is planned to accommodate this area and extend along the old Runway 18-36 footprint with access from S. Hangar Lane.

The remainder of the old Runway 18-36 footprint is planned for a new executive hangar development and vehicle parking lot with airfield access via Taxiway C and the east GA apron. The site of the existing ARFF (which is planned to be relocated) is planned for a new 14,400 sf conventional hangar.

On the north side of the GA area, a set of 30,000 sf conventional hangars is planned that could be utilized by a large-scale aircraft maintenance/repair/overhaul (MRO) operator, aircraft manufacturer, or other FBO/SASO activities. Vehicle access to this area and parking would extend from Wichita Avenue. Development of this area includes the acquisition of approximately 5.1 acres of property currently occupied by the U.S. Customs and Border Patrol.

Additional property acquisition in the amount of approximately five acres is planned along S. 10th Street and S. Old 10th Street east of the GA area. New GA hangar and apron facilities are planned for the triangle-shaped property bound by Bales Road, S. Old 10th Street, and S. 10th Street. A portion of S. Old 10th Street is planned to be closed to allow for taxilane access to the new hangars.

As a reminder, all hangar-related development should occur only as dictated by demand. The locations and sizes of hangars proposed in the recommended concept are conceptual and may not reflect the needs of future developers and their customers. The recommended concept is intended to be used strictly as a guide for MFE staff when considering new developments.

NON-AVIATION DEVELOPMENT RESERVE

Airports often have property that is inaccessible to the airfield and therefore offers limited utility for aviation operations. These areas are typically reserved for other non-aviation related uses that provide an opportunity to diversify and expand the revenue streams for the airport.

The recommended concept includes the acquisition of approximately 20 acres of property along S. 10th Street, which includes Cascade Park and a natural gas compressor station. This property is separated from the airfield by a drainage way that restricts the ability to provide airfield access. As has been previously explained, a portion of this property is planned for a CONRAC, while the remaining area, depicted in orange shading on **Exhibit 5A**, is planned for non-aviation developments. This property, which has good visibility and frontage from S. 10th Street, could be prime real estate for retail opportunities, government facilities, and commercial and office development.

AIRPORT ZONING ORDINANCE

Chapter 138, Appendix A of the city's municipal code establishes the scope and purpose of provisions for airport zoning regulations. The airport zoning ordinance was originally established in May 1963 and amended in July 1969. The purpose of the airport zoning regulations is stated as: "both the prevention of the creation or establishment of airport hazards and the elimination, removal, alteration, mitigation, or marking and lighting of existing airport hazards are public purposes for which political subdivisions may raise and expend public funds and require land or interests in land."

The Texas Department of Transportation (TxDOT) has developed a reference document, Airport Compatibility Guidelines, dated January 2003, for elected officials, zoning board members, and city and county staff members responsible for assuring compatibility between an airport and the community it serves. This reference document provides an understanding of compatibility issues, as well as instructions for implementing compatibility plans. This document also contains model zoning regulations that can be utilized when developing new or modified regulations.

Airport compatible land use and height and hazard zoning regulations, which are generally the subject of airport zoning regulations, consist of two items: regulation text and a zoning map. The text describes land uses that are not permissible or the height limitations in the various overlay zones, as well as the procedures for administering and enforcing the regulation. The zoning map graphically depicts the various overlay boundaries. Compatible land use zoning maps generally utilize the Airport's noise exposure contours to establish overlay zones, and the Airport's Title 14 of the Code of Federal Regulation (14 CFR), Part 77 imaginary surfaces are generally utilized to establish the height and hazard overlay zones.

There are two options for updating the Airport's zoning regulations. The first option is to establish a Joint Airport Zoning Board (JAZB) with members appointed from both the City of McAllen and County of Hidalgo. Since the Airport is located within the boundaries of a city that has a population of more than 45,000 persons (McAllen's 2017 estimated population is 142,696, according to the U.S. Census Bureau), the city can act unilaterally in the adoption of the zoning updates, although the areas affected by the zoning may extend beyond its normal jurisdictional limits. If the city chooses to act unilaterally, an Airport Zoning Board (AZB) must be appointed to recommend the boundaries of the various zones or an existing commission, such as the City Commission or the Planning and Zoning Board, can be appointed.

The Airport's 14 CFR Part 77 airspace surfaces are being updated for this Airport Master Plan and are included as a drawing in the Airport Layout Plan (ALP) set (included in **Appendix C**). This updated 14 CFR

Part 77 airspace drawing can be utilized by the city for the establishment of height zoning regulations. The ALP set will be included as an appendix in this Airport Master Plan. The Airport's noise exposure contours are also being updated as a part of this Airport Master Plan. These updated noise exposure contours are discussed in more detail in the Environmental Overview section of this chapter.

It is recommended that a JAZB be established or the city establish an AZB or appoint an existing commission to update its airport zoning regulations based upon, at a minimum, the updated 14 CFR Part 77 airspace surface drawing within the ALP and the updated noise exposure contours prepared for this Airport Master Plan. Furthermore, for those portions of the RPZs that are not owned by the Airport, the city should not allow any zoning changes that increase the likelihood of incompatible developments. The specific procedural steps to be taken by the city in this process are outlined in Chapter Four: Adoption of Airport Zoning Regulations, of the TxDOT Airport Compatibility Guidelines reference document.

In addition to updating the airport zoning regulations to be consistent with the 14 CFR Part 77 Airspace Drawing, new criteria for noise compatibility and other hazards to flight should be considered. Other hazards to flight include: wildlife, glare, electronic interference, and smoke/steam. A summary of specific airport zoning regulation recommendations are included **Table 5B**.

TABLE 5B
Recommended Changes to the City of McAllen and County of Hidalgo Airport Zoning Regulations
McAllen International Airport

Section	Issue	Recommendation
Section 1. Authority for Scope and Purpose	The Texas Airport Zoning Act (AZA), Chapter 241 of the Texas Local Government Code, permits two or more political subdivisions in the vicinity of an airport to form a JAZB. Compatible land use or hazard zoning regulations adopted by a JAZB are then effective in each of the jurisdictions represented on the board. The current Airport Zoning Regulations appears to be developed for the City of McAllen and County of Hidalgo, but does not define the makeup of the JAZB, how members are appointed, their function, how often they meet, or meeting protocols.	***Option 1.*** The City of McAllen and County of Hidalgo establish a JAZB. This requires the city and county to each pass an ordinance establishing a JAZB and appointing representatives. ***Option 2.*** The AZA has a provision for a population of more than 45,000. Cities of 45,000 or more population having an airport within their territorial limits may unilaterally adopt compatible land use or hazard zoning regulations, which are effective in all jurisdictions covered by the overlay zones. The City Commission or the Planning and Zoning Board could be designated as the JAZB.
Section 1. Authority for Scope and Purpose	No mention of aircraft noise compatibility or other hazards to flight (wildlife, glare, electronic interference, smoke/steam, etc.)	Consider adding aircraft noise compatibility and other hazards to flight.
Section 2. Definitions	No mention of aircraft noise compatibility or other hazards to flight (wildlife, glare, electronic interference, smoke/steam, etc.)	Consider adding definitions for aircraft noise compatibility and other hazards to flight.

TABLE 5B (Continued)
Recommended Changes to the City of McAllen and County of Hidalgo Airport Zoning Regulations
McAllen International Airport

Section	Issue	Recommendation
Section 3. Zoning	The zoning map consists of one sheet, prepared by Fabian and Nelson, Inc., and dated February 7, 1969.	Consider updating the zoning map with the most recent 14 CFR Part 77 Airspace Drawing. Should also consider adding graphic depicting forecast aircraft noise exposure contours for the airport.
Section 3. Zoning	Zoning discussion not consistent with updated 14 CFR Part 77 Airspace Drawing.	Consider updating this section to address the changes to the updated airspace drawing.
Section 3. Zoning	No mention of aircraft noise compatibility or other hazards to flight (wildlife, glare, electronic interference, smoke/steam, etc.)	Consider adding discussion on aircraft noise compatibility and other hazards to flight.
Section 4. Zoning	Height limit discussion not consistent with updated 14 CFR Part 77 Airspace Drawing.	Consider updating this section to address the changes to the updated airspace drawing.
Section 5. Use Restrictions	No mention of aircraft noise compatibility or other hazards to flight (wildlife, glare, electronic interference, smoke/steam, etc.)	Consider adding land use restrictions for aircraft noise compatibility and other hazards to flight.
Section 8. Enforcement	The building inspector is identified as the person to administer and enforce the airport zoning regulations.	Consider having the JAZB or City Planning Commission play a role in airport zoning regulation enforcement.

Source: City of McAllen Zoning Regulations; Coffman Associates, Inc. analysis.

AIRPORT RECYCLING, REUSE, and WASTE REDUCTION

The *FAA Modernization and Reform Act of 2012* (FMRA), which amended Title 49, United States Code (USC), included several changes to the Airport Improvement Program (AIP). Two of these changes are related to recycling, reuse, and waste reduction at airports.

- Section 132 (b) of the FMRA expanded the definition of airport planning to include "developing a plan for recycling and minimizing the generation of airport solid waste, consistent with applicable State and local recycling laws, including the cost of a waste audit."
- Section 133 of the FMRA added a provision requiring airports that have or plan to prepare a master plan, and that receive AIP funding for an eligible project, to ensure that the new or updated master plan addresses issues relating to solid waste recycling at the airport, including:
    - The feasibility of solid waste recycling at the airport;
    - Minimizing the generation of solid waste at the airport;
    - Operation and maintenance requirements;
    - A review of waste management contracts; and,
    - The potential for cost savings or the generation of revenue.

Typically, airport sponsors have purview over waste handling services in facilities they own and operate, such as the passenger terminal building, ARFF station, and maintenance facilities. Tenants of airport-owned buildings/hangars or tenants that own their own facilities are typically responsible for coordinating their own waste handling services. While the focus of this plan is on Airport-operated facilities, the Airport should work to incorporate facility-wide strategies that create consistency in waste disposal mechanisms. This would ultimately result in the reduction of materials sent to the landfill.

Understanding the Airport's waste stream requires an understanding of the types of waste typically generated at airports. Generally, waste from airports can be divided into eight categories, with additional types of municipal solid waste (MSW).[2]

- **Municipal Solid Waste** – more commonly known as trash or garbage – consists of everyday items that are used and then discarded, like product packaging. The following subcategories are either combined with MSW or sorted separately depending on an airport's solid waste practices.

  *Approximately **25-35** percent of deplaned waste, by weight, consists of recyclables.*

  - **Construction and Demolition Waste** (C&D) is considered non-hazardous trash resulting from land clearing, excavation, demolition, renovation or repair of structures, roads and utilities, including concrete, wood, metals, drywall, carpet, plastic, pipe, cardboard, and salvaged building components.
  - **Green Waste** is yard waste consisting of tree, shrub and grass clippings, leaves, weeds, small branches, seeds, and pods.
  - **Food Waste** includes unconsumed food products or waste generated and discarded during food preparation.
  - **Deplaned Waste** is waste removed from passenger aircrafts. Deplaned waste includes bottles, cans, newspaper, mixed paper (newspaper, napkins, paper towels), plastic cups, service ware, food waste, and food soiled paper/packaging.

- **Lavatory Waste** is a special waste that is emptied through a hose and pumped into a lavatory service vehicle. The waste is then transported to a triturator[3] facility for pretreatment prior to discharge in the sanitary sewage system. Due to the chemical in lavatory waste, it can present environmental and human health risks if mishandled. Caution must be taken to ensure lavatory waste is not released to the public sanitary sewerage system prior to pretreatment.

- **Spill Clean and Remediation Wastes** are also special wastes and are generated during cleanup of spills and/or the remediation of contamination from several types of sites on an airport.

- **Hazardous Wastes** are governed by the *Resource Conservation and Recovery Act* (RCRA), as well as the regulations in 40 Code of Federal Regulations (CFR) Subtitle C, Parts 260 to 270. The Environmental Protection Agency (EPA) developed less stringent regulations for certain hazardous waste, known as universal waste, described in 40 CFR Part 237 – The Universal Waste Rule.

[2] Recycling, Reuse and Waste Reduction at Airports, FAA (April 24, 2013)
[3] A triturator facility turns lavatory waste into fine particulates for further processing.

As seen on **Exhibit 5B**, there are seven potential areas of an airport contributing to the waste stream, including terminals, airfields, aircraft maintenance hangars, cargo hangars, flight kitchens, offices, and airport construction projects. To create a comprehensive waste reduction and recycling plan for MFE, all potential inputs must be considered.

The FAA's Airport Cooperative Research Program (ACRP) identified five key best practices in its report, *Recycling Best Practices – A Guidebook for Advancing Recycling from Aircraft Cabins* (2014), that are most effective at advancing aviation recycling.

1. Secure top-down and bottom-up commitment within the airport for recycling efforts
2. Develop consistent recycling procedures and infrastructure
3. Increase the efficiency of existing systems
4. Track, evaluate, and share data on program performance
5. Make recycling a part of everyday business

There are often few key staff members that are directly involved in the waste management system, making their support and participation critical. It is also crucial to gain the participation of tenants to ensure buy-in of the airport's recycling efforts. MFE must establish consistent internal procedures to ensure there are no unacceptable items contaminating recycling containers, or recyclables thrown in the trash. Clearly marked signage of what is and is not accepted placed near the solid waste and recycling containers is another significant part of a consistent, effective recycling system.

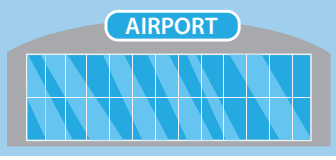
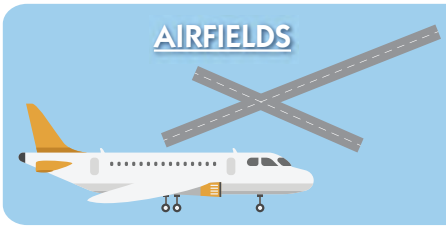
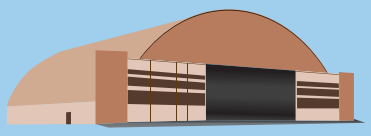
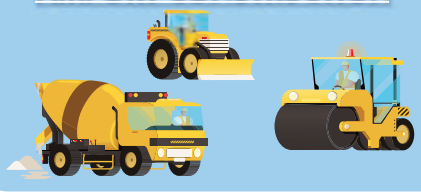
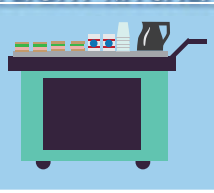
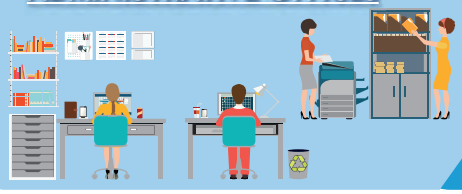
MSW Receptacle in Coffee Shop Area

MFE should ensure that waste and recycling containers are right-sized to the existing operation, as well as on a collection schedule that picks up only when the containers are full. Once recycling services are offered in the public areas of the terminal, MFE could track recycling rates and waste quantities to identify cost-saving measures that are currently unidentified simply based on the lack of quantitative data. Lastly, MFE should make recycling a part of everyday business. Airport administration can provide training, education, and support to personnel, tenants, and others who conduct business at the Airport. In-person meetings with Airport tenants should be held to create mutual understanding of the Airport's solid waste and recycling goals and how tenants play a vital role in the Airport's overall success.

MSW Receptacle in Terminal Parking Lot

The implementation of an effective program requires accurate data of current waste and recycling rates. There are several ways an airport can gain insight into their waste stream. The waste audit is the most comprehensive and intensive way to assess waste stream composition, opportunities for waste reduction, and capture of recyclables. This Recycling Plan is based on information provided by the Airport using an examination of records.

AIRPORT WASTE STREAMS

AIRPORT AREA	POTENTIAL INPUTS	POTENTIAL OUTPUTS
TERMINALS 	Restaurants Shops Passengers Employees	Food Waste, Paper Plastic, Aluminum Cans Trash, Grease & Oil Green Waste Deplaned Waste
AIRFIELDS 	Aircraft Operations	Runway Rubber Green Waste
CARGO HANGARS 	Goods Movements	Plastic Wood Vehicle Waste (Tires & Fluids)
AIRCRAFT	Aircraft Ground Support Equipment (GSE)	Vehicle Waste Plastic Wastewater Hazmat
AIRPORT CONSTRUCTION 	Construction Re-Construction Demolition	Reused Concrete Reused Asphalt Vehicle Waste Soils, Building Materials Wood, General Waste
FLIGHT KITCHENS 	Aircraft Food Services	Food Waste Waste Water Plastic Wood
ADMINISTRATIVE OFFICES 	Employees	Food Waste Paper, Plastic Aluminum Cans Trash

Source: Recycling, Reuse, and Waste Reduction at Airports, FAA (April 24, 2013)

Examination of Records

- Waste hauling and disposal records and contracts
- Supply and equipment invoices
- Other waste management costs (commodity rebates, container costs, etc.)

Facility Walk-Through

- Qualitative waste information
- Understanding waste pickup and hauling practices

Waste Audit

- Collection and analysis of the types of waste produced

MSW RECEPTACLE IN TICKETING AREA

SOLID WASTE/RECYCLING SERVICES

Solid waste services at the Airport are provided by the City of McAllen Public Works department. The Airport's account includes two dumpsters (8-yard and 2-yard) at the terminal and one (8-yard) dumpster at the air cargo facility. The MSW dumpsters are collected twice weekly on Wednesdays and Fridays, and a recycling dumpster is collected once weekly on Fridays.

The Airport does not currently offer recycling services to the public areas of the terminal; however, Airport administration and tenants of the terminal are able to recycle paper and cardboard materials only. According to its website[4], in addition to paper and cardboard, the Public Works department collects other recyclable materials including plastic, aluminum cans, tin cans, and glass.

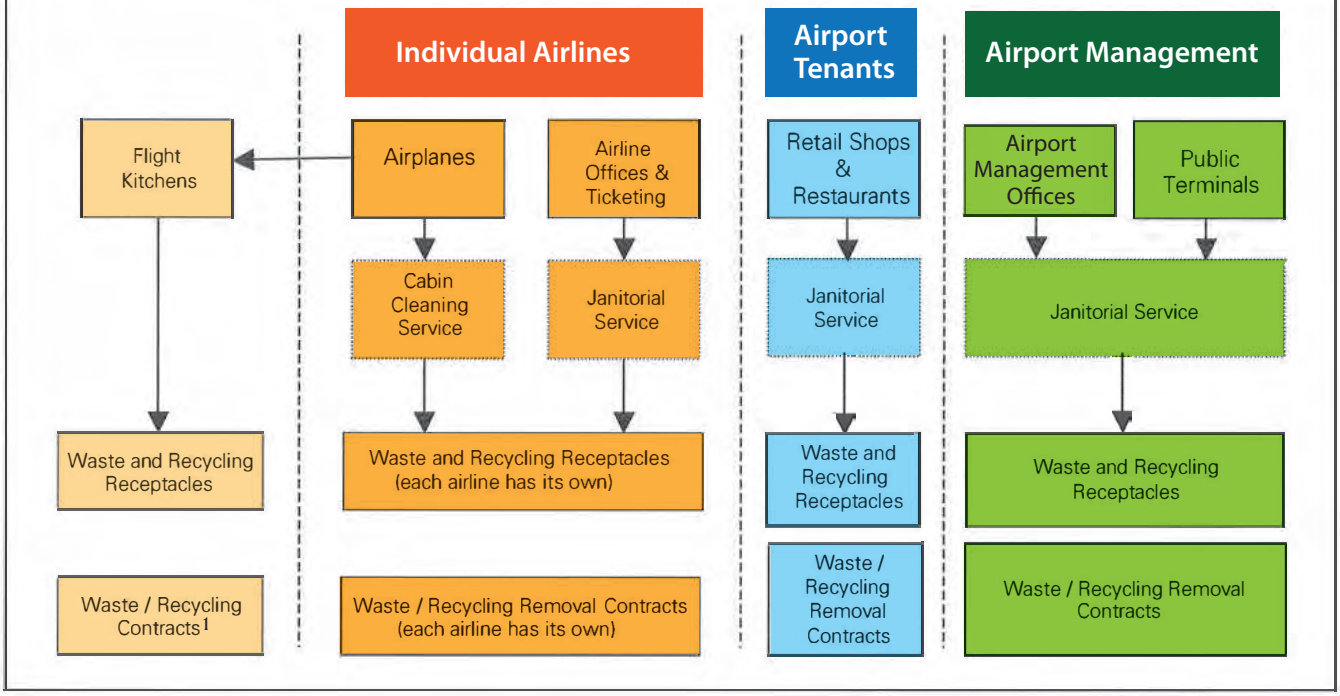
SOLID WASTE MANAGEMENT SYSTEM

Waste management services at MFE are presently handled independently by various tenants and entities in what is known as a *decentralized* waste management system. To maximize recycling efforts, the Airport should more actively engage tenants by transitioning to a *centralized* waste management system. **Exhibit 5C** summarizes the differences between these two styles.

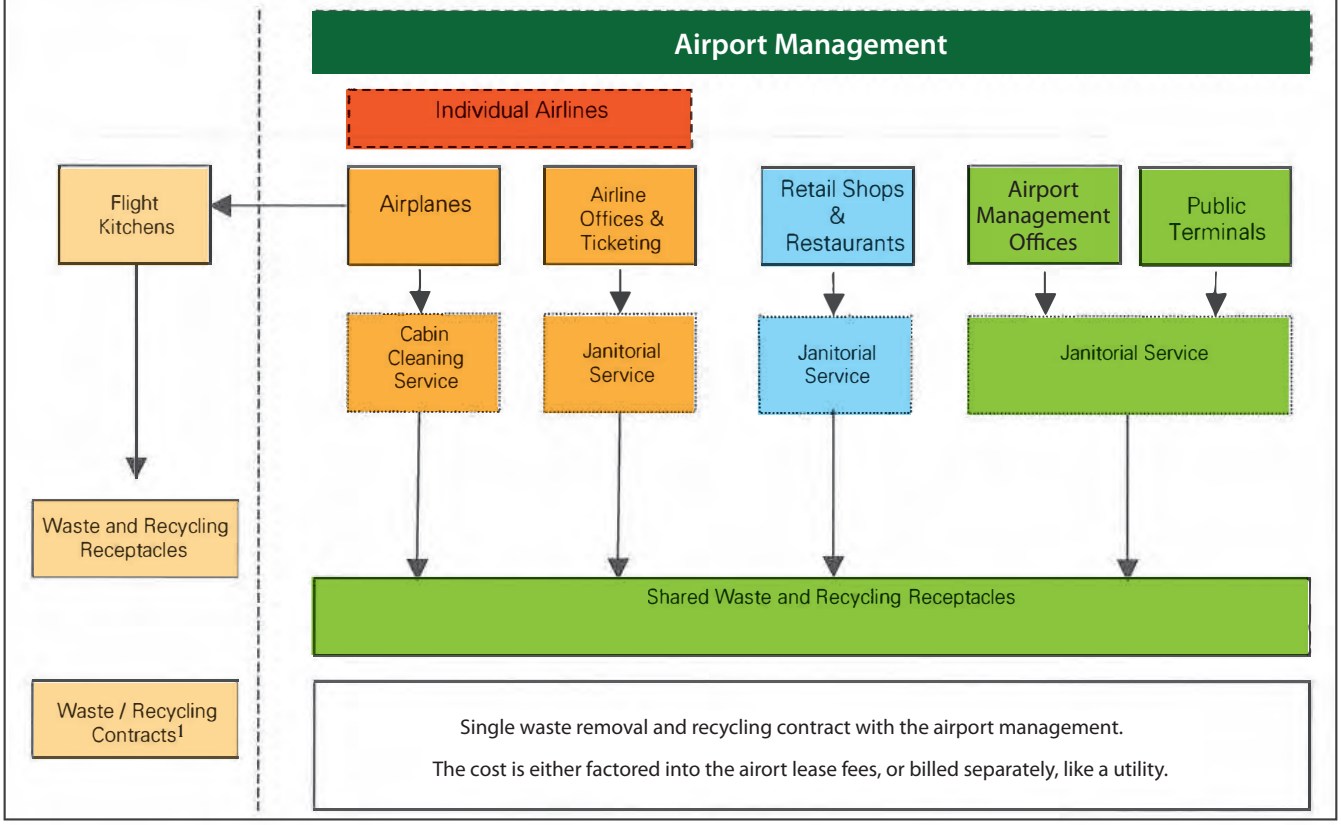
Centralized waste management systems provide greater opportunity for participation from airport tenants who may not be incentivized to recycle on their own. The centralized system is advantageous in

[4] https://mcallenpublicworks.net/services/recycling/

Components of a Decentralized Airport Waste Management System



Components of a Centralized Airport Waste Management System



[1] Flight kitchens usually manage their own waste even if an airport relies on a centralized system

Source: Natural Resources Defense Council, Trash Landings: How Airlines and Airports Can Clean Up Their Recycling Programs, December 2006.

that is has less players involved in the overall management of the solid waste and recycling efforts. This management style allows greater control by the airport over the type, placement, and maintenance of compactors and dumpsters, saving space and eliminating the need for each tenant to have their own containers. A centralized strategy can be inefficient for some airports as it requires more effort and oversight on the part of airport management. Ultimately, a centralized waste management system will streamline waste and recycling collection, maximizing the opportunity to reduce waste generation and increase diversion of recyclables.

SOLID WASTE AND RECYCLING GOALS

While the Airport may or may not pursue the implementation of a centralized waste management system, there are other opportunities for improvement. **Table 5C** outlines objectives that could help reduce waste generation and increase recycling efforts at MFE. To increase the effectiveness of tracking progress at the Airport, a baseline state of all suggested metrics should be established to provide a comparison over time.

TABLE 5C
Waste Management and Recycling Goals
McAllen International Airport

Goals	Objectives to Meet Goals
Reduce amount of solid waste generated	Switch to online bill pay to eliminate monthly paper bills
	Conduct a waste audit to identify most common types of waste
	Eliminate purchase of items that are not recyclable (i.e. Styrofoam, plastic bags)
Increase amount of material recycled	Expand recycling services to all public areas of the terminal
	Improve waste and recycling tracking and data management
	Incorporate recycling requirements and/or recommendations into tenant lease agreements
	Expand recycling marketing & promotion efforts throughout public areas
	Require contractors to implement strategies to reduce, reuse & recycle construction & demolition waste
	Require contractors to implement strategies to reduce, reuse & recycle construction & demolition waste

Source: Coffman Associates

ENVIRONMENTAL OVERVIEW

Analysis of the potential environmental impacts of recommended airport development projects, as discussed in this chapter and depicted on **Exhibit 5A**, is a key component of the Airport Master Plan process. The primary purpose of this Environmental Overview is to identify significance thresholds for the various resource categories contained in the FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, Exhibit 4-1 and FAA Order 5050.4B, *National Environmental Policy Act* (NEPA) *Implementation Instructions for Airport Actions*, Table 7.1. The Environmental Overview then evaluates the development program to determine whether proposed actions could individually or collectively significantly affect the quality of the environment.

The construction of any improvements depicted on the recommended development concept plan would require compliance with NEPA to receive federal financial assistance or to obtain a federal approval (i.e., a federal action). For projects not "categorically excluded" under FAA Order 1050.1F, compliance with NEPA is generally satisfied through the preparation of an Environmental Assessment (EA). An EA is prepared when the initial review of the proposed action indicates that it is not categorically excluded, involves at least one extraordinary circumstance, or the action is not one known normally to require an Environmental Impact Statement (EIS). If none of the potential impacts are likely to be significant, then the responsible FAA official prepares a Finding of No Significant Impact (FONSI), which briefly presents, in writing, the reasons why an action, not otherwise categorically excluded, would not have a significant impact on the human environment and the approving official may approve it. Issuance of a FONSI signifies that FAA would not prepare an EIS and has completed the NEPA process for the proposed action.

In instances where significant environmental impacts are expected, an EIS may be required. An EIS is a clear, concise, and appropriately detailed document that provides agency decision-makers and the public with a full and fair discussion of significant environmental impacts of the proposed action and reasonable alternatives and implements the requirement in NEPA §102(2)(C) for a detailed written statement.

POTENTIAL ENVIRONMENTAL CONCERNS

Table 5D summarizes potential environmental concerns associated with implementation of the recommended master plan development concept. Analysis under NEPA includes direct, indirect, and cumulative impacts. Direct impacts are those caused by the action and occur at the same time and place (see 40 CFR § 1508.8(a)). Examples of direct impacts include:

- Construction of a facility or runway in a wetland which results in the loss of a portion of the wetland; or
- Noise generated by the proposed action or alternative(s) which adversely affects noise-sensitive land uses.

Indirect impacts are those impacts caused by the action but are later in time or farther removed in distance but are still reasonably foreseeable (see 40 CFR § 1508.8(b)). Indirect impacts may include growth-inducing impacts and other effects related to induced changes in the pattern of land use, population density or growth rate, and related impacts on air and water and other natural systems, including ecosystems (see 40 CFR § 1508.8(b)). Cumulative impacts are those that take into consideration the environmental impact of past, present, and future actions. Cumulative impacts would vary based on the project type, geographic location, potential to impact resources, and other factors, such as the current condition of potentially affected impact categories.

TABLE 5D
Summary of Potential Environmental Concerns
McAllen International Airport

Environmental Impact Category	Significance Threshold/Factors to Consider	Potential Concern
Air Quality	**Threshold: The action would cause pollutant concentrations to exceed one or more of the National Ambient Air Quality Standards (NAAQS), as established by the United States (U.S.) Environmental Protection Agency (EPA) under the *Clean Air Act*, for any of the time periods analyzed, or to increase the frequency or severity of any such existing violations.**	**Potential Impact.** Although the projected increase in operations over the 20-year planning horizon of the master plan would result in additional emissions, Hidalgo County currently meets federal NAAQS standards. Therefore, general conformity review per the *Clean Air Act* is not required. According to the most recent FAA *Aviation Emissions and Air Quality Handbook* (2015), an emissions inventory under NEPA may be necessary for any proposed action that would result in a reasonably foreseeable increase in emissions due to plan implementation. For construction emissions, a qualitative or quantitative emissions inventory under NEPA may be required, depending on the type of environmental review needed for development projects outlined in the master plan.
Biological Resources (including fish, wildlife, and plants)	**Threshold: The U.S. Fish and Wildlife Service (FWS) or the National Marine Fisheries Service (NMFS) determines that the action would be likely to jeopardize the continued existence of a federally listed threatened or endangered species or would result in the destruction or adverse modification of federally designated critical habitat.** FAA has not established a significance threshold for non-listed species. However, factors to consider are if an action would have the potential for: • Long-term or permanent loss of unlisted plant or wildlife species; • Adverse impacts to special status species or their habitats; • Substantial loss, reduction, degradation, disturbance, or fragmentation of native species' habitats or their populations; or • Adverse impacts on a species' reproductive rates, non-natural mortality, or ability to sustain the minimum population levels required for population maintenance.	*For federally-listed species*: **Potential Impact**. There are nine species protected by the *Endangered Species Act* (ESA) with potential to occur near the Airport: least tern, northern Aplomado falcon, piping plover, red knot, star cactus, Texas ayenia, Walker's manioc, Gulf Coast jaguarundi, and ocelot. In general, habitat to support the least tern and piping plover includes sparsely vegetated sandbars and shorelines. The red knot uses coastal marine and estuarine areas with large areas of exposed intertidal sediments. Northern Aplomado falcon habitat consists of open terrain with scattered trees or shrubs. The star cactus occurs at low elevations in sparse, open thorn shrub and grasslands in a warm, temperate, subtropical steppe climate. This species is currently only known to occur in Starr County, which is west of Hidalgo County. Walker's manioc, Gulf Coast jaguarundi, and ocelot are commonly found in areas of thorny shrublands. Gulf Coast jaguarundi are also found in bunchgrass pastures adjacent to woodland areas. The Texas ayenia grows in areas of well-drained soils with subtropical thorny woodlands and tall shrublands. In addition to the federally-listed species above, there are several state-listed species with potential to occur at or near the Airport. Prior to implementation of projects at the Airport, biological studies may be required. These studies

TABLE 5D
Summary of Potential Environmental Concerns
McAllen International Airport

Environmental Impact Category	Significance Threshold/Factors to Consider	Potential Concern
		may include visits to the site by a biologist to characterize habitat within proposed project areas to determine if an improvement could potentially affect a protected species. *For designated critical habitat:* **No Impact**. There are no areas of critical habitat within the areas proposed for development in the Airport Master Plan. *For non-listed species:* **Potential Impact**. Non-listed species of concern include those protected by the *Migratory Bird Treaty Act* and the *Golden and Bald Eagle Protection Act*. There are presently 15 non-listed species of concern that could be affected by activities at the Airport. Pre-construction nesting surveys prior to development may be required prior to implementation of projects outlined in the master plan.
Climate	FAA has not established a significance threshold for Climate; refer to FAA Order 1050.1F's Desk Reference and/or the most recent FAA *Aviation Emissions and Air Quality Handbook* for the most up-to-date methodology for examining impacts associated with climate change.	**Potential Impact.** An increase in greenhouse gas (GHG) emissions could occur over the 20-year planning horizon of the master plan. As operations and based aircraft forecasts are projected to increase, additional storage facilities would be constructed, as demand dictates. Increased operations and facilities at the Airport may result in added Airport users who would require vehicles to get to and from the Airport, with additional potential to increase emissions.
Coastal Resources	FAA has not established a significance threshold for Coastal Resources.	**No Impact**. The Airport is not located within a designated coastal zone.
***Department of Transportation* (DOT) *Act*: Section 4(f)**	**Threshold: The action involves more than a minimal physical use of a Section 4(f) resource or constitutes a "constructive use" based on an FAA determination that the aviation project would substantially impair the Section 4(f) resource. Resources that are protected by Section 4(f) are publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance; and publicly or privately owned land from an historic site of national, state, or local significance. Substantial impairment occurs when the activities, features, or attributes of the resource that contribute to its significance or enjoyment are substantially diminished.**	**No Impact**. There are no wilderness areas, wildlife refuges, or properties included in the National Register of Historic Places (NRHP) that would be impacted by proposed development given the distance from the resources to the Airport. As discussed in Chapter One, there several locally owned and managed parks within the vicinity of the Airport. These include Cascade Park, Airport Park, Motocross Park, and Springfest Park. The long-term development plan for the Airport would affect each of these parks. Cascade Park is the location of the proposed consolidated rental car development; Airport Park is located within the RPZ for Runway 14 and is identified for acquisition; Motocross Park is within the area planned to be developed with the proposed parallel runway; and Springfest Park would be affected due to the proposed Mission Inlet Channel Relocation.

TABLE 5D
Summary of Potential Environmental Concerns
McAllen International Airport

Environmental Impact Category	Significance Threshold/Factors to Consider	Potential Concern
		Prior to implementation of improvements which would affect the properties listed above, the Airport would need to coordinate with the Parks Division of the McAllen Parks and Recreation Department to determine the extent to which these facilities would be affected and to discuss potential mitigation for these impacts. Any NEPA documentation involving impacts to these properties must include a finding there is no feasible and prudent alternative that would avoid the use of Section 4(f) property and that the project includes all possible planning to minimize harm resulting from the use. FAA provides the following mitigation measures for impacts to Section 4(f) properties: changing the project design to lessen the impact; replacement of land or facilities; monetary compensation to enhance the remaining segments of the affected property; enhancing project access the jurisdictional agency supports (i.e., disabled access ramps).
Farmlands	**Threshold: The total combined score on Form AD-1006, *Farmland Conversion Impact Rating*," ranges between 200 and 260.** Form AD-1006 is used by the U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) to assess impacts under the *Farmland Protection Policy Act* (FPPA).	**Potential Impact**. Based on the USDA NRCS Web Soil Survey, portions of the land proposed for acquisition are considered prime farmland or prime farmland, if irrigated.[5] Prior to acquisition and development in these areas, coordination with USDA NRCS would be required. This could include filing Form AD-1006 to determine if an impact would occur under the FPPA.
Hazardous Materials, Solid Waste, and Pollution Prevention	FAA has not established a significance threshold for Hazardous Materials, Solid Waste, and Pollution Prevention. However, factors to be considered are if an action would have the potential to: • Violate applicable federal, state, tribal, or local laws or regulations regarding hazardous materials and/or solid waste management; • Involve a contaminated site; • Produce an appreciably different quantity or type of hazardous waste; • Generate an appreciably different quantity or type of solid waste or use a different method of collection or disposal and/or would exceed local capacity; or	**No Impact**. There are no documented Superfund[6] sites, brownfields,[7] or hazardous waste[8] facilities on existing Airport property. Prior to acquiring land for future development, a site assessment, in accordance with FAA Order 1050.19A, Environmental Due Diligence Audits in the Conduct of FAA Real Property Transactions, would be required. The audit would focus on risk and the associated liabilities from past site and adjacent site uses and potential environmental contamination.

[5] **Prime farmland** is land having the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops with minimal use of fuel, fertilizer, pesticides, or products (7 CFR § 657.5).
[6] A **Superfund** site is any land in the U.S. that has been contaminated by hazardous waste and identified by the EPA as a candidate for cleanup as it poses a human health risk and/or the environment (U.S. Department of Health and Human Services).
[7] A **brownfield** is a property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutants, or contaminant (U.S. EPA).
[8] **Hazardous waste** is a type of solid waste that has at least one of four characteristics: ignitibility, corrosivity, reactivity, or toxicity (FAA, 40 CFR § 261.3).

TABLE 5D
Summary of Potential Environmental Concerns
McAllen International Airport

Environmental Impact Category	Significance Threshold/Factors to Consider	Potential Concern
	• Adversely affect human health and the environment.	The recommended development concept does not include land uses that would produce an appreciably different quantity or type of hazardous waste. However, should this type of land use be proposed, further NEPA review and/or permitting would be required. Construction and demolition waste would be generated because of development proposed in the master plan. Construction and demolition waste, along with all other types of non-hazardous solid waste, would be hauled to a facility that accepts construction waste.
Historical, Architectural, Archaeological, and Cultural Resources	FAA has not established a significance threshold for Historical, Architectural, Archaeological, and Cultural Resources. Factors to consider are if an action would result in a finding of "adverse effect" through the Section 106 process. However, an adverse effect finding does not automatically trigger preparation of an EIS (i.e., a significant impact).	**Potential Impact**. As discussed in Chapter One, portions of the irrigation canals located near the Airport are listed on the National Register of Historic Places. Prior to constructing the parallel runway, coordination between FAA and the State Historic Preservation Office would be needed to determine responsibilities under Section 106. This could include preparation of a cultural resources survey and public engagement regarding the project. This information would be used to determine if the proposed Airport project would affect historic properties. If it is determined that an impact would occur, mitigation would be required. FAA provides the following as examples of mitigation for this type of impact: • To the extent practicable, modifying, conditioning, or limiting activities associated with the undertaking to lessen effects; • Educating visitors, members of the general public, construction, maintenance, and operations personnel, as well as contractors and tenant organizations, on the importance of cultural resources, the need to stay within defined work zones, and the legal implications of vandalism and artifact collecting; • Archival documentation of affected historic properties to Historic American Buildings Survey/Historic American Engineering Record standards; and • Monitoring by a qualified archaeologist of ground-disturbing activities during construction. Additionally, there are areas of proposed development at the Airport that are previously undisturbed. This includes the areas south of the Airport that would be acquired for the parallel runway and associated development. If these undisturbed areas, including those areas identified for acquisition,

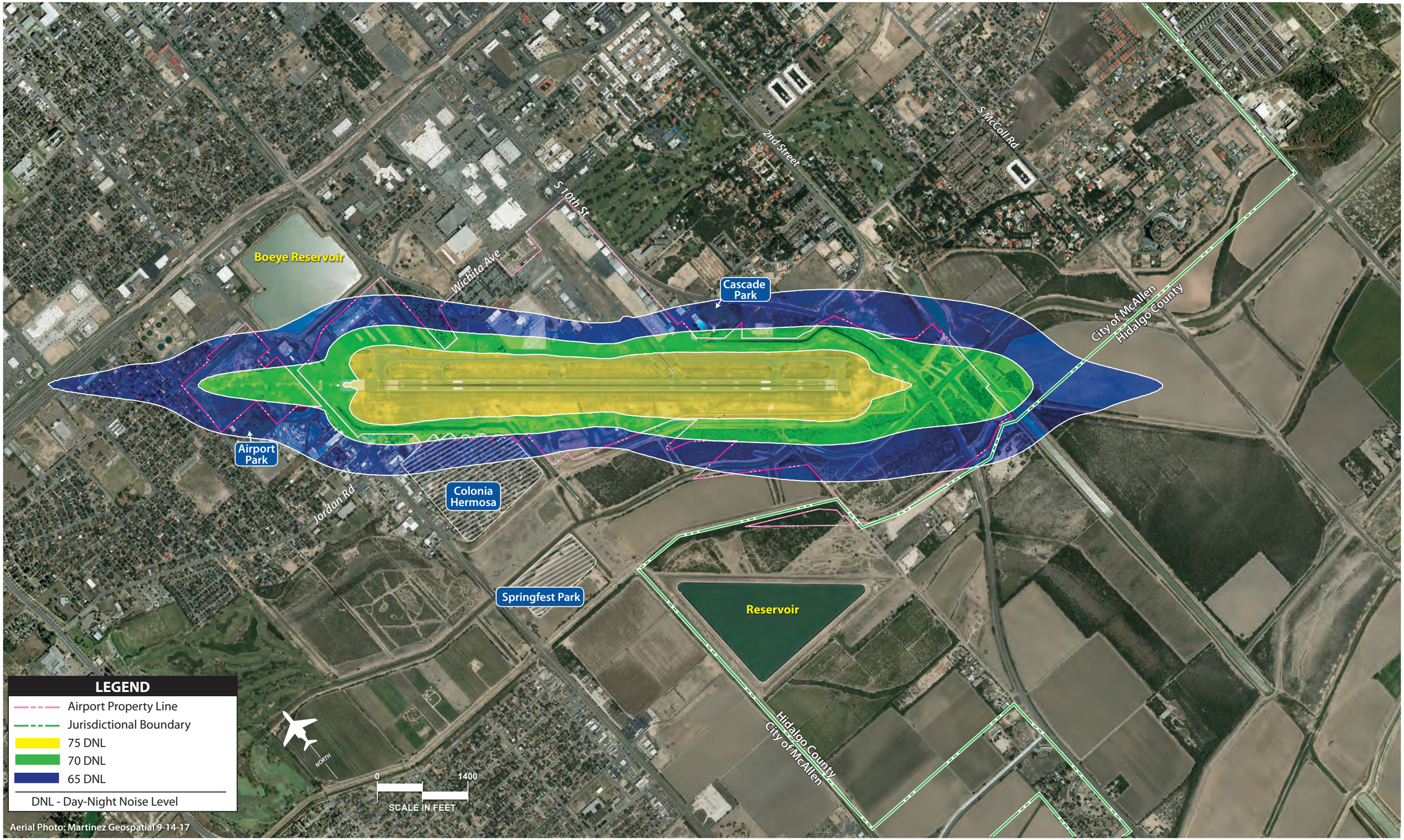
TABLE 5D
Summary of Potential Environmental Concerns
McAllen International Airport

Environmental Impact Category	Significance Threshold/Factors to Consider	Potential Concern
		are subject to ground disturbance, a cultural resources survey may be necessary to determine the potential presence of historical or cultural resources. There are no tribal lands that would be affected by construction as the closest such area is over 100 miles away from the Airport.
Land Use	FAA has not established a significance threshold for Land Use. There are also no specific independent factors to consider. The determination that significant impacts exist is normally dependent on the significance of other impacts.	**Potential Impact**. The proposed Airport development concept includes projects that would result in substantial land use changes near the Airport. Construction of the proposed parallel runway would first require relocation of a portion of the Mission Inlet Channel, which would likely impact Springfest Park and would also require changes to a portion of S. 10th Street. Acquisition of parcels south and east of the Airport will also be necessary to implement the parallel runway project. The master plan also includes acquisition of land within RPZs to prevent future land use incompatibility in these areas. As previously noted, the land proposed for acquisition includes land currently used for public parks (Airport Park, Cascade Park, Springfest Park, and Motocross Park), commercial development, and existing residences. Coordination requirements for these projects are described in other portions of this overview.
Natural Resources and Energy Supply	FAA has not established a significance threshold for Natural Resources and Energy Supply. However, factors to consider are if an action would have the potential to cause demand to exceed available or future supplies of these resources.	**No Impact**. Planned development projects at the Airport could increase demands on energy utilities, water supplies and treatment, and other natural resources during construction; however, impacts are not anticipated to be long-term. Should long-term impacts be a concern, coordination with service providers is recommended. Chapter One describes existing service utility providers for the Airport.
Noise and Noise-Compatible Land Use	**Threshold: The action would increase noise by Day-Night Average Sound Level (DNL) 1.5 decibel (dB) or more for a noise-sensitive area that is exposed to noise at or above the DNL 65 dB noise exposure level, or that will be exposed at or above the DNL 65 dB level due to a DNL 1.5 dB or greater increase, when compared to the no action alternative for the same timeframe.** Another factor to consider is that special consideration needs to be given to the evaluation of the	**Potential Impact**. The Airport's existing (2016) and ultimate (2036) DNL noise exposure contours are shown on **Exhibit 5D**. The contours include the 65, 70, and 75 Day-Night Average Sound Level (DNL).[9] The FAA's threshold for compatibility with noise-sensitive land uses is the 65 DNL contour. In the existing condition, the 65 DNL noise contour extends off Airport property in several locations as shown on the exhibit. Noise-sensitive land uses within the 65 DNL noise contour include residences located in Colonia Hermosa west of the Airport and

[9] **Day-Night Average Sound Level** (DNL): The 24-hour average sound level, in decibels, for the period from midnight to midnight, obtained after the addition of ten decibels to sound levels for the periods between midnight and 7 a.m., and between 10 p.m., and midnight, local time. The symbol for DNL is Ldn (See 14 CFR § 150.7).

TABLE 5D
Summary of Potential Environmental Concerns
McAllen International Airport

Environmental Impact Category	Significance Threshold/Factors to Consider	Potential Concern
	significance of noise impacts on noise-sensitive areas within Section 4(f) properties where the land use compatibility guidelines in Title 14 Code of Federal Regulations (CFR) Part 150 are not relevant to the value, significance, and enjoyment of the area in question.	residences located northwest of the Airport in the area that is generally bounded by Uvalde Avenue, Interstate 2, South 23rd Street, and South 29th Street. Section 4(f) resources within the noise contours include Cascade Park, Airport Park, Motocross Park, and the irrigation canals located near the Airport that are listed on the National Register of Historic Places. In the future noise condition (2036), the noise contours reflect the planned construction of the parallel runway. The planned property acquisition is also shown on **Exhibit 5D**. As indicated on the exhibit, the 65 DNL noise contour extends off Airport property in several locations. Noise-sensitive land uses within the 65 DNL noise contour include residences located in Colonia Hermosa west of the Airport and residences located northwest of the Airport in the area that is generally bounded by Sonora Avenue, Quebec Avenue, South 25 1/2 Street, and South 29th Street. There are also residences within the contours in the area southeast of the Airport along Whalen Road. Section 4(f) resources within the noise contours include Cascade Park, Airport Park, Palm City Park, Motocross Park, and the irrigation canals located near the Airport that are listed on the National Register of Historic Places. As discussed in the noise contour and grid point comparison included in Chapter Four, noise exposure may increase in noise-sensitive areas near the Airport. However, it is important to note that operational growth, unless tied to a specific project, will not result in noise impacts under FAA Order 1050.1F. Impacts to noise-sensitive land uses are only identified through NEPA documentation for specific projects or through the voluntary Part 150 process.
Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health and Safety Risks		
Socioeconomic Impacts	FAA has not established a significance threshold for socioeconomics. However, factors to consider are if an action would have the potential to: • Induce substantial economic growth in an area, either directly or indirectly (e.g., through establishing projects in an undeveloped area); • Disrupt or divide the physical arrangement of an established community; • Cause extensive relocation when sufficient replacement housing is unavailable; • Cause extensive relocation of community businesses that would cause severe economic hardship for affected communities;	**Potential Impact**. The master plan details projects that would alter the local roadway system, including three alternatives for S. 10th Street: rerouting, tunneling, or closure. The roadway rerouting and tunnel options would maintain local roadway system connectivity. Additionally, a portion of S. McColl Road would be closed to facilitate the proposed extension of the existing runway and construction of the parallel runway. The proposed projects outlined in the master plan could result in temporary disruption of local traffic patterns during the construction phase. Specifically,


Boeye Reservoir
Wichita Ave
S 10th St
2nd Street
S McColl Rd
Cascade Park
City of McAllen
Hidalgo County
Airport Park
Colonia Hermosa
Jordan Rd
Springfest Park
Reservoir
Hidalgo County
City of McAllen
LEGEND
Airport Property Line
Jurisdictional Boundary
75 DNL
70 DNL
65 DNL
DNL - Day-Night Noise Level
NORTH
0
1400
SCALE IN FEET
Aerial Photo: Martinez Geospatial 9-14-17

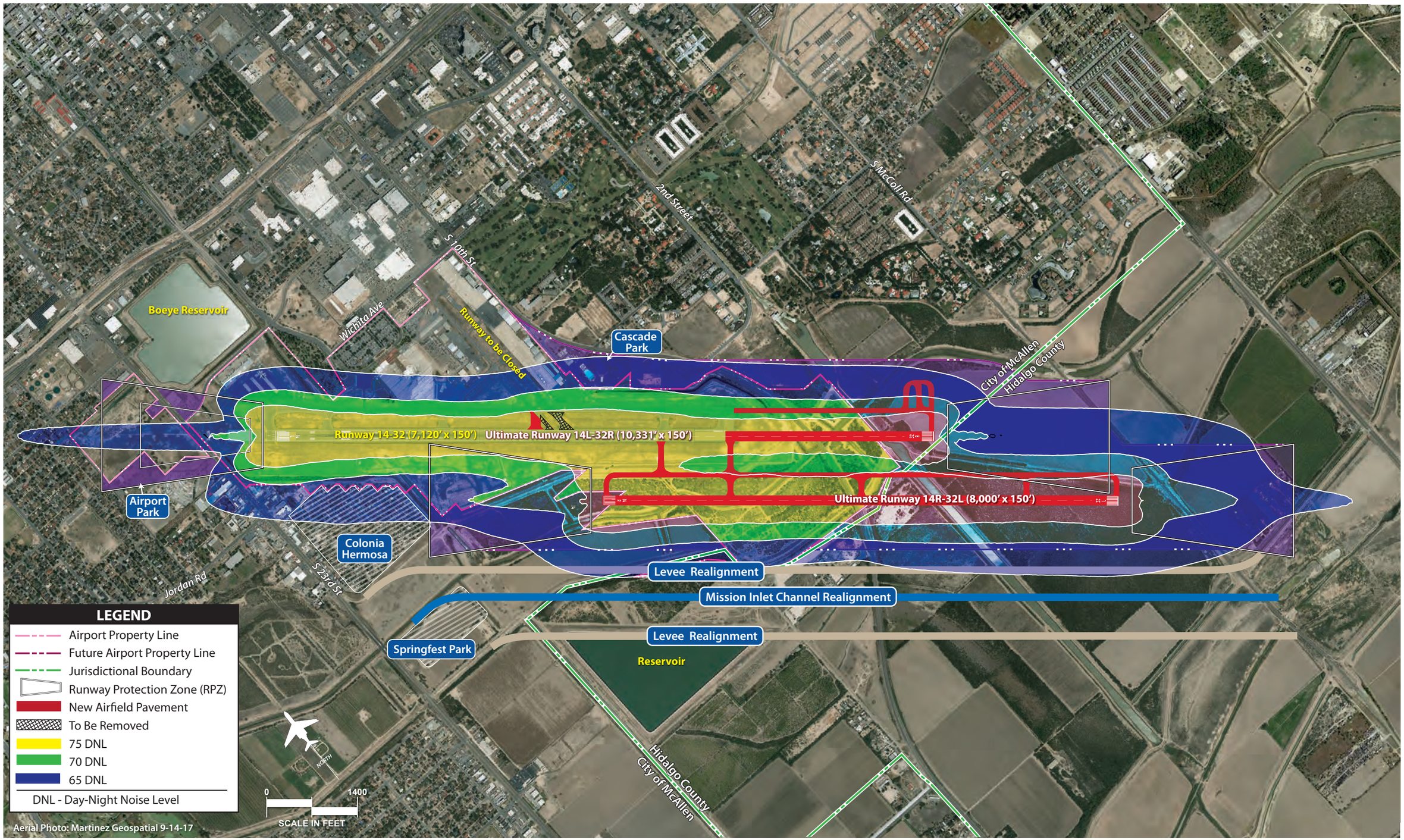

Boeye Reservoir
Wichita Ave
S 10th St
2nd Street
S McColl Rd
Runway to be Closed
Cascade Park
City of McAllen
Hidalgo County
Runway 14-32 (7,120' x 150')
Ultimate Runway 14L-32R (10,331' x 150')
Ultimate Runway 14R-32L (8,000' x 150')
Airport Park
Colonia Hermosa
S 23rd St
Jordan Rd
Levee Realignment
Mission Inlet Channel Realignment
Levee Realignment
Springfest Park
Reservoir
Hidalgo County
City of McAllen
LEGEND
Airport Property Line
Future Airport Property Line
Jurisdictional Boundary
Runway Protection Zone (RPZ)
New Airfield Pavement
To Be Removed
75 DNL
70 DNL
65 DNL
DNL - Day-Night Noise Level
NORTH
0
1400
SCALE IN FEET
Aerial Photo: Martinez Geospatial 9-14-17

TABLE 5D
Summary of Potential Environmental Concerns
McAllen International Airport

Environmental Impact Category	Significance Threshold/Factors to Consider	Potential Concern
	• Disrupt local traffic patterns and substantially reduce the levels of service of roads serving the airport and its surrounding communities; or • Produce a substantial change in the community tax base.	landside improvements on the east side of the Airport would result in construction vehicles entering and exiting S. 10th Street. Additionally, the proposed parallel runway construction project and associated Mission Inlet Channel relocation would increase traffic on local roads near the Airport. However, these projects are anticipated to be temporary in nature and would not result in long-term impacts to the surrounding community. As mentioned previously, portions of land adjacent to the Airport is identified for acquisition. This includes areas that are currently developed with residences and businesses. During the acquisition process, the requirements of the *Uniform Relocation Assistance and Real Property Acquisitions Policy Act of 1970* would apply. This act ensures that owners of real property to be acquired for, and those displaced by, Federal and Federally-assisted projects are treated fairly and consistently. There is potential for increased economic activity given the capacity-increasing components of the development concept, specifically the additional terminal capacity, hangar space, and runway improvements. Should substantial impacts to the community's tax base be anticipated, further evaluation as proposed projects progress would be recommended.
Environmental Justice	FAA has not established a significance threshold for Environmental Justice. However, factors to consider are if an action would have the potential to lead to a disproportionately high and adverse impact to an environmental justice population (i.e., a low-income or minority population) due to: • Significant impacts in other environmental impact categories; or • Impacts on the physical or natural environment that affect an environmental justice population in a way that FAA determines are unique to the environmental justice population and significant to that population.	**Potential Impact**. E.O. 12898, *Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations*, and the accompanying Presidential Memorandum, and Order DOT 5610.2, *Environmental Justice*, require the FAA to provide for meaningful public involvement by minority and low-income populations, as well as analysis that identifies and addresses potential impacts on these populations that may be disproportionately high and adverse. As outlined in the FAA's 1050.1E Desk Reference, *Meaningful Involvement* means that: • people have an opportunity to participate in decisions about activities that may affect their environment and/or health; • the public's contribution can influence the regulatory agency's decision; • their concerns will be considered in the decision-making process; and • the decision makers seek out and facilitate the involvement of those potentially affected. If disproportionately high or adverse impacts are noted, mitigation and enhancement measures and

TABLE 5D
Summary of Potential Environmental Concerns
McAllen International Airport

Environmental Impact Category	Significance Threshold/Factors to Consider	Potential Concern
		offsetting benefits can be taken into consideration. As discussed in Chapter One, low income and minority populations are located within the vicinity of the Airport and meaningful involvement, as described above, will likely be required as part of NEPA processes for the projects outlined in the master plan, particularly the proposed parallel runway project.
Children's Environmental Health and Safety Risks	FAA has not established a significance threshold for Children's Environmental Health and Safety Risks. However, factors to consider are if an action would have the potential to lead to a disproportionate health or safety risk to children.	Per E.O. 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, federal agencies are directed to identity and assess environmental health and safety risks that may disproportionately affect children. These risks include those that are attributable to products or substances that a child is likely to come in contact with or ingest, such as air, food, drinking water, recreational waters, soil, or products to which they may be exposed. As previously discussed, there are several parks and residences near the Airport. Best management practices should be implemented to decrease environmental health risks to children. During construction of the projects outlined in the master plan, appropriate measures should be taken to prevent access by unauthorized persons to construction projects areas.
Visual Effects		
Light Emissions	FAA has not established a significance threshold for Light Emissions. However, a factor to consider is the degree to which an action would have the potential to: • Create annoyance or interfere with normal activities from light emissions; and • Affect the visual character of the area due to the light emissions, including the importance, uniqueness, and aesthetic value of the affected visual resources.	**Potential Impact**. The primary recommendations related to lighting include MALSR approach lighting systems to Runways 14R, 32R, and 32L. Construction of the parallel runway will include installation of runway and taxiway lighting. Additionally, new structures in the landside areas of the Airport will include additional exterior lighting for security and parking lots. During NEPA processes for the projects proposed in the master plan, changes in lighting will need to be discussed and explained to the public. Light-sensitive species that hunt, migrate, or mate at night near the Airport are likely already acclimated to airport lights. The change in lighting due to recommended master plan concept is not anticipated to cause undue stress.
Visual Resources/Visual Character	FAA has not established a significance threshold for Visual Resources/Visual Character. However, a factor to consider is the extent an action would have the potential to: • Affect the nature of the visual character of	**No Impact**. Development planned in the master plan concept would change the overall visual character of the Airport with additional structures associated with future aviation development planned for the site.

TABLE 5D
Summary of Potential Environmental Concerns
McAllen International Airport

Environmental Impact Category	Significance Threshold/Factors to Consider	Potential Concern
	the area, including the importance, uniqueness, and aesthetic value of the affected visual resources; • Contrast with the visual resources and/or visual character in the study area; and • Block or obstruct the views of the visual resources, including whether these resources would still be viewable from other locations.	During NEPA processes for the projects proposed in the master plan, changes in lighting will need to be discussed and explained to the public.
Water Resources (including Wetlands, Floodplains, Surface Waters, Groundwater, and Wild and Scenic Rivers)		
Wetlands	**Threshold: The action would:** **1. Adversely affect a wetland's function to protect the quality or quantity of municipal water supplies, including surface waters and sole source and other aquifers;** **2. Substantially alter the hydrology needed to sustain the affected wetland system's values and functions or those of a wetland to which it is connected;** **3. Substantially reduce the affected wetland's ability to retain floodwaters or storm runoff, thereby threatening public health, safety, or welfare (the term welfare includes cultural, recreational, and scientific resources or property important to the public);** **4. Adversely affect the maintenance of natural systems supporting wildlife and fish habitat or economically important timber, food, or fiber resources of the affected or surrounding wetlands;** **5. Promote development of secondary activities or services that would cause the circumstances listed above to occur; or** 6. **Be inconsistent with applicable state wetland strategies.**	**No Impact**. As discussed in Chapter One, the U.S. FWS National Wetlands Inventory indicates there are no wetlands on existing or proposed Airport property. Additionally, there are no hydric soils, which can support wetlands, on the existing or proposed Airport property. Given the geographic extent of the proposed parallel runway and numerous drainage features, FAA may require field surveys for wetlands and waters of the U.S. within the proposed acquisition areas as part of the NEPA process for this project.
Floodplains	**Threshold: The action would cause notable adverse impacts on natural and beneficial floodplain values. Natural and beneficial floodplain values are defined in Paragraph 4.k of DOT Order 5650.2, *Floodplain Management and Protection.***	**Potential Impact**. As discussed in Chapter One, a 100-year floodplain, associated with the Mission Inlet Channel, is located south of the Airport. As part of the proposed Mission Inlet Channel relocation that would be required for the proposed parallel runway, the 100-year floodplain would shift along the proposed channel alignment. In addition to coordination with the drainage district, coordination with the floodplain administrator would be required to determine if the proposed project would result in impacts to the floodplain.
Surface Waters	**Threshold: The action would:** **1. Exceed water quality standards established by federal, state, local, and tribal regulatory agencies; or** **2. Contaminate public drinking water supply such that public health may be adversely affected.**	**No Impact**. As previously discussed, implementation of the parallel runway project would require relocation of the Mission Inlet Channel and would also result in alteration of several of the irrigation canals near the Airport.

TABLE 5D
Summary of Potential Environmental Concerns
McAllen International Airport

Environmental Impact Category	Significance Threshold/Factors to Consider	Potential Concern
	Factors to consider are when a project would have the potential to: • Adversely affect natural and beneficial water resource values to a degree that substantially diminishes or destroys such values; • Adversely affect surface water such that the beneficial uses and values of such waters are appreciably diminished or can no longer be maintained and such impairment cannot be avoided or satisfactorily mitigated; or • Present difficulties based on water quality impacts when obtaining a permit or authorization.	The Airport maintains stormwater control measures to eliminate any unauthorized non-stormwater discharge. Should a spill occur, the exposure would be minimized by immediately locating the discharge and containing it prior to it flowing to or discharging into any outfall or off any impervious surface with spill response equipment. Should any of the contaminants come into contact with pervious surfaces on Airport, the contaminated material would be discarded. If the spill is too large for the Airport to handle on its own, a contractor may be needed for further cleanup.
Groundwater	**Threshold: The action would:** **1. Exceed groundwater quality standards established by federal, state, local, and tribal regulatory agencies: or** **2. Contaminate an aquifer used for public water supply such that public health may be adversely affected.** Factors to consider are when a project would have the potential to: • Adversely affect natural and beneficial groundwater values to a degree that substantially diminishes or destroys such values; • Adversely affect groundwater quantities such that the beneficial uses and values of such groundwater are appreciably diminished or can no longer be maintained and such impairment cannot be avoided or satisfactorily mitigated; or • Present difficulties based on water quality impacts when obtaining a permit or authorization.	**None.** Proposed projects would not substantially change the amount of water used by the Airport. Additionally, the Airport property does not serve as a significant source of groundwater recharge and is not located near a sole source aquifer.
Wild and Scenic Rivers	FAA has not established a significance threshold for Wild and Scenic Rivers.	**No Impact**. Although the Rio Grande River is only a few miles south of the Airport, the section of this river that is classified as Wild and Scenic is more than 300 miles away.

SUMMARY

This chapter has been prepared to guide the City of McAllen in making decisions on the future growth and development of MFE by describing narratively and graphically the master plan concept and detailing environmental conditions that must be considered when implementing the development plan. The plan represents an airfield facility that fulfills aviation needs for the Airport, while conforming to safety and design standards to the extent practicable. It also provides a landside complex that can be developed as

demand dictates and is subject to further refinement pending comments from the AAB, Airport staff, the City of McAllen, and general public.

Flexibility will be very important to the future development at the Airport, as activity may not occur as predicted. The master plan concept provides stakeholders with a general guide that, if followed, can maintain the Airport's long-term viability and allow it to continue to provide air transportation service to the Rio Grande Valley region. The next chapter of this Master Plan provides a reasonable schedule for undertaking the projects based on safety and demand over the course of the next 20 years and considers strategies for funding the recommended improvements.

McAllen International Airport

Chapter 6

Financial Management/Development Program

CHAPTER SIX

Financial Management/ Development Program

The analyses completed in previous chapters evaluated development needs at the McAllen International Airport (MFE) over the next 20 years and potentially beyond, based on forecast activity, operational safety and efficiency, as well as sustainability. The next step is the preparation of a capital improvement program (CIP) for those projects that are expected to be implemented over the near term. A more general discussion of the funding of the intermediate and long term projects is provided because of the possible demand changes that would shift the need and priority of those projects.

This chapter presents the description of the CIP and the resulting financial projections for MFE. The CIP is developed under the assumption that various demand-based indicators, such as annual operations, annual passenger enplanements, and based aircraft grow in-line with the aviation activity forecasts presented in Chapter Two, Table 2MM. The base forecast for enplanements included in that table reflect a compound annual growth rate (CAGR) from 2016-2036 of 2.5 percent, which is comparable with the 2017 *Terminal Area Forecast* (TAF) prepared by the Federal Aviation Administration's (FAA) CAGR from 2016-2036 of 2.1 percent.

MFE's and the City of McAllen's (City) Fiscal Year (FY) ends September 30. Financial projections were developed for three planning horizons: short term (years 1-6, or FY 2019 through FY 2024), intermediate term (years 7-11, or FY 2025 through FY 2029), and long term (years 12-21, or FY 2030 through FY 2039). The FY 2018 numbers included in this chapter reflect the amounts presented in the City's Comprehensive Annual Financial Report (2018 CAFR), and the FY 2019 amounts are as presented in the City's 2018-2019 Fiscal Year Budget (2019 Budget).

CAPITAL PROGRAM AND COST SUMMARIES

From the specific needs and improvements that have been established for MFE, a realistic schedule and the associated costs for implementing the plan can be determined. The implementation plan considers the interrelationships among the projects in the recommended alternative to determine a logistics sequence to minimize conflicts and establish a master schedule.

This section will examine the overall cost of each item in the recommended development alternative and present a development schedule. The implementation plan covers the same years as the forecasts in the planning effort. A CIP by year has been developed to cover the short-, intermediate-, and long-term planning horizons. More detailed information is provided for the short-term horizon, with less detail for the longer planning periods. By utilizing planning horizons instead of specific years for intermediate- and long-term development, MFE will have greater flexibility to adjust capital needs as demand dictates.

A key aspect of this planning document is the use of demand-based planning milestones. The short-term planning horizon contains items of highest need and/or priority. These items should be considered for development based on actual demand levels within the next six years. As short-term horizon activity levels are reached, it will then be time to program for the intermediate-term based upon the next activity milestones. Similarly, when the intermediate term milestones are reached, it will be time to program for the long-term activity milestones.

Several development items included in the recommended alternative will need to follow demand indicators which essentially establish triggers for key improvements. If growth slows or does not occur as projected, projects could be delayed. As a result, capital expenditures will be undertaken as needed, which leads to a responsible use of capital assets. Some development items do not depend on demand, such as pavement maintenance. These types of projects typically are associated with day-to-day operations and should be monitored and identified by MFE management.

All airports receiving federal Airport Improvement Program (AIP) funding are required to maintain a current CIP with the FAA, which identifies projects to be undertaken at an airport over a specified period of time. MFE's CIP includes the projects recommended as part of this master plan from FY 2019 through FY 2039. **Table 6A** presents the recommended CIP and its corresponding cost estimates, which are based on a planning level of detail. While accurate for master planning purposes, actual project costs will likely vary from these planning estimates once project design and engineering estimates are developed. The cost estimates presented in the table are presented in 2018 dollars and include contingencies, design costs and construction management costs. Since the intermediate- and long-term project costs are more difficult to estimate, they have been increased by 2.7 percent annually reflecting the most recent five-year average of Engineering News-Record's Construction Cost Index. As shown in the table, the CIP is estimated at approximately $467.4 million in 2018 dollars and approximately $715.0 million in inflated dollars.

TABLE 6A
CIP and Funding Sources
(in 000s)

Year	Project Number	Description	Project Costs		Funding Sources						
					AIP Grants		Local				
			2018 $	Inflated[1]	Eligibility	Amount Avail	PFCs	CFCs	GARBs	Deferred	Total
Short Term (2019 - 2024)											
2019	1	Runway 14-32/Taxiway A Safety Improvements Phase I	$7,548	$7,548	$6,793	$6,793	$0	$0	$755	$0	$7,548
2020	2	Runway 14-32/Taxiway A Safety Improvements Phase II	4,743	4,743	4,269	4,269	0	0	474	0	4,743
2021	3	Runway 14-32/Taxiway A Safety Improvements Phase III	3,346	3,346	3,011	3,011	0	0	335	0	3,346
2022	4	Runway 14-32/Taxiway A Safety Improvements Phase IV	6,783	6,783	6,105	6,105	0	0	678	0	6,783
2022	5	Runway 14-32 Rehabilitation	1,850	1,850	1,665	1,665	0	0	185	0	1,850
2023	6	Cargo Apron Reconstruction - Phase 1	6,200	6,200	5,580	5,580	0	0	620	0	6,200
2024	7	Cargo Apron Reconstruction - Phase 2	2,400	2,400	2,160	2,160	0	0	240	0	2,400
2024	8	Mill and Overlay GA Apron	477	477	429	429	0	0	48	0	477
2024	9	Cost Benefit Analysis for Parallel Runway Development	100	100	90	90	0	0	10	0	100
		Total Short Term (2019 - 2024)	$33,447	$33,447	$30,102	$30,102	$0	$0	$3,345	$0	$33,447
Intermediate Term (2025 - 2029)											
	10	Miscellaneous Pavement Repairs	$1,225	$1,476	$1,328	$1,328	$148	$0	$0	$0	$1,476
	11	Terminal Roof Replacement	750	904	0	0	0	0	904	0	904
	12	Perimeter Road Improvements-Repair & Pave Unpaved Areas	2,612	3,148	2,833	2,833	315	0	0	0	3,148
	13	Terminal Area Parking Lot and Road Resurfacing	2,565	3,091	0	0	0	0	3,091	0	3,091
	14	Widen US Customs Apron Taxiway to 50'	827	997	897	897	100	0	0	0	997
	15	Land Acquisition - Properties in Runway 14 RPZ	13,132	16,470	14,823	9,000	7,470	0	0	0	16,470
	16	Environmental Impact Statement	4,000	5,084	4,576	0	5,084	0	0	0	5,084
	17	Land Acquisition - Properties to Allow for Airfield Expansion	23,274	30,790	27,711	6,000	24,790	0	0	0	30,790
	18	Construct New ARFF Facility	4,300	5,764	5,188	5,188	576	0	0	0	5,764
	19	Relocation of Mission Inlet Channel - Design Only	1,828	2,451	2,206	2,206	245	0	0	0	2,451
	20	Mitigate Direct Access Points to Runway 14-32	79	106	95	95	11	0	0	0	106
	21	Replace VASI with PAPI-4 - Runway 32	247	331	298	298	33	0	0	0	331
	22	Replace HIRL with LED Fixtures	1,000	1,340	1,206	1,206	134	0	0	0	1,340
	23	Replace Airfield Signage with LED Fixtures	604	809	728	728	81	0	0	0	809
	24	Collapsed Airfield Pipe Repair	2,061	2,763	0	0	0	0	2,763	0	2,763
	25	Terminal Waterline Improvements	907	1,216	0	0	0	0	1,216	0	1,216
	26	Perimeter and Existing Parking Areas CCTV System	7,785	10,436	0	0	0	0	10,436	0	10,436
	27	Plumbing Improvements in Terminal Restroom	876	1,174	0	0	0	0	1,174	0	1,174
	28	Electric Generator Installation	696	932	839	839	93	0	0	0	932
		Total Intermediate Term (2025 - 2029)	$68,767	$89,282	$62,728	$30,618	$39,079	$0	$19,584	$0	$89,282
Long Term (2030 - 2039)											
	29	Structural Overlay of All Runway and Taxiway Pavements	$27,390	$39,800	$35,820	$20,000	$0	$0	$0	$19,800	$39,800
	30	Relocation of Mission Inlet Channel	45,514	67,921	61,129	16,547	0	0	0	51,374	67,921
	31	10th Street Realignment - Design/Construction	57,037	85,117	76,606	0	0	0	0	85,117	85,117
	32	Expansion of Air Cargo Apron and Truck Staging Areas	5,821	9,404	8,463	4,000	0	0	0	5,404	9,404
	33	Terminal Expansion - Design/Construction	45,103	72,858	65,572	0	0	0	72,858	0	72,858
	34	Construct Parking Garage at Terminal	30,244	48,855	0	0	0	0	0	48,855	48,855
	35	Construct Consolidated Rental Car Facility	9,202	14,865	0	0	0	14,865	0	0	14,865
	36	Parallel Runway 14R-32L	144,830	253,417	228,076	14,607	0	0	0	238,810	253,417
		Total Long Term (2030 - 2039)	$365,141	$592,238	$475,666	$55,154	$0	$14,865	$72,858	$449,361	$592,238
		Total CIP	$467,354	$714,966	$568,495	$115,875	$39,079	$14,865	$95,786	$449,361	$714,966

[1] Beginning in the intermediate term, project costs were inflated at 2.7 percent, which reflects a five-year average of Engineering News-Record's Construction Cost Index.
Source: Coffman Associates, project costs

Exhibit 6A graphically presents the master plan projects color-coded by planning period. Short-term projects are shown in yellow, intermediate-term projects in blue, long-term projects in green, and beyond long-term projects in orange. A brief discussion of key projects in each period follows.

SHORT-TERM IMPROVEMENTS

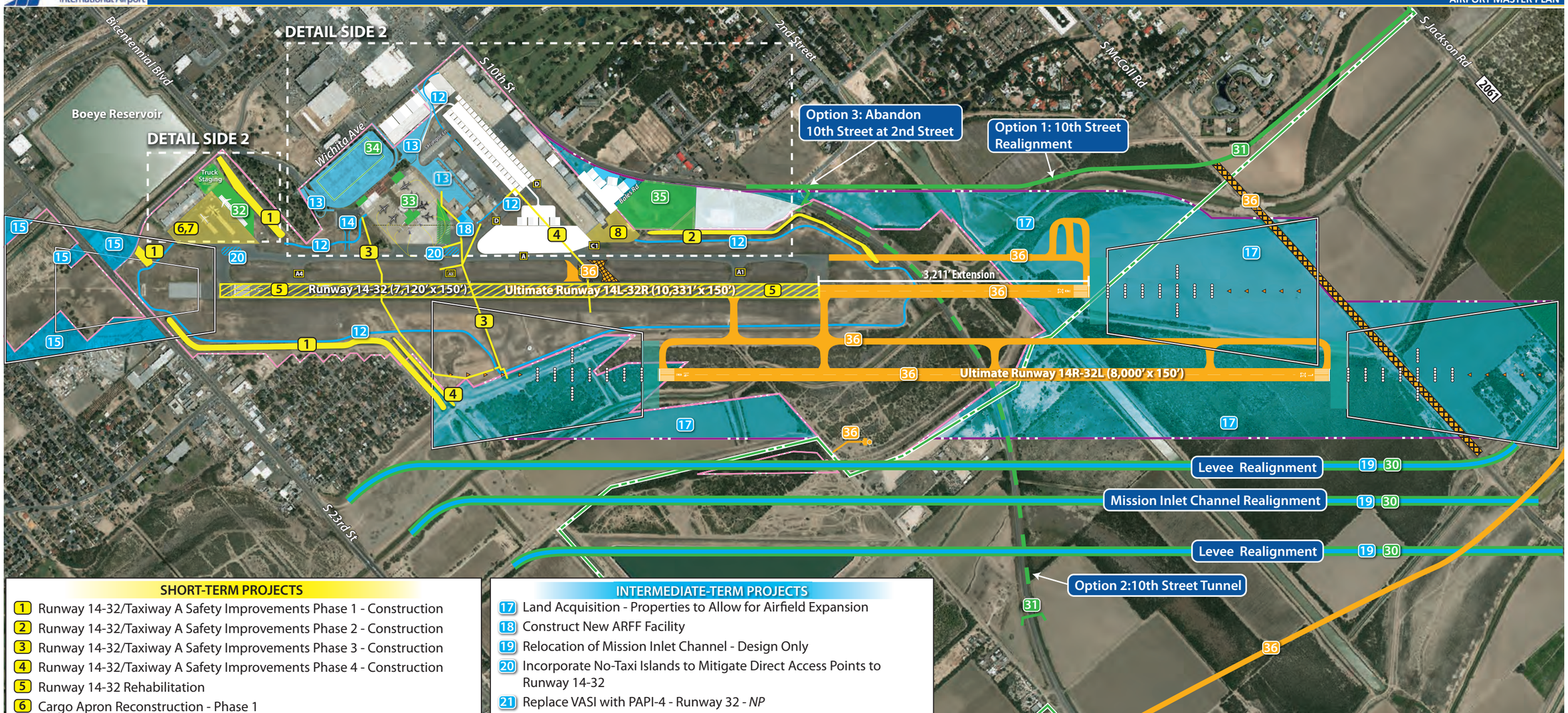
The short-term projects are those anticipated to be implemented in calendar years 2019 through 2024. The list of projects is divided into yearly timeframes and are prioritized based on the needs of the Airport. A runway/taxiway safety improvements project that has been structured into four phases accounts for the bulk of funding in the short term. The first two construction phases of this project will be undertaken in 2019 and 2020 with the final two phases in 2021 and 2022. Phase I involves enclosing the 23rd Street Canal; Phase II encloses the 10th Street Canal and replaces a deficient pipe; Phase III involves installing new storm sewer pipe extending from the east and west sides of the terminal to the south side of the airfield; and Phase IV involves installing new storm sewer pipe along Taxiway C to the south side of the airfield and enclosing the Irrigation Canal. Depending on funding availability, the phasing of this project could be restructured so that multiple phases are accomplished in a single fiscal year. Remaining short-term projects include the rehabilitation of Runway 14-32 in 2021, reconstruction of the air cargo apron (two phases in 2023 and 2024), the mill and overlay of a portion of the general aviation (GA) apron in 2024, and a cost-benefit analysis for the future development of a parallel runway in 2024.

INTERMEDIATE-TERM IMPROVEMENTS

The intermediate-term projects are those that are anticipated to be necessary in fiscal years 2025 through 2029. These projects are not tied to specific years for implementation; instead, they have been prioritized so that Airport management has the flexibility to determine when they need to be pursued based on the current conditions at the time of implementation. It is not unusual for certain projects to be delayed or advanced based on changing conditions, such as funding availability or changes in the aviation industry.

Nineteen projects have been identified for completion during the intermediate-term. These include several routine maintenance projects associated with airfield pavement, the tiled portion of the terminal roof, the perimeter road, and waterline improvements for the terminal. Safety and security related projects include widening the U.S. Customs apron to 50 feet to more safely serve larger aircraft, construction of a new aircraft rescue and firefighting (ARFF) station, upgrades to several airfield visual aids and lighting systems and installation of new security closed circuit TV (CCTV) system and electric generator.

It is also anticipated that it will be during this period that the Airport takes additional steps towards expanding the airfield by undertaking an Environmental Impact Statement (EIS). The EIS process takes several years to complete culminating with the FAA's issuance of a Record of Decision (ROD). If the FAA approves the action (project) in the ROD, assuming funding is in place, the Airport can move forward with projects associated with the airfield improvements including property acquisition and the design of the Mission Inlet Channel relocation.



SHORT-TERM PROJECTS

1. Runway 14-32/Taxiway A Safety Improvements Phase 1 - Construction
2. Runway 14-32/Taxiway A Safety Improvements Phase 2 - Construction
3. Runway 14-32/Taxiway A Safety Improvements Phase 3 - Construction
4. Runway 14-32/Taxiway A Safety Improvements Phase 4 - Construction
5. Runway 14-32 Rehabilitation
6. Cargo Apron Reconstruction - Phase 1
7. Cargo Apron Reconstruction - Phase 2
8. Mill and Overlay GA Apron
9. Cost Benefit Analysis for Parallel Runway Development - *NP*

INTERMEDIATE-TERM PROJECTS

10. Miscellaneous Pavement Repairs - *NP*
11. Terminal Roof Replacement (Tiled Roof Areas Only)
12. Perimeter Road Improvements - Repair and Pave Unpaved Areas
13. Terminal Area Parking Lot and Road Resurfacing
14. Widen US Customs Apron Taxiway to 50'
15. Land Acquisition - Properties in Runway 14 RPZ
16. Environmental Impact Statement (EIS) For Airfield Improvements - *NP*

INTERMEDIATE-TERM PROJECTS

17. Land Acquisition - Properties to Allow for Airfield Expansion
18. Construct New ARFF Facility
19. Relocation of Mission Inlet Channel - Design Only
20. Incorporate No-Taxi Islands to Mitigate Direct Access Points to Runway 14-32
21. Replace VASI with PAPI-4 - Runway 32 - *NP*
22. Replace HIRL with LED Fixtures - *NP*
23. Replace Airfield Signage with LED Fixtures - *NP*
24. Collapsed Airfield Pipe Repair - *NP*
25. Terminal Waterline Improvements - *NP*
26. Perimeter and Existing Parking Areas CCTV System - *NP*
27. Plumbing Improvements in Terminal Restroom - *NP*
28. Electric Generator Installation - *NP*

LONG-TERM PROJECTS

29. Structural Overlay of All Runway and Taxiway Pavements - *NP*
30. Relocation of Mission Inlet Channel - Construction
31. 10th Street Realignment - Design/Construction
32. Expansion of Air Cargo Apron and Truck Staging Areas

LONG-TERM PROJECTS

33. Terminal Expansion - Design/Construction
34. Construct Parking Garage at Terminal
35. Construct Consolidated Rental Car Facility

BEYOND LONG-TERM PROJECTS

36. Infield Parallel Taxiway/Connecting Taxiway Construction Design/Construction
    Parallel Runway 14R-32L Construction
    Runway 14L-32R and Parallel Taxiway Extension
    New Airport Traffic Control Tower Design/Construction

NP - Not Pictured White - Private Development

S 10th St
S Hangar Ln
S Old 10th St
Bales Rd
Property Acquisition
+/-25.7 acres
Truck
Staging
La Piedad
Cemetery
150'
160'
Runway 14-32 (7,120' x 150')
LEGEND
Airport Property Line
Future Property Line
Short-Term Development
Intermediate-Term Development
Long-Term Development
To Be Removed
NORTH
0
400
800
SCALE IN FEET
Aerial Photo: Martinez Geospatial 9-14-17

LONG-TERM IMPROVEMENTS

Long-term projects are those considered for fiscal years 2030-2038 of the Master Plan. A total of seven projects are included in the long-term horizon, understanding that some of these may be moved ahead if needed or not implemented at all if demand for the improvement does not materialize.

The first project in the long term is the structural overlay of all runway and taxiway pavements followed by projects associated with the expansion of the airfield including the construction of the Mission Inlet Channel relocation and the design/construction of the S. 10th Street realignment. Remaining projects are demand-based including the expansion of the air cargo apron and truck staging areas, the expansion of the terminal building, including new gates and concourse spaces and pre-security airline ticketing, security checkpoint, and baggage claim space. Finally, the last two projects in the long term involve the construction of a vehicle parking garage at the terminal and a consolidated rental car facility (CONRAC) along S. 10th Street.

BEYOND LONG-TERM IMPROVEMENTS

Due to the scale of the proposed airfield improvement projects and associated projects to realign the Mission Inlet Channel and S. 10th Street, an aggressive estimate does not anticipate construction to begin on a Runway 14-32 extension and a parallel runway until well after fiscal year 2039. Numerous issues could arise to push construction of the extension and parallel runway even further into the future, including environmental issues discovered during the EIS process; or issues associated with gaining approval to relocate the Mission Inlet Channel. Property acquisition alone could involve negotiations with numerous individual property owners over several years and funding for these projects may not be readily available. For these reasons, the runway extension, parallel runway, and new airport traffic control tower (ATCT) are anticipated to be developed beyond the long-term planning horizon of this master plan.

CAPITAL PROGRAM FUNDING SOURCES

Table 6B presents the CIP's estimated funding sources for the planning period. The following sections describe the amount of funding available from these sources.

AIP GRANTS

Grants administered by the FAA through the AIP are a critical capital funding source to implement the projects recommended in this master plan. On October 3, 2018, the U.S. Senate passed a five-year reauthorization bill for the FAA — the *FAA Reauthorization Act of 2018* — which was signed into law by the President on October 5, 2018. The 2018 FAA reauthorization retains the federal cap on PFCs at $4.50 and authorizes $3.35 billion per year for the FAA's AIP through federal fiscal year 2023, which is the same funding level as was in place for the preceding five years. The AIP provides federal capital grants to

support airport infrastructure through entitlement grants, which are determined by formulas based on passenger, cargo and general aviation activity levels, and discretionary grants, allocated on the basis of specific set-asides and the national priority ranking system.

TABLE 6B
CIP Funding Sources by Year
(in 000s)

Year	Project Costs							
			AIP	Local				
	2018 $	Inflated[1]	Grants	PFCs	CFCs	GARBs	Deferred	Total
2019	$7,548	$7,548	$6,793	$0	$0	$755	$0	$7,548
2020	4,743	4,743	4,269	0	0	474	0	4,743
2021	5,196	5,196	4,676	0	0	520	0	5,196
2022	6,783	6,783	6,105	0	0	678	0	6,783
2023	6,200	6,200	5,580	0	0	620	0	6,200
2024	2,977	2,977	2,679	0	0	298	0	2,977
Total Short Term (2019 - 2024)	$33,447	$33,447	$30,102	$0	$0	$3,345	$0	$33,447
Total Intermediate Term (2025 - 2029)	$68,767	$89,282	$30,618	$39,079	$0	$19,584	$0	$89,282
Total Long Term (2030 - 2039)	$365,141	$592,238	$55,154	$0	$14,865	$72,858	$449,361	$592,238
Total CIP	**$467,354**	**$714,966**	**$115,875**	**$39,079**	**$14,865**	**$95,786**	**$449,361**	**$714,966**

[1] Beginning in the intermediate term, project costs were inflated at 2.7% which reflects a 5-year average of Engineering News-Record's Construction Cost Index.
Source: Coffman Associates, project costs

The U.S. DOT classifies MFE as a small hub primary airport. Therefore, the AIP formula stipulates that MFE is entitled to receive 90 percent in federal funding for AIP-eligible projects. AIP funds can be used for most improvement needs, but not operating costs. However, AIP funds are typically not available for revenue-generating projects, so it may be difficult for MFE to use these funds for projects designated to generate revenue.

As shown on **Table 6B**, federal grants are estimated to be approximately $115.9 million from FY 2019 through FY 2039. Of this amount, approximately $65.3 million is assumed to be funded with entitlement grants and approximately $50.6 million with discretionary grants, both of which are described in detail below.

Entitlement Grants

Entitlement funds are distributed through grants by a formula based on the number of enplanements at individual airports. In cases where entitlement funds are not used during the current federal fiscal year, these funds are redistributed to other airport sponsors as discretionary funds and become what is known as protected entitlement funding in the next federal fiscal year. **Table 6C** presents MFE'S AIP entitlement calculation. This calculation is based on the enplanement forecast presented in Chapter Two. As shown

in the table, it is estimated that MFE will receive approximately $65.3 million in entitlement AIP grants from FY 2019 through FY 2039.

TABLE 6C
AIP Entitlement Calculation
(in 000s)

	2019	2020	2021	2022	2023	2024	2025 - 2029	2030 - 2039
Enplanements for Entitlement	383	408	435	445	455	465	2,487	5,826
FAA Formula [1]								
$7.80 for 1st 50,000 Enplanements	$390	$390	$390	$390	$390	$390	$1,950	$3,900
$5.20 for next 50,000 Enplanements	260	260	260	260	260	260	1,300	2,600
$2.60 for next 400,000 Enplanements	735	801	871	897	923	950	5,097	10,400
$0.65 for next 500,000 Enplanements	0	0	0	0	0	0	17	537
$0.50 for the remaining Enplanements	0	0	0	0	0	0	0	0
Total Calculated Entitlements	$1,385	$1,451	$1,521	$1,547	$1,573	$1,600	$8,364	$17,437
Total Calculated Entitlements x 2 [2]	$2,770	$2,902	$3,042	$3,094	$3,146	$3,200	$16,728	$34,873
2 Year Lag in Receipt of Grants [3]		**$2,646**	**$2,770**	**$2,902**	**$3,042**	**$3,094**	**$16,280**	**$34,564**
Cumulative AIP Entitlement Grants		**$2,646**	**$5,416**	**$8,318**	**$11,360**	**$14,454**	**$30,734**	**$65,298**

[1] The FAA formula is defined in 49 United States Code § 47114.

[2] In any fiscal year in which the total amount available under 49 United States Code § 48103 is $3.2 billion or more, the amount apportioned to a sponsor shall be increased by doubling the amount that would otherwise be apportioned.

[3] A two year lag is assumed to reflect the time needed to compile annual enplanement data and complete the grant application and approval process.

Discretionary Grants

At the beginning of each federal fiscal year, the FAA sets aside the amount of discretionary funds to cover the Letter of Intent (LOI) payment schedules. The total discretionary funds in all LOIs subject to future obligation are limited to approximately 50 percent of the forecast discretionary funds available for that purpose. The authorizing statute directs the FAA to allocate certain discretionary funding to specific airport types and set-aside categories, such as noise, reliever airports, military airport program and projects relating to capacity, safety, security, and noise. However, the FAA has some discretion in funding specific projects within these discretionary funding set-aside categories. The FAA approves discretionary funds for use on specific projects, after consideration of project priority and other selection criteria. MFE has approximately $10.6 million in outstanding LOIs. It is assumed they will submit future LOIs to the FAA to fund certain eligible CIP projects in the amount of $10 million every five years.

Table 6D presents the AIP grants assumed to fund the eligible portions of the capital program. As shown in the table, AIP entitlement funds are insufficient to fund the eligible portions of the CIP; therefore, discretionary grant funding in the amount of approximately $50.6 million will be needed in combination with entitlement dollars to fund eligible projects.

The amount of future CIP projects funded with AIP grants was determined by the available AIP grant cash flow presented in the table. It is possible that MFE will not receive the amount required in discretionary funding for the eligible projects during the projection period. If MFE does not receive this discretionary funding, MFE will need to identify alternative funding sources, delay the project until funding sources become available, or cancel the project.

TABLE 6D
Application of AIP Grants
(in 000s)

	2019	2020	2021	2022	2023	2024	2025 - 2029	2030 - 2039	Total
Available AIP Grants									
Entitlement	$0	$2,646	$2,770	$2,902	$3,042	$3,094	$16,280	$34,564	$65,298
Discretionary	10,577	0	0	0	0	10,000	10,000	20,000	50,577
Total available AIP Grants	$10,577	$2,646	$2,770	$2,902	$3,042	$13,094	$26,280	$54,564	$115,875
Beginning balance	$0	$3,784	$2,161	$255	($2,948)	($5,486)	$4,929	$591	$0
Plus: available AIP grants	$10,577	$2,646	$2,770	$2,902	$3,042	$13,094	$26,280	$54,564	$115,875
Less: AIP eligible portion of CIP [1]	($6,793)	($4,269)	($4,676)	($6,105)	($5,580)	($2,679)	($30,618)	($55,154)	($115,875)
Ending balance	$3,784	$2,161	$255	($2,948)	($5,486)	$4,929	$591	$0	$0

[1] Represents federally eligible portion of the CIP as presented in Table 6A.

LOCAL FUNDS

Approximately $39.1 million in PFC revenue, $14.9 million in CFC revenue, and $95.8 million in MFE revenue through the issuance of general airport revenue bonds (GARBs) is required to fund the remaining costs of the CIP. These funding sources are described in greater detail in the following subsections.

Passenger Facility Charges

PFCs are authorized by Title 14 of the Code of Federal Regulations, Part 158, and are administered by the FAA. PFCs collected from qualified enplaned passengers are used to fund eligible projects. An airport operator can impose a PFC of $1, $2, $3, $4 or $4.50 per eligible, enplaned passenger. Once a PFC is imposed, it is included as part of the ticket price paid by passengers enplaning at the airport, collected by the airlines and remitted to the airport operator, less an allowance for airline processing expenses. The PFC legislation stipulates that if a medium to large hub airport institutes a PFC of $1, $2, or $3, they must forego 50 percent of their AIP entitlement funds. This increases to 75 percent if they charge a $4 or $4.50 PFC. Since MFE is designated by the FAA as a small hub airport, it does not have to forego any of its annual AIP entitlement funds.

Projects that are eligible for PFC funding include those that preserve or enhance the capacity, safety, or security of the air transportation system; reduce noise or mitigate noise effects; or furnish opportunities for enhanced competition between or among air carriers. PFCs cannot be used for revenue-generating

facilities at airports, such as restaurants and other concession space, rental car facilities, public parking facilities or construction of exclusively leased space or facilities.

Since 1997, MFE has submitted six PFC applications to the FAA; currently, PFC Application #4, PFC Application #5, and PFC Application #6 are the active applications. PFC Application #4 and PFC Application #6 were approved to fund specific projects and expire prior to PFC Application #5. PFC Application #5 was approved to collect a $4.50 per enplaned passenger fee to pay for the debt service associated with the Series 2011 Bonds. This application is due to expire in 2031. As a result, PFC revenues are not fully available to fund the CIP until that time. **Table 6A** details the projects that are assumed to be funded with PFCs. **Table 6E** presents the PFC calculation for MFE based on the enplanement projections presented in Chapter Two, as well as the annual funding plan for these revenues. The amount of future CIP projects funded with PFCs was determined by the available PFC cash flow presented in the table.

TABLE 6E
Application of PFCs
(in 000s)

	2019	2020	2021	2022	2023	2024	2025 - 2029	2030 - 2039	Total
Enplanements	383	408	435	445	455	465	2,487	5,826	
% of enplanements revenue producing	90%	90%	90%	90%	90%	90%	90%	90%	
Enplanements for PFC	344	367	392	400	410	419	2,238	5,243	
$4.50 per Enplanement [1]	$4.39	$4.39	$4.39	$4.39	$4.39	$4.39	$4.39	$4.39	
Total PFC Revenue	$1,512	$1,612	$1,719	$1,758	$1,798	$1,839	$9,825	$23,017	$43,079
Beginning Balance	$7,686	$8,473	$9,359	$10,352	$11,387	$12,460	$13,575	$10,435	$7,686
PFC revenue	$1,512	$1,612	$1,719	$1,758	$1,798	$1,839	$9,825	$23,017	$43,079
Less: PFC #5 Series 2011 debt service	($725)	($726)	($726)	($723)	($724)	($724)	($3,624)	($1,452)	($9,424)
Less: Future PFC eligible debt service [2]	$0	$0	$0	$0	$0	$0	($9,341)	($31,238)	($40,579)
Ending Balance	$8,473	$9,359	$10,352	$11,387	$12,460	$13,575	$10,435	$762	$762

[1] The PFC formula is defined in 49 United States Code § 40117. PFC of $4.50 less airline collection fee of $0.11.

[2] See Table 6F.

As shown in the table, MFE is estimated to collect $43.1 million in PFCs, $40.6 million of which is not committed under the outstanding PFC applications; therefore, available to fund the PFC-eligible portions of certain CIP projects.

Customer Facility Charges

The CIP includes the construction of a consolidated rental car facility of approximately $14.9 million inflated. MFE currently does not have a customer facility charge (CFC). This analysis assumes that MFE would institute a CFC to fund this project. If MFE does not institute a CFC, MFE will need to identify alternative funding sources, delay the project until funding sources become available, or cancel the project.

MFE Funds

MFE generates revenue through airline revenues, parking, rental car, terminal concessions, Transportation Security Administration (TSA) rentals, cargo and hangar rentals, and FBO and fuel flowage fees. Typically, such revenues are used to cover maintenance and operating expenses along with debt service obligations. However, any surplus revenues can be applied directly to the CIP. As shown on **Table 6A**, approximately $95.8 million of the CIP is assumed to be funded through the issuance of future GARBs. The debt service associated with the future GARB issuances would be funded with MFE revenues.

DEFERRED FUNDS

Due to the size of the CIP and MFE's limited funding sources, there are certain projects in the intermediate- and long-term planning horizons that are not funded. These projects total approximately $449.4 million and include various runway, taxiway, street alignments, and parking projects. This analysis assumes these projects are deferred until such time as funding sources become available.

MFE'S ACCOUNTING STRUCTURE

The City is a municipal corporation, which was incorporated February 20, 1911 under Article XI, Section 5 of the Texas Constitution. The City operates under the commission-manager form of government and provides a full range of municipal services as authorized by its charter. The governing body consists of an elected mayor and a six-member commission. MFE is owned by and is a department of the City and is operated as a financially self-sufficient enterprise fund of the City. The accounting and financial reporting policies of the City conform to accounting principles for local government units as set forth by the Governmental Accounting Standards Board.

In 2007, the City entered into airline agreements with some of the airlines (signatory airlines) serving MFE. Signatory airlines as of December 31, 2018 include Aeromar Airlines, American Airlines, and United Airlines. Allegiant Airlines also serves MFE but is a non-signatory. Under the terms of the airline agreements, rates for rentals, charges, and fees are fixed for the term of the agreement. American and United's airline agreements expired on September 30, 2010 and Aeromar's on February 28, 2015 but continue on a month-to-month basis. MFE is currently in the process of renegotiating these agreements.

FINANCIAL FEASIBILITY

This section of the financial analysis presents the projected operating expenses and revenues resulting from the daily operation of MFE. In addition, the funding of the CIP is layered into projections to determine if it is feasible for MFE to undertake the program in the FY 2019 through FY 2039 planning period.

DEBT SERVICE

Table 6F presents MFE's debt service requirements for the planning period. As shown in the table, the Series 2011 Bonds is MFE's only outstanding bond issue and is funded with PFC Application #5. As previously mentioned, this analysis assumes future PFC bond and GARB issuance.

TABLE 6F
Debt Service
(in 000s)

Fiscal Year	Outstanding	Future PFC Bonds	Future GARBs			
	Series 2011	Series 2025	Series 2020	Series 2025	Series 2030	Total
Short Term (2019 - 2024)						
2019	$725	$0	$0	$0	$0	$0
2020	$726	$0	$0	$0	$0	$0
2021	$726	$0	$0	$0	$0	$0
2022	$723	$0	$266	$0	$0	$266
2023	$724	$0	$266	$0	$0	$266
2024	$724	$0	$267	$0	$0	$267
Intermediate Term (2025 - 2029)						
	$3,624	$9,341	$1,335	$4,681	$0	$6,016
Long Term (2030 - 2039)						
	$1,452	$31,238	$2,682	$15,654	$46,492	$64,829

As shown in the table, PFCs are forecast to be leveraged to fund approximately $39.1 million of the CIP with future PFC applications. While this analysis does not make any recommendations on the type of debt structure MFE should undertake, it does assume the issuance of a 30-year bond issuance at a 5 percent interest rate in 2025, a two-year capitalized interest period, and the funding of a debt service reserve equaling maximum annual debt service. These assumptions translate into a bond issuance in a par amount of $47.6 million and generate PFC-eligible debt service of approximately $3.1 million annually.

As also shown in the table, approximately $95.8 million of the CIP is forecast to be funded from GARBs. While this analysis does not make any recommendations on the type of debt structure MFE should undertake, it does assume the issuance of a 30-year GARB at a 5 percent interest rate in 2020, 2025, and 2030, a two-year capitalized interest period, and the funding of a debt service reserve equaling maximum

annual debt service. These assumptions translate into three GARB issuances with a total par amount of $116.3 million, generating debt service of approximately $7 million annually.

OPERATING EXPENSES

Operating expenses at MFE are assigned to line items which include salaries and benefits, supplies, contractual and other services, repairs and maintenance, and capital outlay. The FY 2018 operating expenses reflect the actual expenses presented in the 2018 CAFR and the FY 2019 operating expenses reflect the amounts presented in the 2019 budget. **Table 6G** presents operating expenses by line item for FY 2018 through FY 2039.

TABLE 6G
Operating Expenses
(in 000s)

	Actual	Budget	Short Term					2025 -	2030 -
	2018	2019	2020	2021	2022	2023	2024	2029	2039
Salaries and benefits	$1,739	$2,099	$2,135	$2,171	$2,208	$2,246	$2,284	$12,015	$27,294
Supplies	81	104	106	108	110	112	114	600	1,350
Contractual and other services	1,526	1,919	1,951	1,984	2,018	2,052	2,087	10,977	24,938
Repairs and maintenance	457	514	523	532	541	550	559	2,945	6,691
Capital outlay	58	246	251	255	259	263	267	1,410	3,201
Increase due to terminal expansion	0	0	0	0	0	0	0	0	5,805
Total operating expenses	**$3,860**	**$4,882**	**$4,966**	**$5,050**	**$5,136**	**$5,223**	**$5,311**	**$27,947**	**$69,279**
Percent change		**26.5%**	**1.7%**	**1.7%**	**1.7%**	**1.7%**	**1.7%**		
CAGR (2019 - 2024)							**1.7%**		

As shown in the table, operating expenses were approximately $3.9 million in FY 2018 and are budgeted to increase 26.5 percent or 6.4 percent over the 2018 approved budget, primarily as a result of increased capital outlay costs for building structures, vehicles, and equipment to approximately $4.9 million in FY 2019. Operating expenses are forecast to be approximately $5.3 million in FY 2024, reflecting a CAGR of 1.7 percent from FY 2019 through FY 2024. Operating expenses are projected based on a review of historical trends and the anticipated effects of inflation assumed at 1.7 percent annually, reflecting the most recent 10-year average of the South Urban Consumer Price Index (CPI). The terminal building expansion is programmed to occur in the long-term planning horizon, and operating expenses are projected to increase to account for the maintenance and operation of the expanded facility.

OPERATING REVENUES

Major sources of operating revenue at MFE are derived from non-airline and airline sources. Non-airline revenues accounted for approximately 67.5 percent (see **Table 6H**) of MFE's revenues in FY 2018 and

include parking, rental car, terminal concessions, Transportation Security Administration (TSA) rentals, cargo and hangar rentals, and FBO and fuel flowage fees.

TABLE 6H
Operating Revenues
(in 000s)

	Actual	Budget	Short Term					2025 -	2030 -
	2018	2019	2020	2021	2022	2023	2024	2029	2039
Charges for services									
Terminal area rental charges	$1,119	$1,083	$1,308	$1,330	$1,353	$1,376	$1,399	$7,363	$26,713
Landing fees	758	716	857	881	907	933	959	5,218	12,906
TSA lease	178	176	178	180	182	183	185	955	2,057
Boarding bridge fees	134	125	133	142	145	148	152	809	1,896
FBO contract	179	181	183	185	187	188	190	980	2,113
Cargo and hangar rentals	94	94	95	96	97	98	99	511	1,102
Fuel sales net profit	92	88	88	89	90	91	92	474	1,021
GA perimeter hangars	68	72	73	74	74	75	76	392	844
RON fees	24	20	21	21	21	21	21	110	234
Ramp fees	14	13	13	13	13	13	14	69	146
Subtotal	$2,659	$2,567	$2,949	$3,011	$3,069	$3,128	$3,188	$16,879	$49,030
Percent change		-3.4%	14.9%	2.1%	1.9%	1.9%	1.9%		
Rentals									
Rental cars	$1,794	$1,676	$1,787	$1,905	$1,949	$1,993	$2,039	$10,891	$25,516
Parking	1,353	1,382	1,473	1,571	1,607	1,643	1,681	9,428	23,803
TSA	182	183	184	186	188	190	192	989	2,131
Terminal concessions									
Food and beverage	125	113	121	129	132	135	138	735	1,759
Other	154	113	121	129	131	134	138	734	1,757
Retail	33	22	24	25	26	27	27	145	345
Miscellaneous	1	0	0	0	0	0	0	0	0
Subtotal	$3,641	$3,489	$3,710	$3,945	$4,033	$4,122	$4,214	$22,922	$55,311
Percent change		-4.2%	6.3%	6.3%	2.2%	2.2%	2.2%		
Total operating revenue	**$6,300**	**$6,056**	**$6,658**	**$6,956**	**$7,101**	**$7,250**	**$7,402**	**$39,801**	**$104,341**
Percent change		**-3.9%**	**9.9%**	**4.5%**	**2.1%**	**2.1%**	**2.1%**		
CAGR (2019 - 2024)							**4.1%**		
Airline revenue	$2,049	$1,956	$2,331	$2,387	$2,439	$2,491	$2,545	$13,568	$41,894
Non-airline revenue	4,252	4,100	4,327	4,569	4,662	4,758	4,857	26,233	62,447
Total operating revenue	$6,300	$6,056	$6,658	$6,956	$7,101	$7,250	$7,402	$39,801	$104,341
Airline revenue	32.5%	32.3%	35.0%	34.3%	34.3%	34.4%	34.4%	34.1%	40.2%
Non-airline revenue	67.5%	67.7%	65.0%	65.7%	65.7%	65.6%	65.6%	65.9%	59.8%

Airline revenues accounted for approximately 32.5 percent (see **Table 6H**) of MFE's revenues in FY 2018 and include revenues generated from passenger airline terminal rentals, landing fees, boarding bridge fees, apron fees, and ramp fees. As previously discussed, the existing airline agreements have expired.

Because the agreements are expired and the existing airline rates and charges have not been increased since FY 2010, the rates and charges were increased in FY 2020 by compounded CPI since 2010 and then every year thereafter by the CPI. The terminal rental rates were increased more than CPI in FY 2036, which is the estimated completion date of the terminal expansion.

Table 6H presents operating revenues for FY 2018 through FY 2039. As shown, operating revenues were approximately $6.3 million in FY 2018 and are budgeted to decrease 3.9 percent to $6.1 million in FY 2019, primarily as a result of the 2019 Budget amounts having been prepared prior to the increase in FY 2018 enplaned passengers being realized. Operating revenues are projected to further increase to approximately $7.4 million in FY 2024, reflecting a CAGR of 4.1 percent from FY 2019. FY 2020 through FY 2039 operating revenues are projected based on the following:

- Historical trends, lease provisions, and inflation.
- It was assumed that MFE would renegotiate concession leases that expire during the planning period with terms and conditions that would implement changes in rate structures and business practices, as necessary, to maintain positive financial performance.
- Revenues from parking, rental cars, and terminal concessions are projected to increase with prospective enplanement growth.
- Parking revenues are anticipated to increase every five years beginning in 2025 due to assumed rate increases.
- Airline rates and charges were increased in FY 2020 by compounded CPI since 2010 and then every year thereafter by the CPI. The terminal rental rates were increased more than CPI in FY 2036, which is the estimated completion date of the terminal expansion.

PRO FORMA CASH FLOW

Table 6J presents the pro forma cash flow of MFE for the planning period, based on the projection of operating revenues, operating expenses, and GARB debt service discussed previously.

TABLE 6J
Pro Forma Cash Flow
(in 000s)

	Actual	Budget	Short Term					2025 -	2030 -
	2018	2019	2020	2021	2022	2023	2024	2029	2039
Operating revenues	$6,300	$6,056	$6,658	$6,956	$7,101	$7,250	$7,402	$39,801	$104,341
Less: operating expenses	(3,860)	(4,882)	(4,966)	(5,050)	(5,136)	(5,223)	(5,311)	(27,947)	(69,279)
Net revenues available for debt service	$2,440	$1,174	$1,692	$1,906	$1,965	$2,027	$2,091	$11,854	$35,062
Less: GARB debt service	$0	$0	$0	$0	($266)	($266)	($267)	($6,016)	($64,829)
Profit/(Loss)	**$2,440**	**$1,174**	**$1,692**	**$1,906**	**$1,699**	**$1,760**	**$1,824**	**$5,838**	**($29,766)**

As shown, MFE does not have sufficient funds to support the GARB debt service needed to fund the CIP and the corresponding increase in expenses in the long term planning horizon. This is based on the operating expense and revenue projections as they are presented in this document and the CIP as it is currently phased. There are several actions MFE could pursue to meet the financial requirements of the CIP, some of which are presented as follows:

- Re-phase certain projects in the CIP, moving them to years when MFE can afford the local share component.
- Identify another funding source for the projects in the CIP currently assigned to local share.
- Obtain additional air service.
- Renegotiate the airline agreement to reflect a formula based rate for terminal rentals and landing fees that recover the costs of the facilities.

SUMMARY

The financial feasibility of future projects will be determined by existing and future leases, funding levels and participation rates of federal grant programs, the availability of PFC revenues and other funding sources, bonding capacity and the ability to generate internal cash flow from operations at MFE.

The financial projections were prepared on the basis of available information and assumptions set forth in this chapter. It is believed that such information and assumptions provide a reasonable basis for the projections to the level of detail appropriate for an airport master plan. Some of the assumptions used to develop the projections may not be realized, and unanticipated events or circumstances may occur. Therefore, the actual results will vary from those projected, and such variations could be material.

Based on these assumptions, MFE may need the assistance of additional grants, PFCs, CFCs, third party funding, or subsidies to fund the CIP as it is presented. As MFE has done in the past, it should continue to monitor its financial situation to determine which projects should be undertaken and when. In addition, MFE should review and evaluate current leases and service incentives to enhance revenues and provide financial solvency, while improving the facilities.

The best means to begin implementation of the recommendations in the master plan is to first recognize that planning is a continuous process that does not end with completion and approval of this document. Rather, the ability to continuously monitor the existing and forecast status of airport activity must be provided and maintained. The issues upon which the master plan is based will remain valid for a number of years. The primary goal is for MFE to best serve the air transportation needs of the region, while continuing to be economically self-sufficient.

The actual need for facilities is most appropriately established by airport activity levels rather than a specified date. Actual demand may be slower to develop than expected. On the other hand, high levels of demand may establish the need to accelerate the development. Although every effort has been made in this master planning process to conservatively estimate when facility development may be needed, aviation demand will dictate when facility improvements need to be delayed or accelerated.

In summary, the planning process requires MFE management to consistently monitor the progress of MFE in terms of aircraft operations and based aircraft. Analysis of aircraft demand is critical to the timing and need for certain airport facilities. The information obtained from continually monitoring airport activity will provide the data necessary to determine if the development schedule should be accelerated or decelerated.

McAllen International Airport

Appendix A

Glossary of Terms

Glossary of Terms

A

ABOVE GROUND LEVEL: The elevation of a point or surface above the ground.

ACCELERATE-STOP DISTANCE AVAILABLE (ASDA): See declared distances.

ADVISORY CIRCULAR: External publications issued by the FAA consisting of nonregulatory material providing for the recommendations relative to a policy, guidance and information relative to a specific aviation subject.

AIR CARRIER: An operator which: (1) performs at least five round trips per week between two or more points and publishes flight schedules which specify the times, days of the week, and places between which such flights are performed; or (2) transports mail by air pursuant to a current contract with the U.S. Postal Service. Certified in accordance with Federal Aviation Regulation (FAR) Parts 121 and 127.

AIRCRAFT: A transportation vehicle that is used or intended for use for flight.

AIRCRAFT APPROACH CATEGORY: A grouping of aircraft based on 1.3 times the stall speed in their landing configuration at their maximum certificated landing weight. The categories are as follows:

- Category A: Speed less than 91 knots.
- Category B: Speed 91 knots or more, but less than 121 knots.
- Category C: Speed 121 knots or more, but less than 141 knots.
- Category D: Speed 141 knots or more, but less than 166 knots.
- Category E: Speed greater than 166 knots.

AIRCRAFT OPERATION: The landing, takeoff, or touch-and-go procedure by an aircraft on a runway at an airport.

AIRCRAFT OPERATIONS AREA (AOA): A restricted and secure area on the airport property designed to protect all aspects related to aircraft operations.

AIRCRAFT OWNERS AND PILOTS ASSOCIATION: A private organization serving the interests and needs of general aviation pilots and aircraft owners.

AIRCRAFT RESCUE AND FIRE FIGHTING: A facility located at an airport that provides emergency vehicles, extinguishing agents, and personnel responsible for minimizing the impacts of an aircraft accident or incident.

AIRFIELD: The portion of an airport which contains the facilities necessary for the operation of aircraft.

AIRLINE HUB: An airport at which an airline concentrates a significant portion of its activity and which often has a significant amount of connecting traffic.

AIRPLANE DESIGN GROUP (ADG): A grouping of aircraft based upon wingspan. The groups are as follows:

- Group I: Up to but not including 49 feet.
- Group II: 49 feet up to but not including 79 feet.
- Group III: 79 feet up to but not including 118 feet.
- Group IV: 118 feet up to but not including 171 feet.
- Group V: 171 feet up to but not including 214 feet.
- Group VI: 214 feet or greater.

AIRPORT AUTHORITY: A quasi-governmental public organization responsible for setting the policies governing the management and operation of an airport or system of airports under its jurisdiction.

AIRPORT BEACON: A navigational aid located at an airport which displays a rotating light beam to identify whether an airport is lighted.

AIRPORT CAPITAL IMPROVEMENT PLAN: The planning program used by the Federal Aviation Administration to identify, prioritize, and distribute funds for airport development and the needs of the National Airspace System to meet specified national goals and objectives.

AIRPORT ELEVATION: The highest point on the runway system at an airport expressed in feet above mean sea level (MSL).

AIRPORT IMPROVEMENT PROGRAM: A program authorized by the Airport and Airway Improvement Act of 1982 that provides funding for airport planning and development.

AIRPORT LAYOUT DRAWING (ALD): The drawing of the airport showing the layout of existing and proposed airport facilities.

AIRPORT LAYOUT PLAN (ALP): A scaled drawing of the existing and planned land and facilities necessary for the operation and development of the airport.

AIRPORT LAYOUT PLAN DRAWING SET: A set of technical drawings depicting the current and future airport conditions. The individual sheets comprising the set can vary with the complexities of the airport, but the FAA-required drawings include the Airport Layout Plan (sometimes referred to as the Airport Layout Drawing (ALD), the Airport Airspace Drawing, and the Inner Portion of the Approach Surface Drawing, On-Airport Land Use Drawing, and Property Map.

AIRPORT MASTER PLAN: The planner's concept of the long-term development of an airport.

AIRPORT MOVEMENT AREA SAFETY SYSTEM: A system that provides automated alerts and warnings of potential runway incursions or other hazardous aircraft movement events.

AIRPORT OBSTRUCTION CHART: A scaled drawing depicting the Federal Aviation Regulation (FAR) Part 77 surfaces, a representation of objects that penetrate these surfaces, runway, taxiway, and ramp areas, navigational aids, buildings, roads and other detail in the vicinity of an airport.

AIRPORT REFERENCE CODE (ARC): A coding system used to relate airport design criteria to the operational (Aircraft Approach Category) to the physical characteristics (Airplane Design Group) of the airplanes intended to operate at the airport.

AIRPORT REFERENCE POINT (ARP): The latitude and longitude of the approximate center of the airport.

AIRPORT SPONSOR: The entity that is legally responsible for the management and operation of an airport, including the fulfillment of the requirements of laws and regulations related thereto.

AIRPORT SURFACE DETECTION EQUIPMENT: A radar system that provides air traffic controllers with a visual representation of the movement of aircraft and other vehicles on the ground on the airfield at an airport.

AIRPORT SURVEILLANCE RADAR: The primary radar located at an airport or in an air traffic control terminal area that receives a signal at an antenna and transmits the signal to air traffic control display equipment defining the location of aircraft in the air. The signal provides only the azimuth and range of aircraft from the location of the antenna.

AIRPORT TRAFFIC CONTROL TOWER (ATCT): A central operations facility in the terminal air traffic control system, consisting of a tower, including an associated instrument flight rule (IFR) room if radar equipped, using air/ground communications and/or radar, visual signaling and other devices to provide safe and expeditious movement of terminal air traffic.

AIR ROUTE TRAFFIC CONTROL CENTER: A facility which provides en route air traffic control service to aircraft operating on an IFR flight plan within controlled airspace over a large, multi-state region.

AIRSIDE: The portion of an airport that contains the facilities necessary for the operation of aircraft.

AIRSPACE: The volume of space above the surface of the ground that is provided for the operation of aircraft.

AIR TAXI: An air carrier certificated in accordance with FAR Part 121 and FAR Part 135 and authorized to provide, on demand, public transportation of persons and property by aircraft. Generally operates small aircraft "for hire" for specific trips.

AIR TRAFFIC CONTROL: A service operated by an appropriate organization for the purpose of providing for the safe, orderly, and expeditious flow of air traffic.

AIR ROUTE TRAFFIC CONTROL CENTER (ARTCC): A facility established to provide air traffic control service to aircraft operating on an IFR flight plan within controlled airspace and principally during the en route phase of flight.

AIR TRAFFIC CONTROL SYSTEM COMMAND CENTER: A facility operated by the FAA which is responsible for the central flow control, the central altitude reservation system, the airport reservation position system, and the air traffic service contingency command for the air traffic control system.

AIR TRAFFIC HUB: A categorization of commercial service airports or group of commercial service airports in a metropolitan or urban area based upon the proportion of annual national enplanements existing at the airport or airports. The categories are large hub, medium hub, small hub, or non-hub. It forms the basis for the apportionment of entitlement funds.

AIR TRANSPORT ASSOCIATION OF AMERICA: An organization consisting of the principal U.S. airlines that represents the interests of the airline industry on major aviation issues before federal, state, and local government bodies. It promotes air transportation safety by coordinating industry and governmental safety programs and it serves as a focal point for industry efforts to standardize practices and enhance the efficiency of the air transportation system.

ALERT AREA: See special-use airspace.

ALTITUDE: The vertical distance measured in feet above mean sea level.

ANNUAL INSTRUMENT APPROACH (AIA): An approach to an airport with the intent to land by an aircraft in accordance with an IFR flight plan when visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude.

APPROACH LIGHTING SYSTEM (ALS): An airport lighting facility which provides visual guidance to landing aircraft by radiating light beams by which the pilot aligns the aircraft with the extended centerline of the runway on his final approach and landing.

APPROACH MINIMUMS: The altitude below which an aircraft may not descend while on an IFR approach unless the pilot has the runway in sight.

APPROACH SURFACE: An imaginary obstruction limiting surface defined in FAR Part 77 which is longitudinally centered on an extended runway centerline and extends outward and upward from the primary surface at each end of a runway at a designated slope and distance based upon the type of available or planned approach by aircraft to a runway.

APRON: A specified portion of the airfield used for passenger, cargo or freight loading and unloading, aircraft parking, and the refueling, maintenance and servicing of aircraft.

AREA NAVIGATION: The air navigation procedure that provides the capability to establish and maintain a flight path on an arbitrary course that remains within the coverage area of navigational sources being used.

AUTOMATED TERMINAL INFORMATION SERVICE (ATIS): The continuous broadcast of recorded non-control information at towered airports. Information typically includes wind speed, direction, and runway in use.

AUTOMATED SURFACE OBSERVATION SYSTEM (ASOS): A reporting system that provides frequent airport ground surface weather observation data through digitized voice broadcasts and printed reports.

AUTOMATIC WEATHER OBSERVATION STATION (AWOS): Equipment used to automatically record weather conditions (i.e. cloud height, visibility, wind speed and direction, temperature, dew point, etc.)

AUTOMATIC DIRECTION FINDER (ADF): An aircraft radio navigation system which senses and indicates the direction to a non-directional radio beacon (NDB) ground transmitter.

AVIGATION EASEMENT: A contractual right or a property interest in land over which a right of unobstructed flight in the airspace is established.

AZIMUTH: Horizontal direction expressed as the angular distance between true north and the direction of a fixed point (as the observer's heading).

B

BASE LEG: A flight path at right angles to the landing runway off its approach end. The base leg normally extends from the downwind leg to the intersection of the extended runway centerline. See "traffic pattern."

BASED AIRCRAFT: The general aviation aircraft that use a specific airport as a home base.

BEARING: The horizontal direction to or from any point, usually measured clockwise from true north or magnetic north.

BLAST FENCE: A barrier used to divert or dissipate jet blast or propeller wash.

BLAST PAD: A prepared surface adjacent to the end of a runway for the purpose of eliminating the erosion of the ground surface by the wind forces produced by airplanes at the initiation of takeoff operations.

BUILDING RESTRICTION LINE (BRL): A line which identifies suitable building area locations on the airport.

C

CAPITAL IMPROVEMENT PLAN: The planning program used by the Federal Aviation Administration to identify, prioritize, and distribute Airport Improvement Program funds for airport development and the needs of the National Airspace System to meet specified national goals and objectives.

CARGO SERVICE AIRPORT: An airport served by aircraft providing air transportation of property only, including mail, with an annual aggregate landed weight of at least 100,000,000 pounds.

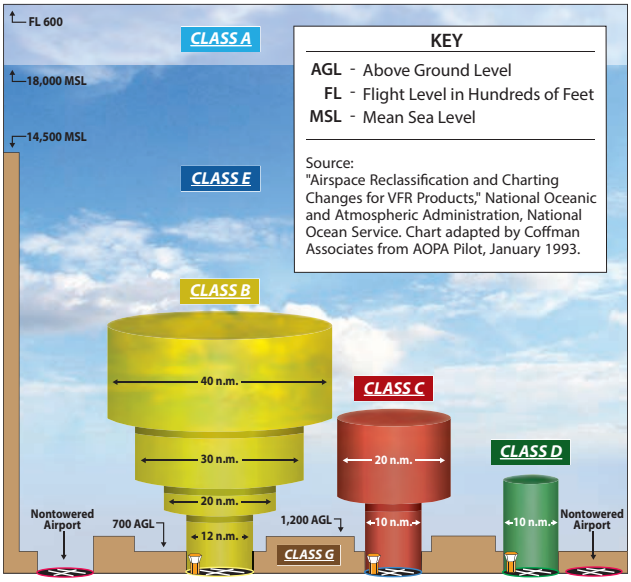
CATEGORY I: An Instrument Landing System (ILS) that provides acceptable guidance information to an aircraft from the coverage limits of the ILS to the point at which the localizer course line intersects the glide path at a decision height of 200 feet above the horizontal plane containing the runway threshold.

CATEGORY II: An ILS that provides acceptable guidance information to an aircraft from the coverage limits of the ILS to the point at which the localizer course line intersects the glide path at a decision height of 100 feet above the horizontal plane containing the runway threshold.

CATEGORY III: An ILS that provides acceptable guidance information to a pilot from the coverage limits of the ILS with no decision height specified above the horizontal plane containing the runway threshold.

CEILING: The height above the ground surface to the location of the lowest layer of clouds which is reported as either broken or overcast.

CIRCLING APPROACH: A maneuver initiated by the pilot to align the aircraft with the runway for landing when flying a predetermined circling instrument approach under IFR.



CLASS A AIRSPACE: See Controlled Airspace.

CLASS B AIRSPACE: See Controlled Airspace.

CLASS C AIRSPACE: See Controlled Airspace.

CLASS D AIRSPACE: See Controlled Airspace.

CLASS E AIRSPACE: See Controlled Airspace.

CLASS G AIRSPACE: See Controlled Airspace.

CLEAR ZONE: See Runway Protection Zone.

COMMERCIAL SERVICE AIRPORT: A public airport providing scheduled passenger service that enplanes at least 2,500 annual passengers.

COMMON TRAFFIC ADVISORY FREQUENCY: A radio frequency identified in the appropriate aeronautical chart which is designated for the purpose of transmitting airport advisory information and procedures while operating to or from an uncontrolled airport.

COMPASS LOCATOR (LOM): A low power, low/medium frequency radio-beacon installed in conjunction with the instrument landing system at one or two of the marker sites.

CONICAL SURFACE: An imaginary obstruction-limiting surface defined in FAR Part 77 that extends

from the edge of the horizontal surface outward and upward at a slope of 20 to 1 for a horizontal distance of 4,000 feet.

CONTROLLED AIRPORT: An airport that has an operating airport traffic control tower.

CONTROLLED AIRSPACE: Airspace of defined dimensions within which air traffic control services are provided to instrument flight rules (IFR) and visual flight rules (VFR) flights in accordance with the airspace classification. Controlled airspace in the United States is designated as follows:

- **CLASS A**: Generally, the airspace from 18,000 feet mean sea level (MSL) up to but not including flight level FL600. All persons must operate their aircraft under IFR.

- **CLASS B**:
  Generally, the airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports. The configuration of Class B airspace is unique to each airport, but typically consists of two or more layers of air space and is designed to contain all published instrument approach procedures to the airport. An air traffic control clearance is required for all aircraft to operate in the area.

- **CLASS C**: Generally, the airspace from the surface to 4,000 feet above the airport elevation (charted as MSL) surrounding those airports that have an operational control tower and radar approach control and are served by a qualifying number of IFR operations or passenger enplanements. Although individually tailored for each airport, Class C airspace typically consists of a surface area with a five nautical mile (nm) radius and an outer area with a 10 nautical mile radius that extends from 1,200 feet to 4,000 feet above the airport elevation. Two-way radio communication is required for all aircraft.

- **CLASS D**: Generally, that airspace from the surface to 2,500 feet above the air port elevation (charted as MSL) surrounding those airports that have an operational control tower. Class D airspace is individually tailored and configured to encompass published instrument approach procedure. Unless otherwise authorized, all persons must establish two-way radio communication.

- **CLASS E**: Generally, controlled airspace that is not classified as Class A, B, C, or D. Class E airspace extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace. When designated as a surface area, the airspace will be configured to contain all instrument procedures. Class E airspace encompasses all Victor Airways. Only aircraft following instrument flight rules are required to establish two-way radio communication with air traffic control.

- **CLASS G**: Generally, that airspace not classified as Class A, B, C, D, or E. Class G airspace is uncontrolled for all aircraft. Class G airspace extends from the surface to the overlying Class E airspace.

CONTROLLED FIRING AREA: See special-use airspace.

CROSSWIND: A wind that is not parallel to a runway centerline or to the intended flight path of an aircraft.

CROSSWIND COMPONENT: The component of wind that is at a right angle to the runway centerline or the intended flight path of an aircraft.

CROSSWIND LEG: A flight path at right angles to the landing runway off its upwind end. See "traffic pattern."

D

DECIBEL: A unit of noise representing a level relative to a reference of a sound pressure 20 micro newtons per square meter.

DECISION HEIGHT/ DECISION ALTITUDE: The height above the end of the runway surface at which a decision must be made by a pilot during the ILS or Precision Approach Radar approach to either continue the approach or to execute a missed approach.

DECLARED DISTANCES: The distances declared available for the airplane's takeoff runway, takeoff distance, accelerate-stop distance, and landing distance requirements. The distances are:

- **TAKEOFF RUNWAY AVAILABLE (TORA):** The runway length declared available and suitable for the ground run of an airplane taking off.

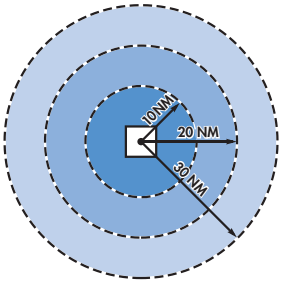
- **TAKEOFF DISTANCE AVAILABLE (TODA):** The TORA plus the length of any remaining runway and/or clear way beyond the far end of the TORA.
- **ACCELERATE-STOP DISTANCE AVAILABLE (ASDA):** The runway plus stopway length declared available for the acceleration and deceleration of an aircraft aborting a takeoff.
- **LANDING DISTANCE AVAILABLE (LDA):** The runway length declared available and suitable for landing.

DEPARTMENT OF TRANSPORTATION: The cabinet level federal government organization consisting of modal operating agencies, such as the Federal Aviation Administration, which was established to promote the coordination of federal transportation programs and to act as a focal point for research and development efforts in transportation.

DISCRETIONARY FUNDS: Federal grant funds that may be appropriated to an airport based upon designation by the Secretary of Transportation or Congress to meet a specified national priority such as enhancing capacity, safety, and security, or mitigating noise.

DISPLACED THRESHOLD: A threshold that is located at a point on the runway other than the designated beginning of the runway.

DISTANCE MEASURING EQUIPMENT (DME): Equipment (airborne and ground) used to measure, in nautical miles, the slant range distance of an aircraft from the DME navigational aid.



DNL: The 24-hour average sound level, in Aweighted decibels, obtained after the addition of ten decibels to sound levels for the periods between 10 p.m. and 7 a.m. as averaged over a span of one year. It is the FAA standard metric for determining the cumulative exposure of individuals to noise.

DOWNWIND LEG: A flight path parallel to the landing runway in the direction opposite to landing. The downwind leg normally extends between the crosswind leg and the base leg. Also see "traffic pattern."

E

EASEMENT: The legal right of one party to use a portion of the total rights in real estate owned by another party. This may include the right of passage over, on, or below the property; certain air rights above the property, including view rights; and the rights to any specified form of development or activity, as well as any other legal rights in the property that may be specified in the easement document.

ELEVATION: The vertical distance measured in feet above mean sea level.

ENPLANED PASSENGERS: The total number of revenue passengers boarding aircraft, including originating, stop-over, and transfer passengers, in scheduled and nonscheduled services.

ENPLANEMENT: The boarding of a passenger, cargo, freight, or mail on an aircraft at an airport.

ENTITLEMENT: Federal funds for which a commercial service airport may be eligible based upon its annual passenger enplanements.

ENVIRONMENTAL ASSESSMENT (EA): An environmental analysis performed pursuant to the National Environmental Policy Act to determine whether an action would significantly affect the environment and thus require a more detailed environmental impact statement.

ENVIRONMENTAL AUDIT: An assessment of the current status of a party's compliance with applicable environmental requirements of a party's environmental compliance policies, practices, and controls.

ENVIRONMENTAL IMPACT STATEMENT (EIS): A document required of federal agencies by the National Environmental Policy Act for major projects are legislative proposals affecting the environment. It is a tool for decision-making describing the positive and negative effects of a proposed action and citing alternative actions.

ESSENTIAL AIR SERVICE: A federal program which guarantees air carrier service to selected small cities by providing subsidies as needed to prevent these cities from such service.

F

FEDERAL AVIATION REGULATIONS: The general and permanent rules established by the executive departments and agencies of the Federal Government for aviation, which are published in the Federal Register. These are the aviation subset of the Code of Federal Regulations.

FEDERAL INSPECTION SERVICES: The provision of customs and immigration services including passport inspection, inspection of baggage, the collection of duties on certain imported items, and the inspections for agricultural products, illegal drugs, or other restricted items.

FINAL APPROACH: A flight path in the direction of landing along the extended runway centerline. The final approach normally extends from the base leg to the runway. See "traffic pattern."

FINAL APPROACH AND TAKEOFF AREA (FATO). A defined area over which the final phase of the helicopter approach to a hover, or a landing is completed and from which the takeoff is initiated.

FINAL APPROACH FIX: The designated point at which the final approach segment for an aircraft landing on a runway begins for a non-precision approach.

FINDING OF NO SIGNIFICANT IMPACT (FONSI): A public document prepared by a Federal agency that presents the rationale why a proposed action will not have a significant effect on the environment and for which an environmental impact statement will not be prepared.

FIXED BASE OPERATOR (FBO): A provider of services to users of an airport. Such services include, but are not limited to, hangaring, fueling, flight training, repair, and maintenance.

FLIGHT LEVEL: A measure of altitude used by aircraft flying above 18,000 feet. Flight levels are indicated by three digits representing the pressure altitude in hundreds of feet. An airplane flying at flight level 360 is flying at a pressure altitude of 36,000 feet. This is expressed as FL 360.

FLIGHT SERVICE STATION: An operations facility in the national flight advisory system which utilizes data interchange facilities for the collection and dissemination of Notices to Airmen, weather, and administrative data and which provides pre-flight and in-flight advisory services to pilots through air and ground based communication facilities.

FRANGIBLE NAVAID: A navigational aid which retains its structural integrity and stiffness up to a designated maximum load, but on impact from a greater load, breaks, distorts, or yields in such a manner as to present the minimum hazard to aircraft.

G

GENERAL AVIATION: That portion of civil aviation which encompasses all facets of aviation except air carriers holding a certificate of convenience and necessity, and large aircraft commercial operators.

GENERAL AVIATION AIRPORT: An airport that provides air service to only general aviation.

GLIDESLOPE (GS): Provides vertical guidance for aircraft during approach and landing. The glideslope consists of the following:

1. Electronic components emitting signals which provide vertical guidance by reference to airborne instruments during instrument approaches such as ILS; or

2. Visual ground aids, such as VASI, which provide vertical guidance for VFR approach or for the visual portion of an instrument approach and landing.

GLOBAL POSITIONING SYSTEM (GPS): A system of 48 satellites used as reference points to enable navigators equipped with GPS receivers to determine their latitude, longitude, and altitude.

GROUND ACCESS: The transportation system on and around the airport that provides access to and from the airport by ground transportation vehicles for passengers, employees, cargo, freight, and airport services.

H

HELIPAD: A designated area for the takeoff, landing, and parking of helicopters.

HIGH INTENSITY RUNWAY LIGHTS: The highest classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

HIGH-SPEED EXIT TAXIWAY: A long radius taxiway designed to expedite aircraft turning off the runway after landing (at speeds to 60 knots), thus reducing runway occupancy time.

HORIZONTAL SURFACE: An imaginary obstruction-limiting surface defined in FAR Part 77 that is specified as a portion of a horizontal plane surrounding a runway located 150 feet above the established airport elevation. The specific horizontal dimensions of this surface are a function of the types of approaches existing or planned for the runway.

I

INITIAL APPROACH FIX: The designated point at which the initial approach segment begins for an instrument approach to a runway.

INSTRUMENT APPROACH PROCEDURE: A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually.

INSTRUMENT FLIGHT RULES (IFR): Procedures for the conduct of flight in weather conditions below Visual Flight Rules weather minimums. The term IFR is often also used to define weather conditions and the type of flight plan under which an aircraft is operating.

INSTRUMENT LANDING SYSTEM (ILS): A precision instrument approach system which normally consists of the following electronic components and visual aids:

1. Localizer.
2. Glide Slope.
3. Outer Marker.
4. Middle Marker.
5. Approach Lights.

INSTRUMENT METEOROLOGICAL CONDITIONS: Meteorological conditions expressed in terms of specific visibility and ceiling conditions that are less than the minimums specified for visual meteorological conditions.

ITINERANT OPERATIONS: Operations by aircraft that are not based at a specified airport.

K

KNOTS: A unit of speed length used in navigation that is equivalent to the number of nautical miles traveled in one hour.

L

LANDSIDE: The portion of an airport that provides the facilities necessary for the processing of passengers, cargo, freight, and ground transportation vehicles.

LANDING DISTANCE AVAILABLE (LDA): See declared distances.

LARGE AIRPLANE: An airplane that has a maximum certified takeoff weight in excess of 12,500 pounds.

LOCAL AREA AUGMENTATION SYSTEM: A differential GPS system that provides localized measurement correction signals to the basic GPS signals to improve navigational accuracy integrity, continuity, and availability.

LOCAL OPERATIONS: Aircraft operations performed by aircraft that are based at the airport and that operate in the local traffic pattern or within sight of the airport, that are known to be departing for or arriving from flights in local practice areas within a prescribed distance from the airport, or that execute simulated instrument approaches at the airport.

LOCAL TRAFFIC: Aircraft operating in the traffic pattern or within sight of the tower, or aircraft known to be departing or arriving from the local practice areas, or aircraft executing practice instrument approach procedures. Typically, this includes touch and-go training operations.

LOCALIZER: The component of an ILS which provides course guidance to the runway.

LOCALIZER TYPE DIRECTIONAL AID (LDA): A facility of comparable utility and accuracy to a localizer, but is not part of a complete ILS and is not aligned with the runway.

LONG RANGE NAVIGATION SYSTEM (LORAN): Long range navigation is an electronic navigational aid which determines aircraft position and speed by measuring the difference in the time of reception of synchronized pulse signals from two fixed transmitters. Loran is used for en route navigation.

LOW INTENSITY RUNWAY LIGHTS: The lowest classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

M

MEDIUM INTENSITY RUNWAY LIGHTS: The middle classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

MICROWAVE LANDING SYSTEM (MLS): An instrument approach and landing system that provides precision guidance in azimuth, elevation, and distance measurement.

MILITARY OPERATIONS: Aircraft operations that are performed in military aircraft.

MILITARY OPERATIONS AREA (MOA): See special-use airspace

MILITARY TRAINING ROUTE: An air route depicted on aeronautical charts for the conduct of military flight training at speeds above 250 knots.

MISSED APPROACH COURSE (MAC): The flight route to be followed if, after an instrument approach, a landing is not affected, and occurring normally:

1. When the aircraft has descended to the decision height and has not established visual contact; or

2. When directed by air traffic control to pull up or to go around again.

MOVEMENT AREA: The runways, taxiways, and other areas of an airport which are utilized for taxiing/hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas. At those airports with a tower, air traffic control clearance is required for entry onto the movement area.

N

NATIONAL AIRSPACE SYSTEM: The network of air traffic control facilities, air traffic control areas, and navigational facilities through the U.S.

NATIONAL PLAN OF INTEGRATED AIRPORT SYSTEMS: The national airport system plan developed by the Secretary of Transportation on a biannual basis for the development of public use airports to meet national air transportation needs.

NATIONAL TRANSPORTATION SAFETY BOARD: A federal government organization established to investigate and determine the probable cause of transportation accidents, to recommend equipment and procedures to enhance transportation safety, and to review on appeal the suspension or revocation of any certificates or licenses issued by the Secretary of Transportation.

NAUTICAL MILE: A unit of length used in navigation which is equivalent to the distance spanned by one minute of arc in latitude, that is, 1,852 meters or 6,076 feet. It is equivalent to approximately 1.15 statute mile.

NAVAID: A term used to describe any electrical or visual air navigational aids, lights, signs, and associated supporting equipment (i.e. PAPI, VASI, ILS, etc.)

NAVIGATIONAL AID: A facility used as, available for use as, or designed for use as an aid to air navigation.

NOISE CONTOUR: A continuous line on a map of the airport vicinity connecting all points of the same noise exposure level.

NON-DIRECTIONAL BEACON (NDB): A beacon transmitting nondirectional signals whereby the pilot of an aircraft equipped with direction finding equipment can determine his or her bearing to and from the radio beacon and home on, or track to, the station. When the radio beacon is installed in conjunction with the Instrument Landing System marker, it is normally called a Compass Locator.

NON-PRECISION APPROACH PROCEDURE: A standard instrument approach procedure in which no electronic glide slope is provided, such as VOR, TACAN, NDB, or LOC.

NOTICE TO AIRMEN: A notice containing information concerning the establishment, condition, or change in any component of or hazard in the National Airspace System, the timely knowledge of which is considered essential to personnel concerned with flight operations.

O

OBJECT FREE AREA (OFA): An area on the ground centered on a runway, taxiway, or taxilane centerline provided to enhance the safety of aircraft operations by having the area free of objects, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes.

OBSTACLE FREE ZONE (OFZ): The airspace below 150 feet above the established airport elevation and along the runway and extended runway centerline that is required to be kept clear of all objects, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function, in order to provide clearance for aircraft landing or taking off from the runway, and for missed approaches.

ONE-ENGINE INOPERABLE SURFACE: A surface emanating from the runway end at a slope ratio of 62.5:1. Air carrier airports are required to maintain a technical drawing of this surface depicting any object penetrations by January 1, 2010.

OPERATION: The take-off, landing, or touch-and-go procedure by an aircraft on a runway at an airport.

OUTER MARKER (OM): An ILS navigation facility in the terminal area navigation system located four to seven miles from the runway edge on the extended centerline, indicating to the pilot that he/she is passing over the facility and can begin final approach.

P

PILOT CONTROLLED LIGHTING: Runway lighting systems at an airport that are controlled by activating the microphone of a pilot on a specified radio frequency.

PRECISION APPROACH: A standard instrument approach procedure which provides runway alignment and glide slope (descent) information. It is categorized as follows:

- **CATEGORY I (CAT I)**: A precision approach which provides for approaches with a decision height of not less than 200 feet and visibility not less than 1/2 mile or Runway Visual Range (RVR) 2400 (RVR 1800) with operative touchdown zone and runway centerline lights.
- **CATEGORY II (CAT II)**: A precision approach which provides for approaches with a decision height of not less than 100 feet and visibility not less than 1200 feet RVR.
- **CATEGORY III (CAT III)**: A precision approach which provides for approaches with minima less than Category II.

PRECISION APPROACH PATH INDICATOR (PAPI): A lighting system providing visual approach slope guidance to aircraft during a landing approach. It is similar to a VASI but provides a sharper transition between the colored indicator lights.

PRECISION APPROACH RADAR: A radar facility in the terminal air traffic control system used to detect and display with a high degree of accuracy the direction, range, and elevation of an aircraft on the final approach to a runway.

PRECISION OBJECT FREE AREA (POFA): An area centered on the extended runway centerline, beginning at the runway threshold and extending behind the runway threshold that is 200 feet long by 800 feet wide. The POFA is a clearing standard which requires the POFA to be kept clear of above ground objects protruding above the runway safety area edge elevation (except for frangible NAVAIDS). The POFA applies to all new authorized instrument approach procedures with less than 3/4 mile visibility.

PRIMARY AIRPORT: A commercial service airport that enplanes at least 10,000 annual passengers.

PRIMARY SURFACE: An imaginary obstruction limiting surface defined in FAR Part 77 that is specified as a rectangular surface longitudinally centered about a runway. The specific dimensions of this surface are a function of the types of approaches existing or planned for the runway.

PROHIBITED AREA: See special-use airspace.

PVC: Poor visibility and ceiling. Used in determining Annual Service Volume. PVC conditions exist when the cloud ceiling is less than 500 feet and visibility is less than one mile.

R

RADIAL: A navigational signal generated by a Very High Frequency Omni-directional Range or VORTAC station that is measured as an azimuth from the station.

REGRESSION ANALYSIS: A statistical technique that seeks to identify and quantify the relationships between factors associated with a forecast.

REMOTE COMMUNICATIONS OUTLET (RCO): An unstaffed transmitter receiver/facility remotely controlled by air traffic personnel. RCOs serve flight service stations (FSSs). RCOs were established to provide ground-to-ground communications between air traffic control specialists and pilots at satellite airports for delivering en route clearances, issuing departure authorizations, and acknowledging instrument flight rules cancellations or departure/ landing times.

REMOTE TRANSMITTER/RECEIVER (RTR): See remote communications outlet. RTRs serve ARTCCs.

RELIEVER AIRPORT: An airport to serve general aviation aircraft which might otherwise use a congested air-carrier served airport.

RESTRICTED AREA: See special-use airspace.

RNAV: Area navigation - airborne equipment which permits flights over determined tracks within prescribed accuracy tolerances without the need to overfly ground-based navigation facilities. Used en route and for approaches to an airport.

RUNWAY: A defined rectangular area on an airport prepared for aircraft landing and takeoff. Runways are normally numbered in relation to their magnetic direction, rounded off to the nearest 10 degrees. For example, a runway with a magnetic heading of 180 would be designated Runway 18. The runway heading on the opposite end of the runway is 180 degrees from that runway end. For example, the opposite runway heading for Runway 18 would be Runway 36 (magnetic heading of 360). Aircraft can takeoff or land from either end of a runway, depending upon wind direction.

RUNWAY ALIGNMENT INDICATOR LIGHT: A series of high intensity sequentially flashing lights installed on the extended centerline of the runway usually in conjunction with an approach lighting system.

RUNWAY DESIGN CODE: A code signifiying the design standards to which the runway is to be built.

RUNWAY END IDENTIFICATION LIGHTING (REIL): Two synchronized flashing lights, one on each side of the runway threshold, which provide rapid and positive identification of the approach end of a particular runway.

RUNWAY GRADIENT: The average slope, measured in percent, between the two ends of a runway.

RUNWAY PROTECTION ZONE (RPZ): An area off the runway end to enhance the protection of people and property on the ground. The RPZ is trapezoidal in shape. Its dimensions are determined by the aircraft approach speed and runway approach type and minima.

RUNWAY REFERENCE CODE: A code signifying the current operational capabilities of a runway and associated taxiway.

RUNWAY SAFETY AREA (RSA): A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway.

RUNWAY VISIBILITY ZONE (RVZ): An area on the airport to be kept clear of permanent objects so that there is an unobstructed line of- site from any point five feet above the runway centerline to any point five feet above an intersecting runway centerline.

RUNWAY VISUAL RANGE (RVR): An instrumentally derived value, in feet, representing the horizontal distance a pilot can see down the runway from the runway end.

S

SCOPE: The document that identifies and defines the tasks, emphasis, and level of effort associated with a project or study.

SEGMENTED CIRCLE: A system of visual indicators designed to provide traffic pattern information at airports without operating control towers.

SHOULDER: An area adjacent to the edge of paved runways, taxiways, or aprons providing a transition between the pavement and the adjacent surface; support for aircraft running off the pavement; enhanced drainage; and blast protection. The shoulder does not necessarily need to be paved.

SLANT-RANGE DISTANCE: The straight line distance between an aircraft and a point on the ground.

SMALL AIRCRAFT: An aircraft that has a maximum certified takeoff weight of up to 12,500 pounds.

SPECIAL-USE AIRSPACE: Airspace of defined dimensions identified by a surface area wherein activities must be confined because of their nature and/or wherein limitations may be imposed upon aircraft operations that are not a part of those activities. Special-use airspace classifications include:

- **ALERT AREA**: Airspace which may contain a high volume of pilot training activities or an unusual type of aerial activity, neither of which is hazardous to aircraft.
- **CONTROLLED FIRING AREA**: Airspace wherein activities are conducted under conditions so controlled as to eliminate hazards to nonparticipating aircraft and to ensure the safety of persons or property on the ground.
- **MILITARY OPERATIONS AREA (MOA)**: Designated airspace with defined vertical and lateral dimensions established outside Class A airspace to separate/segregate certain military activities from instrument flight rule (IFR) traffic and to identify for visual flight rule (VFR) traffic where these activities are conducted.
- **PROHIBITED AREA**: Designated airspace within which the flight of aircraft is prohibited.
- **RESTRICTED AREA**: Airspace designated under Federal Aviation Regulation (FAR) 73, within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Most restricted areas are designated joint use. When not in use by the using agency, IFR/VFR operations can be authorized by the controlling air traffic control facility.
- **WARNING AREA:** Airspace which may contain hazards to nonparticipating aircraft.

STANDARD INSTRUMENT DEPARTURE (SID): A preplanned coded air traffic control IFR departure routing, preprinted for pilot use in graphic and textual form only.

STANDARD INSTRUMENT DEPARTURE PROCEDURES: A published standard flight procedure to be utilized following takeoff to provide a transition between the airport and the terminal area or en route airspace.

STANDARD TERMINAL ARRIVAL ROUTE (STAR): A preplanned coded air traffic control IFR arrival routing, preprinted for pilot use in graphic and textual or textual form only.

STOP-AND-GO: A procedure wherein an aircraft will land, make a complete stop on the runway, and then commence a takeoff from that point. A stop-and-go is recorded as two operations: one operation for the landing and one operation for the takff .

STOPWAY: An area beyond the end of a takeoff runway that is designed to support an aircraft during an aborted takeoff without causing structural damage to the aircraft. It is not to be used for takeoff, landing, or taxiing by aircraft.

STRAIGHT-IN LANDING/APPROACH: A landing made on a runway aligned within 30 degrees of the final approach course following completion of an instrument approach.

T

TACTICAL AIR NAVIGATION (TACAN): An ultrahigh frequency electronic air navigation system which provides suitably-equipped aircraft a continuous indication of bearing and distance to the TACAN station.

TAKEOFF RUNWAY AVAILABLE (TORA):
See declared distances.

TAKEOFF DISTANCE AVAILABLE (TODA):
See declared distances.

TAXILANE: The portion of the aircraft parking area used for access between taxiways and aircraft parking positions.

TAXIWAY: A defined path established for the taxiing of aircraft from one part of an airport to another.

TAXIWAY DESIGN GROUP: A classification of airplanes based on outer to outer Main Gear Width (MGW) and Cockpit to Main Gear (CMG) distance.

TAXIWAY SAFETY AREA (TSA): A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway.

TERMINAL INSTRUMENT PROCEDURES: Published flight procedures for conducting instrument approaches to runways under instrument meteorological conditions.

TERMINAL RADAR APPROACH CONTROL: An element of the air traffic control system responsible for monitoring the en-route and terminal segment of air traffic in the airspace surrounding airports with moderate to high levels of air traffic.

TETRAHEDRON: A device used as a landing direction indicator. The small end of the tetrahedron points in the direction of landing.

THRESHOLD: The beginning of that portion of the runway available for landing. In some instances the landing threshold may be displaced.

TOUCH-AND-GO: An operation by an aircraft that lands and departs on a runway without stopping or exiting the runway. A touch-and go is recorded as two operations: one operation for the landing and one operation for the takff .

TOUCHDOWN: The point at which a landing aircraft makes contact with the runway surface.

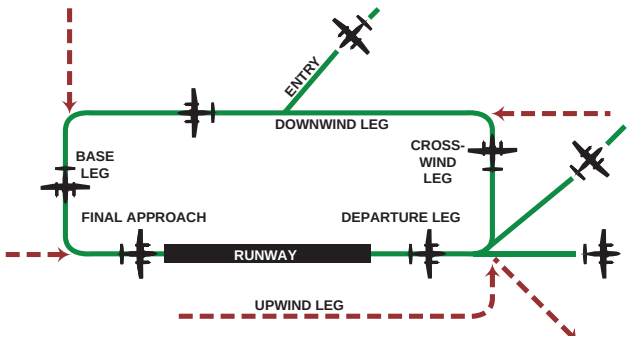
TOUCHDOWN AND LIFT-OFF AREA (TLOF): A load bearing, generally paved area, normally centered in the FATO, on which the helicopter lands or takes off.

TOUCHDOWN ZONE (TDZ): The first 3,000 feet of the runway beginning at the threshold.

TOUCHDOWN ZONE ELEVATION (TDZE): The highest elevation in the touchdown zone.

TOUCHDOWN ZONE (TDZ) LIGHTING: Two rows of transverse light bars located symmetrically about the runway centerline normally at 100- foot intervals. The basic system extends 3,000 feet along the runway.

TRAFFIC PATTERN: The traffic flow that is prescribed for aircraft landing at or taking off from an airport. The components of a typical traffic pattern are the upwind leg, crosswind leg, downwind leg, base leg, and final approach.



U

UNCONTROLLED AIRPORT: An airport without an air traffic control tower at which the control of Visual Flight Rules traffic is not exercised.

UNCONTROLLED AIRSPACE: Airspace within which aircraft are not subject to air traffic control.

UNIVERSAL COMMUNICATION (UNICOM):
A nongovernment communication facility which may provide airport information at certain airports. Locations and frequencies of UNICOM's are shown on aeronautical charts and publications.

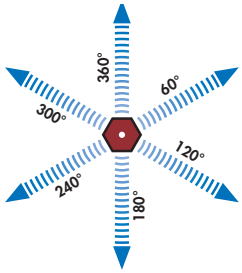
UPWIND LEG: A flight path parallel to the landing runway in the direction of landing. See "traffic pattern."

V

VECTOR: A heading issued to an aircraft to provide navigational guidance by radar.

VERY HIGH FREQUENCY/ OMNIDIRECTIONAL RANGE (VOR): A ground-based electronic navigation aid transmitting very high frequency navigation signals, 360 degrees in azimuth, oriented from magnetic north. Used as the basis for navigation in the national airspace system. The VOR periodically identifies itself by Morse Code and may have an additional voice identification feature.

VERY HIGH FREQUENCY OMNI-DIRECTIONAL RANGE/ TACTICAL AIR NAVIGATION (VORTAC): A navigation aid providing VOR azimuth, TACAN azimuth, and TACAN distance-measuring equipment (DME) at one site.



VICTOR AIRWAY: A control area or portion thereof established in the form of a corridor, the centerline of which is defined by radio navigational aids.

VISUAL APPROACH: An approach wherein an aircraft on an IFR flight plan, operating in VFR conditions under the control of an air traffic control facility and having an air traffic control authorization, may proceed to the airport of destination in VFR conditions.

VISUAL APPROACH SLOPE INDICATOR (VASI): An airport lighting facility providing vertical visual approach slope guidance to aircraft during approach to landing by radiating a directional pattern of high intensity red and white focused light beams which indicate to the pilot that he is on path if he sees red/ white, above path if white/white, and below path if red/red. Some airports serving large aircraft have three-bar VASI's which provide two visual guide paths to the same runway.

VISUAL FLIGHT RULES (VFR): Rules that govern the procedures for conducting flight under visual conditions. The term VFR is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of flight plan.

VISUAL METEOROLOGICAL CONDITIONS: Meteorological conditions expressed in terms of specific visibility and ceiling conditions which are equal to or greater than the threshold values for instrument meteorological conditions.

VOR: See "Very High Frequency Omnidirectional Range Station."

VORTAC: See "Very High Frequency Omnidirectional Range Station/Tactical Air Navigation."

W

WARNING AREA: See special-use airspace.

WIDE AREA AUGMENTATION SYSTEM: An enhancement of the Global Positioning System that includes integrity broadcasts, differential corrections, and additional ranging signals for the purpose of providing the accuracy, integrity, availability, and continuity required to support all phases of flight.

Abbreviations

AC: advisory circular

ADF: automatic direction finder

ADG: airplane design group

AFSS: automated flight service station

AGL: above ground level

AIA: annual instrument approach

AIP: Airport Improvement Program

AIR-21: Wendell H. Ford Aviation Investment and Reform Act for the 21st Century

ALS: approach lighting system

ALSF-1: standard 2,400-foot high intensity approach lighting system with sequenced flashers (CAT I configuration)

ALSF-2: standard 2,400-foot high intensity approach lighting system with sequenced flashers (CAT II configuration)

AOA: Aircraft Operation Area

APV: instrument approach procedure with vertical guidance

ARC: airport reference code

ARFF: aircraft rescue and fire fighting

ARP: airport reference point

ARTCC: air route traffic control center

ASDA: accelerate-stop distance available

ASR: airport surveillance radar

ASOS: automated surface observation station

ATCT: airport traffic control tower

ATIS: automated terminal information service

AVGAS: aviation gasoline - typically 100 low lead (100LL)

AWOS: automatic weather observation station

BRL: building restriction line

CFR: Code of Federal Regulation

CIP: capital improvement program

DME: distance measuring equipment

DNL: day-night noise level

DWL: runway weight bearing capacity of aircraft with dual-wheel type landing gear

DTWL: runway weight bearing capacity of aircraft with dual-tandem type landing gear

FAA: Federal Aviation Administration

FAR: Federal Aviation Regulation

FBO: fixed base operator

FY: fiscal year

GPS: global positioning system

GS: glide slope

HIRL: high intensity runway edge lighting

IFR: instrument flight rules (FAR Part 91)

ILS: instrument landing system

IM: inner marker

LDA: localizer type directional aid

LDA: landing distance available

LIRL: low intensity runway edge lighting

LMM: compass locator at middle marker

LOM: compass locator at outer marker

LORAN: long range navigation

MALS: medium intensity approach lighting system with indicator lights

MIRL: medium intensity runway edge lighting

MITL: medium intensity taxiway edge lighting

MLS: microwave landing system

MM: middle marker

MOA: military operations area

MSL: mean sea level

NAVAID: navigational aid

NDB: nondirectional radio beacon

NM: nautical mile (6,076.1 feet)

NPES: National Pollutant Discharge Elimination System

NPIAS: National Plan of Integrated Airport Systems

NPRM: notice of proposed rule making

ODALS: omnidirectional approach lighting system

OFA: object free area

OFZ: obstacle free zone

OM: outer marker

PAC: planning advisory committee

PAPI: precision approach path indicator

PFC: porous friction course

PFC: passenger facility charge

PCL: pilot-controlled lighting

PIW public information workshop

PLASI: pulsating visual approach slope indicator

POFA: precision object free area

PVASI: pulsating/steady visual approach slope indicator

PVC: poor visibility and ceiling

RCO: remote communications outlet

RRC: Runway Reference Code

RDC: Runway Design Code

REIL: runway end identification lighting

RNAV: area navigation

RPZ: runway protection zone

RSA: runway safety area

RTR: remote transmitter/receiver

RVR: runway visibility range

RVZ: runway visibility zone

SALS: short approach lighting system

SASP: state aviation system plan

SEL: sound exposure level

SID: standard instrument departure

SM: statute mile (5,280 feet)

SRE: snow removal equipment

SSALF: simplified short approach lighting system with runway alignment indicator lights

STAR: standard terminal arrival route

SWL: runway weight bearing capacity for aircraft with single-wheel tandem type landing gear

TACAN: tactical air navigational aid

TAF: Federal Aviation Administration (FAA) Terminal Area Forecast

TDG: Taxiway Design Group

TLOF: Touchdown and lift-off

TDZ: touchdown zone

TDZE: touchdown zone elevation

TODA: takeoff distance available

TORA: takeoff runway available

TRACON: terminal radar approach control

VASI: visual approach slope indicator

VFR: visual flight rules (FAR Part 91)

VHF: very high frequency

VOR: very high frequency omni-directional range

VORTAC: VOR and TACAN collocated

McAllen International Airport

Appendix B

FAA Forecast Approval Letter

U.S. Department
of Transportation
Federal Aviation Administration

Federal Aviation Administration
Southwest Region, Airports Division
Texas Airports District Office3

FAA-ASW 650
10101 Hillwood Parkway
Fort Worth, Texas 76177

May 16, 2018

McAllen-Miller International Airport
Ms. Elizabeth Suarez
Director of Aviation
2500 S. Bicentennial Blvd
McAllen, TX 78503

Dear Ms. Suarez:

Subject: **Aviation Forecast Approval McAllen-Miller International Airport, McAllen, Texas**

The Federal Aviation Administration (FAA) has reviewed the Aviation Forecasts submitted by McAllen-Miller International Airport on March 19, 2018, as originally developed and contained in the March 2018 draft Aviation Demand Forecast Chapter as part of the Airport Master Plan Update for McAllen-Miller International Airport. Forecasted enplanements and airport operations versus actual/TAF are summarized below:

Year	Actual/TAF Enplanements	Forecast Enplanements	Actual/TAF Total OPS	Forecast Total OPS
2016	364,890	365,928	56,135	57,236
2021	401,567	435,000	56,585	59,630
2026	445,474	487,000	57,765	63,620
2031	495,178	540,555	59,117	66,896

We have reviewed the Update of the Aviation Demand Forecast to ensure they are realistic, supported by information in the study, and are in reasonable close conformance with the FAA Terminal Area Forecasts (TAF). We have no objection to the forecasts and have determined they are considered acceptable by this office. For your information, this office will provide your forecasts to the FAA Headquarters Planning Office during the next annual TAF update cycle (September 2018) so that the TAF will be updated to reflect your current forecasts. If you have any questions, please call me at 817-222-5682.

Sincerely,

Sarah Conner
Program Manager
Texas Airports District Office

cc: Roman Pinon

McAllen International Airport

Appendix C

Airport Layout Plans

As part of this Master Plan, the Federal Aviation Administration (FAA) requires the development of Airport Layout Plan (ALP) drawings detailing specific parts of the airport and its environs. The ALP drawings are created on a computer-aided drafting (CAD) system and serve as the official depiction of the current and planned condition of the airport. The ALP drawings are reviewed by the FAA from a technical perspective to be sure all applicable federal regulations are met. The FAA use the ALP as the basis for justification for funding decisions.

It should be noted that the FAA requires any changes to the airfield (i.e., runway and taxiway system, navigational aids, etc.) be presented on the ALP. The landside configuration developed during the master planning process is also depicted on the ALP, but the FAA recognizes that landside development is much more fluid and dependent upon developer needs. Thus, an updated ALP set is typically not necessary for future landside development.

The five primary functions of the ALP that define its purpose are provided in Advisory Circular (AC) 150/5070-6B, *Airport Master Plans*, as follows:

1) An ALP creates a blueprint for airport development by depicting proposed facility improvements. The ALP provides a guideline by which the airport sponsor can ensure that development maintains airport design standards and safety requirements and is consistent with airport and community land use plans.

2) The ALP is a public document that serves as a record of aeronautical requirements, both present and future, and as a reference for community deliberations on land use proposals and budget resource planning.

3) The approved ALP enables the airport sponsor and the FAA to plan for facility improvements at the airport. It also allows the FAA to anticipate budgetary and procedural needs. The approved ALP will also allow the FAA to protect the airspace required for facility or approach procedure improvements.

4) The ALP can be a working tool for the airport sponsor, including its development and maintenance staff.

5) An approved ALP is necessary for the airport to receive financial assistance under the terms of the *Airport and Airway Improvement Act of 1982*, as amended, and to be able to impose and use Passenger Facility Charges. An airport must keep its ALP current and follow that plan because those are grant assurance requirements of the Airport Improvement Program (AIP) and previous airport development programs, including the 1970 *Airport Development Aid Program* (ADAP) and *Federal Aid Airports Program* (FAAP) of 1946, as amended.

The FAA requires that any planned changes to the airfield (i.e., runway and taxiway system, etc.) be represented on the drawings. However, the ALP drawing set is not intended to provide design engineering accuracy.

AIRPORT LAYOUT PLAN DRAWING SET

The ALP drawing set for the Airport Master Plan includes several technical drawings which depict various aspects of the current and future layout of the airport. The following is a description of the ALP drawings included with this Airport Master Plan.

AIRPORT LAYOUT DRAWING

An official airport layout drawing (ALD) has been developed for McAllen International Airport, which is included in this appendix. The ALD graphically presents the existing and future airport facilities and layout plan. The ALD drawing includes, but is not limited to, such elements as the physical airport features, wind data tabulation, location of airfield facilities (i.e., runways, taxiways, navigational aids), and landside development. Also presented on the ALD are the runway safety areas, airport property boundary, and revenue support areas.

The computerized plan provides detailed information on existing and future facility layouts on multiple layers that permit the user to focus on any section of the airport at a desired scale. The plan can be used as base information for subsequent planning and design efforts, and can be easily updated in the future to reflect new development and more detail concerning existing conditions as made available through design surveys.

FAR PART 77 AIRPORT AIRSPACE DRAWING

Federal Aviation Regulation (F.A.R.) Part 77, *Objects Affecting Navigable Airspace*, was established for use by local authorities to control the height of objects near airports. The FAR Part 77 Airport Airspace drawing included in this Airport Master Plan is a graphic depiction of this regulatory criterion. The FAR Part 77 Airport Airspace drawing is a tool to aid local authorities in determining if proposed development could present a hazard to aircraft using the airport. The FAR Part 77 Airport Airspace drawing can be a critical tool for the airport sponsor's use in reviewing proposed development near the airport.

The FAR Part 77 Airport Airspace drawing assigns three-dimensional imaginary surfaces associated with the airport. These imaginary surfaces emanate from the runway centerline(s) and are dimensioned according to the visibility minimums associated with the approach to the runway end and size of aircraft to operate on the runway. The FAR Part 77 imaginary surfaces include the primary surface, approach surface, transitional surface, horizontal surface, and conical surface.

The airport sponsor should do all in their power to ensure development stays below the FAR Part 77 surfaces to protect the role of the airport. The drawing includes a table detailing the penetrations to any of the FAR Part 77 surfaces. A recommended action or disposition is also presented for each penetration. This drawing is based on the planned future condition of the Airport.

Penetrations of the FAR Part 77 surfaces indicate an obstruction. Once an obstruction is identified, the FAA determines if the obstruction is a hazard to air navigation. When an obstruction is determined to be a hazard, a variety of actions can be taken to mitigate the hazard. The table included on the drawing presents a recommended action or disposition; however, the FAA is responsible to make the final determination as to what course of action should be taken. Potential mitigating measures include removing the hazard, lowering the hazard, adding an obstruction light, increasing instrument approach visibility minimums, or displacing runway landing thresholds. The following discussion will describe those surfaces that make up the recommended FAR Part 77 surfaces.

Primary Surface: The Primary Surface is longitudinally centered on the runways and extends 200 feet beyond each runway end. The elevation of any point on the Primary Surface is the same as the elevation along the nearest associated point on the runway centerline. The Primary Surface for Runway 14-32 is 1,000 feet wide as centered on the runway and 250 feet wide for Runway 18-36. The Primary Surface for the ultimate parallel runway (Runway 14R-32L) is also 1,000 feet wide.

Approach Surface: An Approach Surface is also established for each runway end. The Approach Surface begins at the end of the Primary Surface, extends upward and outward, and is centered along an extended runway centerline. The dimensions of the Approach Surface leading to each runway are based upon the type of instrument approach available (instrument or visual) or planned.

Runways 14 and 32 are equipped with a precision instrument landing system (ILS); therefore, the Approach Surface extends a horizontal distance of 10,000 feet at a 50:1 slope with an additional 40,000 feet at a slope of 40:1. The outer width of the Approach Surface is 16,000 feet. The ultimate parallel runway ends (14R and 32L) are also planned for precision approaches with the same approach surface

dimensions. As a visual-only runway, the Approach Surfaces to Runways 18 and 36 have an outer width of 1,500 feet and extend a horizontal distance of 5,000 feet at a 20:1 slope.

Transitional Surface: Each runway has a Transitional Surface that begins at the outside edge of the Primary Surface at the same elevation as the runway. The Transitional Surface also connects with the Approach Surfaces of runways with a precision approach, such as Runways 14 and 32. The Transitional Surface rises at a slope of 7:1, up to a height 150 feet above the highest runway elevation. At that point, the Horizontal Surface begins where the Transitional Surface ends.

Horizontal Surface: The Horizontal Surface is established at 150 feet above the highest elevation of the runway surface. Having no slope, the Horizontal Surface connects the Transitional and Approach Surfaces to the Conical Surface at a distance of 10,000 feet from the end of the Primary Surfaces of each runway.

Conical Surface: The Conical Surface begins at the outer edge of the Horizontal Surface. The Conical Surface then continues for an additional 4,000 feet horizontally at a slope of 20:1. Therefore, at 4,000 feet from the Horizontal Surface, the elevation of the Conical Surface is 350 feet above the highest airport elevation.

INNER APPROACH SURFACE DRAWING

The Inner Approach Surface drawing provides greater detail of penetrations to the Approach Surface and the Obstacle Clearance Surface (OCS) within a few thousand feet of the runway end. Any penetrations are documented in the obstruction table. The obstruction table includes a description of the object, its top elevation, the depth of penetration, and a recommended disposition to mitigate the penetration.

TERMINAL AREA PLAN DRAWING

The Terminal Area Plan drawing presents a large-scale depiction of areas with significant terminal facility development. This drawing is an enlargement of a portion of the ALP. The drawing includes the landside facility areas as well as the supporting infrastructure, including access roads and parking facilities. The terminal area drawings include a listing of all airport buildings and identifies the aircraft apron areas.

AIRPORT LAND USE DRAWING

The objective of the Airport Land Use drawing is to coordinate uses of the airport property in a manner compatible with the functional design of the airport facility. Airport land use planning is important for orderly development and efficient use of available space. There are two primary considerations for airport land use planning, which are to secure those areas essential to the safe and efficient operation of the airport and to determine compatible land uses for the balance of the property which would be most advantageous to the airport and community.

DEPARTURE SURFACE DRAWING

For runways supporting instrument operations, a separate drawing depicting the Departure Surface is required. The Departure Surface, when clear, allows pilots to follow standard departure procedures. The Departure Surface emanates from the departure end of the runway to a distance of 10,200 feet. The inner width is 1,000 feet and the outer width is 6,466 feet. The slope of the Departure Surface is 40:1.

Obstacles frequently penetrate the Departure Surface. Where object penetrations exist, the departure procedure can be adjusted by:

a) Non-standard climb rates, and/or
b) Non-standard (higher) departure minimums.

Therefore, it is important for the airport sponsor to identify and remove Departure Surface obstacles whenever possible in order to enhance takeoff operations at the airport. The airport sponsor should also prevent any new obstacles from developing.

AIRPORT PROPERTY MAP

The Airport Property Map provides a drawing depicting the airport property boundary, the various tracts of land that were acquired to develop the airport, the method of acquisition, and other information on the property under airport control that is subject to FAA grant assurances. The various recorded deeds that make up the airport property are listed in tabular format. The primary purpose of the drawing is to provide information for analyzing the current and future aeronautical use of land acquired with federal funds.

AIRPORT LAYOUT PLAN

McAllen International Airport (MFE)

McAllen, Texas

INDEX OF DRAWINGS

1. TITLE SHEET
2. AIRPORT DATA
3. EXISTING AIRPORT LAYOUT DRAWING
4. ULTIMATE AIRPORT LAYOUT DRAWING
5. AIRPORT AIRSPACE DRAWING CONICAL SURFACE
6. AIRPORT AIRSPACE DRAWING RUNWAY 14
7. AIRPORT AIRSPACE DRAWING RUNWAY 32
8. RUNWAY 14L APPROACH SURFACE PROFILE
9. RUNWAY 32R APPROACH SURFACE PROFILE
10. RUNWAY 14R APPROACH SURFACE PROFILE
11. RUNWAY 32L APPROACH SURFACE PROFILE
12. RUNWAY 18 APPROACH SURFACE DRAWING
13. RUNWAY 36 APPROACH SURFACE DRAWING
14. INNER PORTION OF RUNWAY 14L APPROACH SURFACE DRAWING
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16. INNER PORTION OF RUNWAY 14R APPROACH SURFACE DRAWING
17. INNER PORTION OF RUNWAY 32L APPROACH SURFACE DRAWING
18. TERMINAL AREA DRAWING
19. AIRPORT LAND USE DRAWING
20. RUNWAY 14L-32R DEPARTURE SURFACE DRAWING
21. RUNWAY 14R-32L DEPARTURE SURFACE DRAWING
22. EXHIBIT A AIRPORT PROPERTY MAP

FAA APPROVAL STAMP

FOR APPROVAL BY

Airport Manager: Elizabeth Suarez DATE:

TRUE NORTH

Magnetic Declination
4° 5' East (April 2018)
Annual Rate of Change 0° 7' West

0 100 200 300
SCALE IN FEET

NO.	REVISIONS	DATE	BY	APP'D.
1	-	—	—	—
2	-	—	—	—

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McAllen International Airport

TITLE SHEET

DRAFT

McAllen, Texas

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Larry D. Johnson
APPROVED BY: Mike W. Dmyterko

May 2019 SHEET 1 OF 22

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AIRPORT DATA		
OWNER: City of McAllen, Texas	CITY: McAllen, Texas	COUNTY: Hidalgo, Tx
McAllen International Airport (MFE)	**EXISTING**	**ULTIMATE**
AIRPORT REFERENCE CODE (ARC)	D-IV	SAME
MEAN MAXIMUM TEMPERATURE OF HOTTEST MONTH	98.1° F (August)	SAME
AIRPORT ELEVATION (NAVD 88)	107.2' MSL	SAME
AIRPORT NAVIGATIONAL AIDS	ILS or LOC (14)	ILS or LOC (14L, 32R)
	ILS or LOC (32)	ILS or LOC (14R, 32L)
	RNAV GPS (LPV) (14)	RNAV GPS (LPV) (14L, 32R)
	RNAV GPS (LPV) (32)	RNAV GPS (LPV) (14R, 32L)
	VOR/DME (14, 32)	VOR/DME (14L, 32R)
	HIRL, PAPI, MALSR	HIRL
	MIRL, REIL, VASI	PAPI, MALSR
AIRPORT REFERENCE POINT (ARP)	Latitude 26° 10' 33.00" N	Latitude 26° 10' 02.63" N
COORDINATES (NAD 83)	Longitude 98° 14' 19.00" W	Longitude 98° 14' 02.04" W
MISCELLANEOUS FACILITIES	ATCT	SAME
	Rotating Beacon	SAME
	MITL	SAME
	ASOS	SAME
	Lighted Windcone	SAME
DESIGN CRITICAL AIRCRAFT	D-IV-5	SAME
DESIGN CRITICAL AIRCRAFT TYPE	B 737-800/900, B757-200	B 737-800/900, B 767-300F
WINGSPAN OF DESIGN AIRCRAFT (FEET)	134.75'	156.1'
APPROACH SPEED OF DESIGN AIRCRAFT (KNOTS)	142 Knots	SAME
UNDERCARRIAGE WIDTH OF DESIGN AIRCRAFT (FEET)	28' MGW	35.8' MGW
MAGNETIC DECLINATION	4° 5' East (April 2018)	SAME
SOURCE: https://www.ngdc.noaa.gov/geomag-web/	Annual Rate of Change 0° 7' West	SAME
NPIAS CODE	Commercial Service (P)	SAME
STATE SYSTEM PLAN ROLE	Regional Airport	SAME

RUNWAY DATA TABLE		RUNWAY 14-32				RUNWAY 18-36			RUNWAY 14R-32L		
		EXISTING		ULTIMATE		EXISTING		ULTIMATE	EXISTING	ULTIMATE	
RUNWAY IDENTIFICATION		14	32	14L	32R	18	36	To Be Closed	N/A	14R	32L
RUNWAY DESIGN CODE (RDC)		D-IV-2400		D-IV-2400		A-I-VIS		N/A	N/A	D-IV-2400	
APPROACH REFERENCE CODE (APRC)		D/IV/2400, D/V/2400		D/IV/2400, D/V/2400		B/I(S)/VIS		N/A	N/A	D/IV/2400, D/V/2400	
DEPARTURE REFERENCE CODE (DPRC)		D/IV, D/V		D/IV, D/V		B/I(S)		N/A	N/A	D/IV, D/V	
RUNWAY SURFACE MATERIAL		Asphalt		Asphalt		Asphalt		N/A	N/A	Asphalt	
RUNWAY PAVEMENT STRENGTH WHEEL (IN THOUSAND LBS. #1)		90 (S), 190 (D), 280 (2D)		90 (S), 190 (D), 280 (2D)		12.5 (S)		N/A	N/A	90 (S), 190 (D), 280 (2D)	
RUNWAY PAVEMENT STRENGTH PCN		N/A		N/A		N/A		N/A	N/A	N/A	
RUNWAY PAVEMENT SURFACE TREATMENT		Grooved		Grooved		Grooved		N/A	N/A	Grooved	
RUNWAY EFFECTIVE GRADIENT (in percent)		0.1%		0.0%		0.3%		N/A	N/A	0.0%	
RUNWAY WIND COVERAGE (20 knots/23 mph)		99.93%		99.93%		99.72%		N/A	N/A	99.93%	
RUNWAY DIMENSIONS (L x W)		7,120' x 150'		10,331' x 150'		2,638' x 60'		To Be Closed	N/A	8,000' x 150'	
RUNWAY DISPLACED THRESHOLD		137'	None	137'	None	None	None	N/A	N/A	None	None
RUNWAY SAFETY AREA (Standard Beyond Runway End)		1000' x 500'	1000' x 500'	1000' x 500'	1000' x 500'	240' x 120'	240' x 120'	N/A	N/A	1000' x 500'	1000' x 500'
RUNWAY SAFETY AREA (Actual L x W)		8,718" x 500'		11,929' x 500'		3,118' x 120'		N/A	N/A	10,000' x 500'	
RUNWAY END COORDINATES (NAD 83)	LAT	26° 10' 58.5395" N	26° 10' 4.0671" N	Same	26° 9' 39.504" N	26° 10' 50.5618" N	26° 10' 24.7345" N	To Be Closed	N/A	26° 10' 12.353" N	26° 9' 11.146" N
	LONG	98° 14' 46.7803" W	98° 13' 57.1506" W	Same	98° 13' 34.768" W	98° 14' 8.6940" W	98° 14' 13.0787" W	To Be Closed	N/A	98° 14' 18.901" W	98° 13' 23.146" W
RUNWAY LIGHTING		HIRL		HIRL		MIRL		N/A	N/A	HIRL	
RUNWAY PROTECTION ZONE DIMENSIONS		1000' x 2500' x 1750'	1000' x 1700' x 1510'	1000' x 2500' x 1750'	1000' x 2500' x 1750'	250' x 1000' x 450'	250' x 1000' x 450'	N/A	N/A	1000' x 2500' x 1750'	1000' x 2500' x 1750'
RUNWAY MARKING		Precision	Precision	Precision	Precision	Basic	Basic	N/A	N/A	Precision	Precision
14 CFR PART 77 APPROACH SLOPE		50:1/40:1	50:1/40:1	50:1/40:1	50:1/40:1	20:1	20:1	N/A	N/A	50:1/40:1	50:1/40:1
14 CFR PART 77 APPROACH CATEGORY/TYPE		Precision [PIR]	Precision [PIR]	Precision [PIR]	Precision [PIR]	Visual [AV]	Visual [AV]	N/A	N/A	Precision [PIR]	Precision [PIR]
VISIBILITY MINIMUMS		1/2 mile	3/4 mile	1/2 mile	1/2 mile	Visual	Visual	N/A	N/A	1/2 mile	1/2 mile
TYPE OF AERONAUTICAL SURVEY REQUIRED FOR APPROACH		VGS	VGS	VGS	VGS	NVGS	NVGS	N/A	N/A	VGS	VGS
DEPARTURE SURFACE (YES/NO)		Yes	Yes	Yes	Yes	No	No	N/A	N/A	Yes	Yes
OBJECT FREE AREA (Standard Beyond Runway End)		1000' x 800'	1000' x 800'	1000' x 800'	1000' x 800'	240' x 250'	240' x 250'	N/A	N/A	1000' x 800'	1000' x 800'
OBJECT FREE AREA (Actual L x W)		8,676' x 800'		11,867' x 800'		3,118' x 250'		N/A	N/A	10,000' x 800'	
OBSTACLE FREE ZONE (Standard Beyond Runway End)		200' x 400'	200' x 400'	200' x 400'	200' x 400'	200' x 250'	200' x 250'	N/A	N/A	200' x 400'	200' x 400'
OBSTACLE FREE ZONE (Actual L x W)		7,520' x 400'		10,731' x 400'		3,038' x 250'		N/A	N/A	8,400' x 400'	
OBSTACLE CLEARANCE SURFACE (EB 99, updated 2018)		Rw Type 5	Rw Type 4	Rw Type 5	Rw Type 5	Rw Type 2	Rw Type 2	N/A	N/A	Rw Type 5	Rw Type 5
INSTRUMENT APPROACH PROCEDURES		ILS or LOC	ILS or LOC	ILS or LOC	ILS or LOC	None	None	To Be Closed	N/A	ILS or LOC	ILS or LOC
		RNAV GPS	RNAV GPS	RNAV GPS	RNAV GPS					RNAV GPS	RNAV GPS
		VOR	VOR	VOR	VOR						
RUNWAY VISUAL NAVIGATIONAL AIDS		MALSR	VASI-4	MALSR	MALSR	PAPI-2	None	To Be Closed	N/A	MALSR	MALSR
			REIL	PAPI-4	PAPI-4					PAPI-4	PAPI-4
TOUCHDOWN ZONE ELEVATION (TDZE)		107.2' MSL	101.6' MSL	107.2' MSL	100' MSL	103.7' MSL	103.7' MSL	N/A	N/A	90' MSL	90' MSL
TAXIWAY CENTERLINE TO FIXED OR MOVABLE OBJECT		129.5'		129.5'		44.5'		N/A	N/A	129.5'	
VERTICAL DATUM		NAVD 88		NAVD 88		NAVD 88		N/A	N/A	NAVD 88	
HORIZONTAL DATUM		NAD 83		NAD 83		NAD 83		N/A	N/A	NAD 83	

1 PAVEMENT STRENGTHS ARE EXPRESSED IN SINGLE (S), DUAL (D), DUAL TANDEM (2D) WHEEL LOAD CAPACITIES

TAXIWAY DATA																								
						EXISTING						PROPOSED												
	STANDARD TDG PER CRITICAL		PARALLEL TAXIWAYS			ENTRANCE / EXIT TAXIWAYS						ENTRANCE / EXIT TAXIWAYS												
	EXISTING	ULTIMATE	EXISTING		ULTIMATE																			
Taxiway Designation			A	C	B	A1	A3	A4	C1	C2	D	A1	A2	A3	A4	A6	A7	A9	B5	B6	B7	B8	B10	B11
Taxiway Design Group (TDG)	ADG IV / 5	ADG IV / 5	TDG 5	TDG 2	TDG 5	TDG 5	TDG 5	TDG 5	TDG 5	TDG 1	TDG 4	TDG 5	TDG 5	TDG 5	TDG 5	TDG 5	TDG 5	TDG 5	TDG 5	TDG 5	TDG 5	TDG 5	TDG 5	TDG 5
Taxiway Width	75'	75'	75	40'	75'	130'	130'	130'	75'	30'	50'	115'	130'	130'	75'	130'	100'	75'	75'	75'	75'	75'	75'	75'
Taxiway Edge Safety Margin	15'	15'	15'	10'	15'	15'	15'	15'	15'	5'	10'	15'	15'	15'	15'	15'	15'	15'	15'	15'	15'	15'	15'	15'
Taxiway Shoulder Width	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None
Taxiway Safety Area (TSA)	171'	171'	171'	79'	171'	171'	171'	171'	171'	49'	171'	171'	171'	171'	171'	171'	171'	171'	171'	171'	171'	171'	171'	171'
Taxiway object Free Area (TOFA)	259'	259'	259'	118'	259'	259'	259'	259'	259'	89'	259'	259'	259'	259'	259'	259'	259'	259'	259'	259'	259'	259'	259'	259'
Object Located in TSA/TOFA	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None
Distance to Object from Centerline	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Taxiway Lighting	MITL	MITL	MITL	MITL	MITL	MITL	MITL	MITL	MITL	MITL	MITL	MITL	MITL	MITL	MITL	MITL	MITL	MITL	MITL	MITL	MITL	MITL	MITL	MITL

* Taxiway/Taxilane To Be Closed

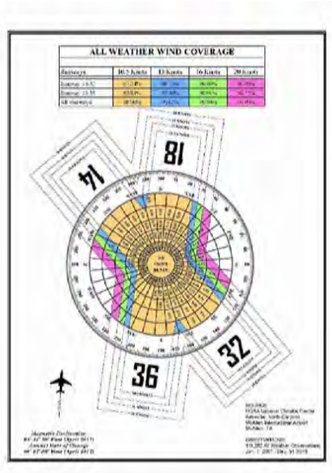
TAXILANE DATA		
	STANDARD	PROPOSED
Taxilane Designation	None	None
Airplane Design Group (ADG)	ADG I	None
Taxilane Width	20'	None
TSA (Actual / Standard)	49'	None
TOFA (Actual / Standard)	79'	None
Objects Located in TSA/TOFA	None	None
Distance to Object from Centerline	N/A	None
Leasehold Ownership	Airport	None

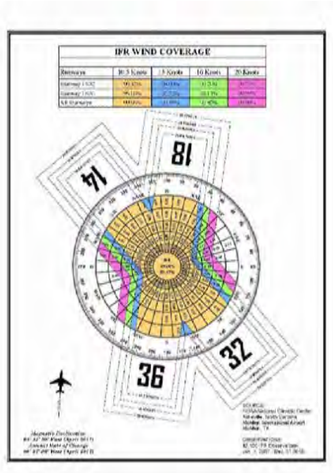
* Taxilane To Be Closed

AIRPORT NAVAID (Owned by FAA)
None

RUNWAY DECLARED DISTANCE	EXISTING		ULTIMATE		EXISTING		ULTIMATE		EXISTING		ULTIMATE	
	14	32	14L	32R	18	36	18	36	14R	32L	14R	32L
TAKE OFF RUN AVAILABLE (TORA)	7,120	7,120	10,331'	10,331'	2,638'	2,638'	To Be Closed		N/A	N/A	8,000'	8,000'
TAKEOFF DISTANCE AVAILABLE (TODA)	7,120	7,120	10,331'	10,331'	2,638'	2,638'	N/A	N/A	N/A	N/A	8,000'	8,000'
ACCELERATE-STOP DISTANCE AVAILABLE (ASDA)	7,120	7,120	10,331'	10,331'	2,638'	2,638'	N/A	N/A	N/A	N/A	8,000'	8,000'
LANDING DISTANCE AVAILABLE (LDA)	6,983	7,120	10,194'	10,331'	2,638'	2,638'	N/A	N/A	N/A	N/A	8,000'	8,000'

MODIFICATIONS FROM FAA AIRPORT DESIGN STANDARDS			
MODIFICATION DESCRIPTION	EFFECTED DESIGN STANDARD	STANDARD MODIFIED	PROPOSED DISPOSITION
RSA at Runway 14 End	Road 820' from runway end	RSA 1000' x 500'	No Action, Existing EMAS 383.5' x 170'
ROFA at Runway 14 End	Ditch 682' from runway end	ROFA 1000' x 800'	No Action, Existing EMAS 383.5' x 170'





GENERAL NOTES:

1. Depiction of features and objects, including related elevations and clearances, within the Federal Aviation Regulations (FAR) Part 77 Approach Surface are depicted on the INNER PORTION OF RUNWAY APPROACH SURFACE DRAWINGS.
2. Details concerning terminal improvements are depicted on the TERMINAL AREA DRAWING.
3. Vertical Datum NAVD 88 and Horizontal Datum NAD 83.
4. Airport and Runway Data general information site. http://webdatasheet.faa.gov/

TRUE NORTH

Magnetic Declination
4° 5' East (April 2018)
Annual Rate of Change 0° 7' West

0 100 200 300
SCALE IN FEET

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McAllen International Airport

AIRPORT DATA

DRAFT

McAllen, Texas

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Larry D. Johnson
APPROVED BY: Mike W. Dmyterko

May 2019 | SHEET 2 OF 22

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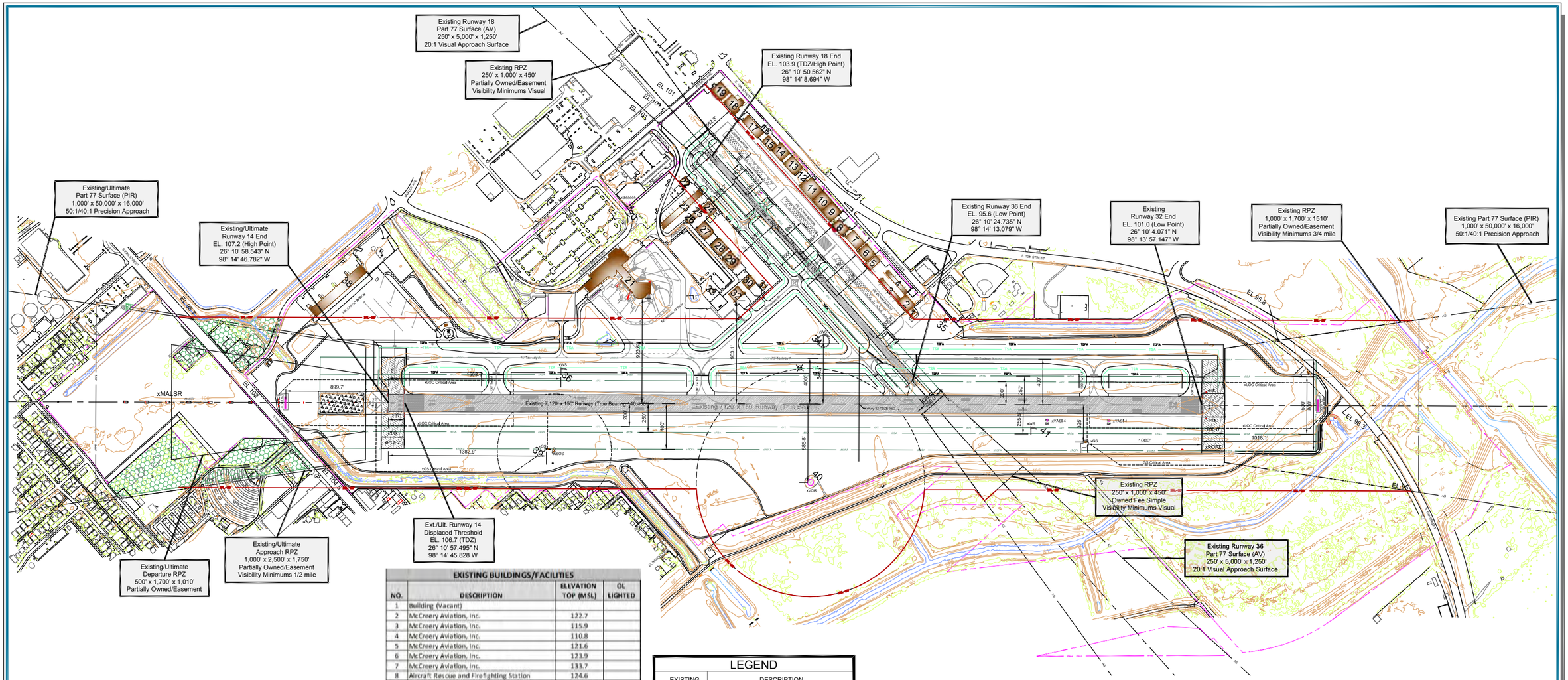


EXISTING BUILDINGS/FACILITIES

NO.	DESCRIPTION	ELEVATION TOP (MSL)	OL LIGHTED
1	Building (Vacant)		
2	McCreery Aviation, Inc.	122.7	
3	McCreery Aviation, Inc.	115.9	
4	McCreery Aviation, Inc.	110.8	
5	McCreery Aviation, Inc.	121.6	
6	McCreery Aviation, Inc.	123.9	
7	McCreery Aviation, Inc.	133.7	
8	Aircraft Rescue and Firefighting Station	124.6	
9	FNBG Financial Group, LP	125.3	
10	FNBG Financial Group, LP	130.8	
11	McCreery Aviation, Inc.	129	
12	Wash Rack		
13	McCreery Aviation, Inc.	131.8	
14	McCreery Aviation, Inc.	131.7	
15	McCreery Aviation, Inc.	135.3	
16	Fuel Farm		
17	McCreery Aviation, Inc.	138.1	
18	McCreery Aviation, Inc.	131.4	
19	McCreery Aviation, Inc.	131.4	
20	Airport Rotating Beacon	160.5	NO
21	Terminal/Administration Building	173.6	
22	Rio Grande Railcar, LLC	127.8	
23	Craftech Enterprises, Inc.	126.5	
24	Walter J. Passmore	127.7	
25	MFE Aviation, LLC	119.5	
	U.S. DHS CBP Air and Marine Facilities		
26	Thomas Michael Stanton Dba Western Flyers	121.3	
27	Thomas Michael Stanton Dba Western Flyers	129.3	
28	Thomas Michael Stanton Dba Western Flyers	143.8	
29	Thomas Michael Stanton Dba Western Flyers	126.9	
30	Freedom Aero, LLC	128.4	
31	Electrical Vault	121.6	
32	Mayfair Properties, LLC	129.4	
33	Airport Traffic Control Tower (ATCT)	173.7	OL
34	Segmented Circle/Windsock	112.4	
35	Fuel Tanks (McCreery Aviation)	107.7	
36	Windsock	106.3	OL
37	Fuel Tanks	115.8	
38	Air Cargo Facility	138.3	
39	ASOS	130.6	
40	VOR	126.7	OL
41	Windsock	102.1	OL

LEGEND

EXISTING	DESCRIPTION
	AIRPORT PROPERTY LINE
	AIRPORT REFERENCE POINT (ARP)
	AIRPORT ROTATING BEACON
	BUILDING / MISC. FACILITIES
	DRAINAGE
	PAVEMENT
	FENCING (up to 10 AGL)
xPAPI-4	NAVIGATIONAL AID INSTALLATION (PAPI)
	RUNWAY THRESHOLD LIGHTS and REIL
	SECTION CORNER
	SEGMENTED CIRCLE/WIND INDICATOR
	TOPOGRAPHY (NAVD 88)
	HOLDING POSITION MARKING
	ROAD and PARKING
TOFA	TAXIWAY OBJECT FREE AREA
TSA	TAXIWAY SAFETY AREA
Extd OFA	EXTENDED OBJECT FREE AREA
xOFZ	RUNWAY OBSTACLE FREE ZONE
xRSA	RUNWAY SAFETY AREA
xOFA	RUNWAY OBJECT FREE AREA
	RUNWAY PROTECTION ZONE
BRL	BUILDING RESTRICTION LINE (BRL)
AS	PART 77 APPROACH SURFACE
xVASI-4	NAVIGATIONAL AID INSTALLATION (VASI)
	AWOS
xLOC	LOCALIZER CRITICAL AREA
xGS	GLIDE SLOPE CRITICAL AREA
	LOCALIZER ANTENNA
	GLIDE SLOPE ANTENNA
	MALSR APPROACH LIGHT SYSTEM
	PRECISION OBSTACLE FREE ZONE (POFZ)
	TIE-DOWNS
N/A	RUNWAY SHADE
	TREES
N/A	ISLAND (PAVEMENT MARKING)
	WIND INDICATOR/WINDSOCK (WS)
	EASEMENT

GENERAL NOTES:

1. Depiction of features and objects, including related elevations and clearances, within the RPZ are depicted on the INNER PORTION OF RUNWAY APPROACH SURFACE DRAWINGS.
2. Details concerning terminal improvements depicted on the TERMINAL AREA DRAWING.
3. Recommended land uses within the airport environs are depicted on the AIRPORT LAND USE DRAWING.
4. NAVD 88 Datum was used for all vertical elevations and NAD 83 for all horizontal elevations.
5. EB-99 Obstacle Clearance Surfaces (Threshold Siting Surface) are depicted on the INNER PORTION OF RUNWAYAPPROACH SURFACE DRAWINGS.

FAA APPROVAL STAMP

Magnetic Declination
4° 5' East (April 2018)
Annual Rate of Change 0° 7' West

0 400 800 1200
SCALE IN FEET

FOR APPROVAL BY:

Airport Manager: Elizabeth Suarez DATE:

FAA APPROVAL STAMP

NO.	REVISIONS	DATE	BY	APP'D.
1	-			
2	-			

"THE PREPARATION OF THESE DOCUMENTS WAS FINANCED IN PART THROUGH A GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, AS AMENDED. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THESE DOCUMENTS BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS."

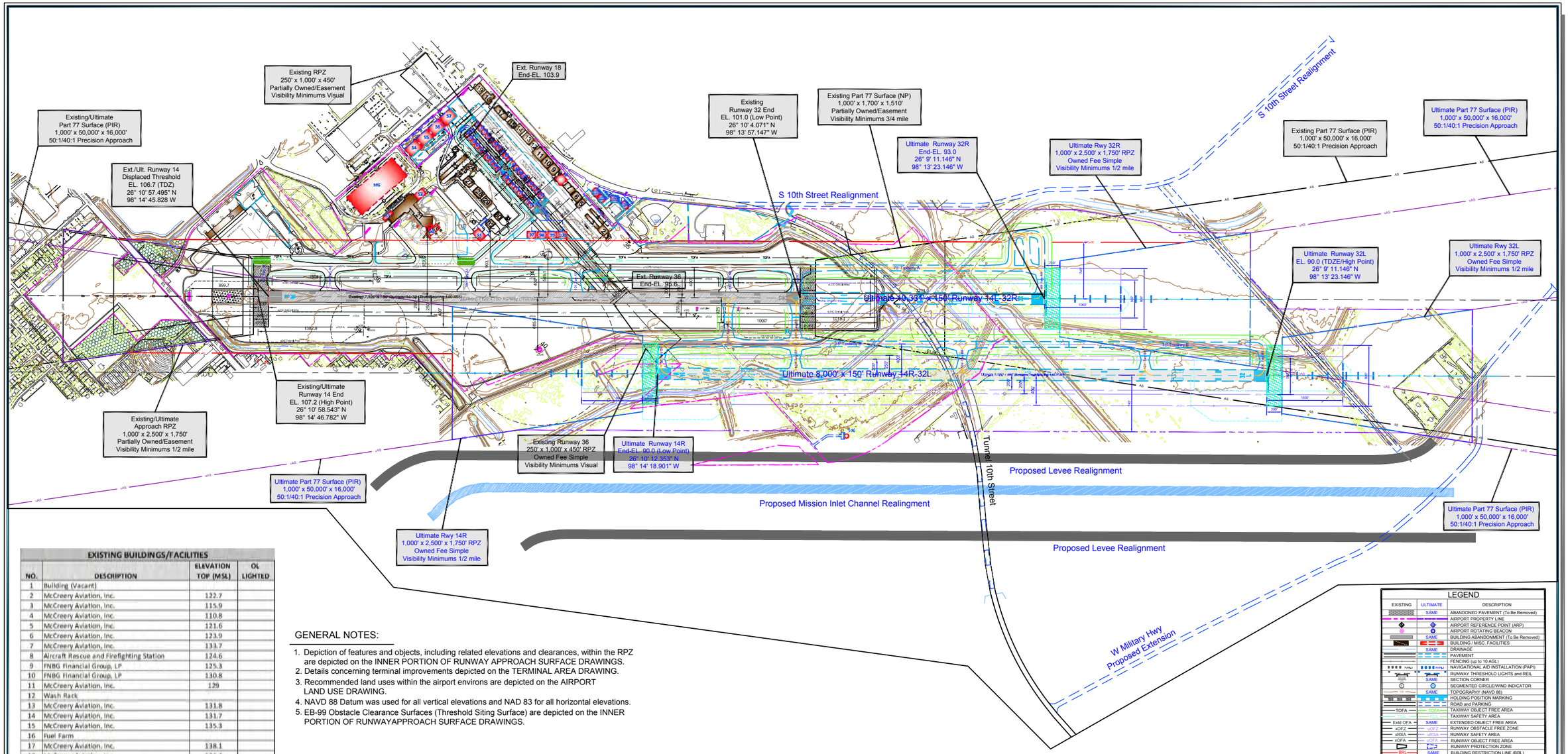
McAllen International Airport
EXISTING
AIRPORT LAYOUT PLAN DRAWING
McAllen, Texas

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Larry D. Johnson
APPROVED BY: Mike W. Dmyterko

May 2019 SHEET 3 OF 22

Coffman Associates
Airport Consultants
www.coffmanassociates.com

Coffman Associates R:\CAD\Johnson_Projects\MFE_McAllen\ALP\MFE_ALP03_xALP4.dwg Printed Date: 5-23-19 11:43:08 AM Johnson



EXISTING BUILDINGS/FACILITIES			
NO.	DESCRIPTION	ELEVATION TOP (MSL)	OL LIGHTED
1	Building (Vacant)		
2	McCreery Aviation, Inc.	122.7	
3	McCreery Aviation, Inc.	115.9	
4	McCreery Aviation, Inc.	110.8	
5	McCreery Aviation, Inc.	121.6	
6	McCreery Aviation, Inc.	123.9	
7	McCreery Aviation, Inc.	133.7	
8	Aircraft Rescue and Firefighting Station	124.6	
9	FNBG Financial Group, LP	125.3	
10	FNBG Financial Group, LP	130.8	
11	McCreery Aviation, Inc.	129	
12	Wash Rack		
13	McCreery Aviation, Inc.	131.8	
14	McCreery Aviation, Inc.	131.7	
15	McCreery Aviation, Inc.	135.3	
16	Fuel Farm		
17	McCreery Aviation, Inc.	138.1	
18	McCreery Aviation, Inc.	131.4	
19	McCreery Aviation, Inc.	131.4	
20	Airport Rotating Beacon	160.5	NO
21	Terminal/Administration Building	173.6	
22	Rio Grande Railcar, LLC	127.8	
23	Craftech Enterprises, Inc.	126.5	
24	Walter J. Passmore	127.7	
25	MFE Aviation, LLC	119.5	
	U.S. DHS CBP Air and Marine Facilities		
26	Thomas Michael Stanton Dba Western Flyers	121.3	
27	Thomas Michael Stanton Dba Western Flyers	129.3	
28	Thomas Michael Stanton Dba Western Flyers	143.8	
29	Thomas Michael Stanton Dba Western Flyers	126.9	
30	Freedom Aero, LLC	128.4	
31	Electrical Vault	121.6	
32	Mayfair Properties, LLC	129.4	
33	Airport Traffic Control Tower (ATCT)	173.7	OL
34	Segmented Circle/Windsock	112.4	
35	Fuel Tanks (McCreery Aviation)	107.7	
36	Windsock	106.3	OL
37	Fuel Tanks	115.8	
38	Air Cargo Facility	138.3	
39	ASOS	130.6	
40	VOR	126.7	OL
41	Windsock	102.1	OL

GENERAL NOTES:

1. Depiction of features and objects, including related elevations and clearances, within the RPZ are depicted on the INNER PORTION OF RUNWAY APPROACH SURFACE DRAWINGS.
2. Details concerning terminal improvements depicted on the TERMINAL AREA DRAWING.
3. Recommended land uses within the airport environs are depicted on the AIRPORT LAND USE DRAWING.
4. NAVD 88 Datum was used for all vertical elevations and NAD 83 for all horizontal elevations.
5. EB-99 Obstacle Clearance Surfaces (Threshold Siting Surface) are depicted on the INNER PORTION OF RUNWAYAPPROACH SURFACE DRAWINGS.

ULTIMATE BUILDINGS/FACILITIES		
NO.	DESCRIPTION	ELEVATION TOP (MSL)
50	TERMINAL EXPANSION A	25' AGL
51	TERMINAL EXPANSION B	25' AGL
52	TERMINAL EXPANSION C	25' AGL
53	ARFF	42' AGL
54	CONVENTIONAL HANGAR	35' AGL
55	CONVENTIONAL HANGAR	35' AGL
56	CONVENTIONAL HANGAR	35' AGL
57	CONVENTIONAL HANGAR	35' AGL
58 - 76	EXECUTIVE HANGARS	25' AGL
77 - 95	EXECUTIVE HANGARS	25' AGL
96	CONVENTIONAL HANGAR	35' AGL
97	CONVENTIONAL HANGAR	35' AGL
98	CONVENTIONAL HANGAR	35' AGL
99	CONVENTIONAL HANGAR	35' AGL
100	CONVENTIONAL HANGAR	35' AGL
101	CONVENTIONAL HANGAR	35' AGL
102	CONVENTIONAL HANGAR	35' AGL
103	CONVENTIONAL HANGAR	35' AGL
104	CONVENTIONAL HANGAR	35' AGL
105	PARKING GARAGE	50' AGL
106	ATCT	60' AGL
107	CONSOLIDATED RENTAL CAR CENTER	25' AGL

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
	SAME	ABANDONED PAVEMENT (To Be Removed)
		AIRPORT PROPERTY LINE
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
	SAME	BUILDING ABANDONMENT (To Be Removed)
		BUILDING / MISC. FACILITIES
	SAME	DRAINAGE
		PAVEMENT
		FENCING (up to 10 AGL)
		NAVIGATIONAL AID INSTALLATION (PAPI)
		RUNWAY THRESHOLD LIGHTS and REIL
	SAME	SECTION CORNER
		SEGMENTED CIRCLE/WIND INDICATOR
	SAME	TOPOGRAPHY (NAVD 88)
		HOLDING POSITION MARKING
		ROAD and PARKING
TOFA	TOFA	TAXIWAY OBJECT FREE AREA
TSA	TSA	TAXIWAY SAFETY AREA
Exist OFA	SAME	EXTENDED OBJECT FREE AREA
xOFZ	uOFZ	RUNWAY OBSTACLE FREE ZONE
xRSA	uRSA	RUNWAY SAFETY AREA
xOFA	uOFA	RUNWAY OBJECT FREE AREA
		RUNWAY PROTECTION ZONE
BRL	SAME	BUILDING RESTRICTION LINE (BRL)
AS	uAS	PART 77 APPROACH SURFACE
		NAVIGATIONAL AID INSTALLATION (PAPI)
	SAME	AWOS
		LOCALIZER CRITICAL AREA
		GLIDE SLOPE CRITICAL AREA
		LOCALIZER ANTENNA
		GLIDE SLOPE ANTENNA
		MALSR APPROACH LIGHT SYSTEM
		PRECISION OBSTACLE FREE ZONE (POFZ)
		TIE-DOWNS
N/A		RUNWAY SHADE
	SAME	TREES
N/A		ISLAND (PAVEMENT MARKING)
xVASI-4	N/A	NAVIGATIONAL AID INSTALLATION (VASI-4)
		WIND INDICATOR/WINDSOCK (WS)
	N/A	EASEMENT

FOR APPROVAL BY:

Airport Manager: Elizabeth Suarez DATE

FAA APPROVAL STAMP

Magnetic Declination
4° 5' East (April 2018)
Annual Rate of Change 0° 7' West

0 600 1200 1800

SCALE IN FEET

NO.	REVISIONS	DATE	BY	APP'D.
2	-	—	—	—
1	-	—	—	—

"THE PREPARATION OF THESE DOCUMENTS WAS FINANCED IN PART THROUGH A GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, AS AMENDED. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THESE DOCUMENTS BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS."

McAllen International Airport

ULTIMATE AIRPORT LAYOUT PLAN DRAWING

McAllen, Texas

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Larry D. Johnson
APPROVED BY: Mike W. Dmyterko

May 2019 SHEET 4 OF 22

Coffman Associates
Airport Consultants
www.coffmanassociates.com

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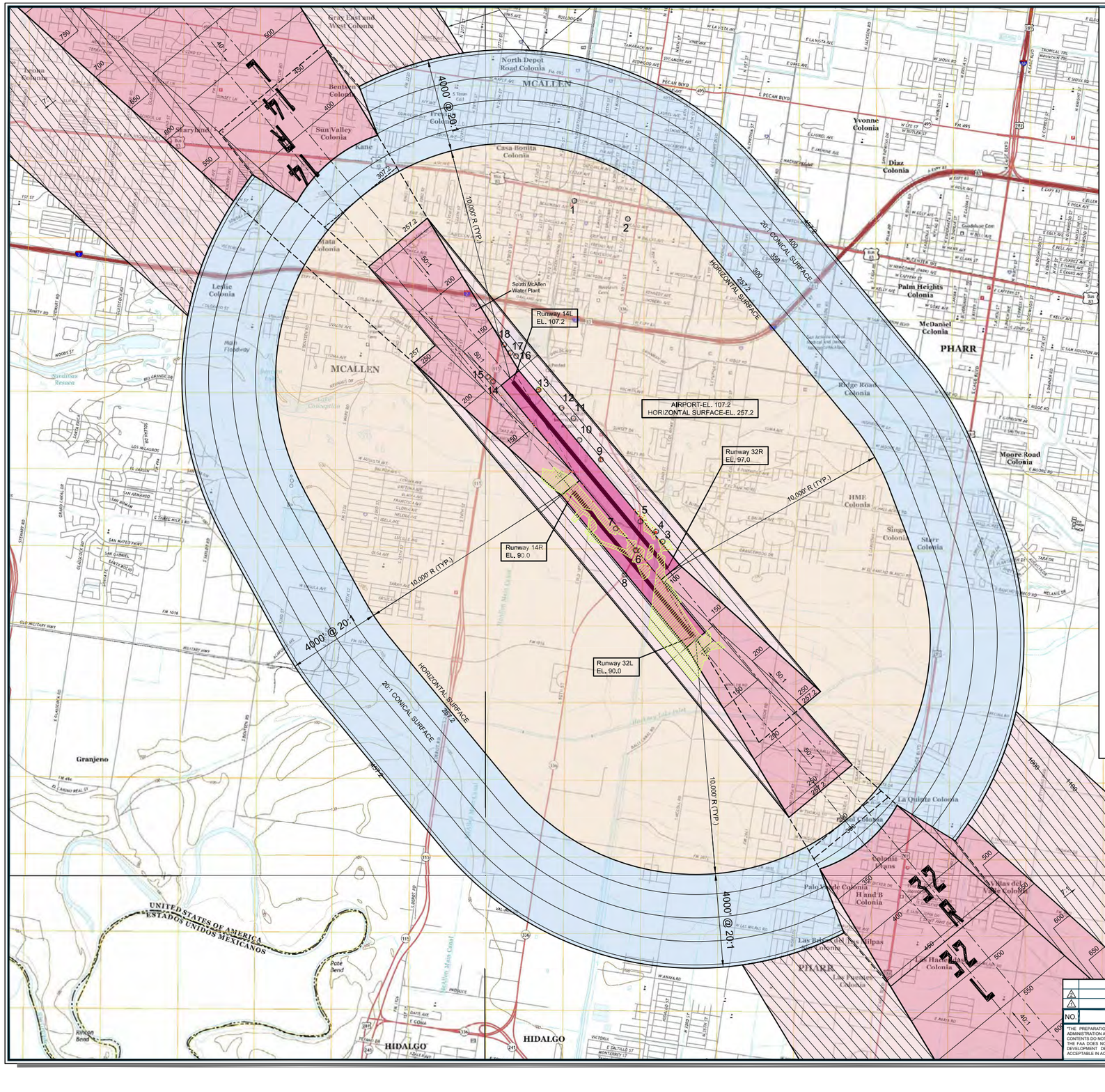


OBSTRUCTION TABLE

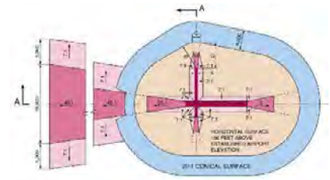
No.	Description	Object MSL	TOP AGL	Part 77 Surface	Object Penetration	Remediation
1	HVAC_ON_BLDG	292.8	171.4	Horizontal Surface	35.7	Add Obst. Light
2	ANTENNA	388.4	263.4	Horizontal Surface	131.3	Add Obst. Light
3	TREES	120.1	24.6	Transitional Surface	20.5	Remove All Trees
4	UTILITY_POLE	183.6	93	Transitional Surface	74.8	Add Obst. Light
5	Road	114.7	15	Transitional Surface	14.6	Request Road To be Relocated
6	TREES	114.7	24.5	Transitional Surface	12.9	Remove All Trees
7	TREES	107.6	26.4	Transitional Surface	7.2	Remove All Trees
8	Road	115	15	Transitional Surface	25	Request Road To be Relocated
9	TREES	152.4	58.2	Transitional Surface	16.5	Trim Trees
10	Antenna	126.2	31	Transitional Surface	17.4	To Remain Lighted
11	ATCT	172	72.6	Transitional Surface	1.6	To Remain Lighted
12	Terminal Building	171	69.5	Transitional Surface	9.6	To Remain Lighted
13	TREES	135.9	32.4	Transitional Surface	13.8	Trim Trees
14	LIGHT POLE	127.4	36.8	Transitional Surface	13.8	Bury Lines/Remove Poles
15	TREES	132.2	38.3	Transitional Surface	10.7	Trim Trees
16	TREES	148.1	47.8	Transitional Surface	2.4	Trim Trees
17	TREES	124.9	44.2	Transitional Surface	19.6	Trim Trees
18	TREES	132.9	40.6	Transitional Surface	5.4	Trim Trees

OBSTRUCTION LEGEND

1 ○ OBSTRUCTION

3 ▨ GROUP TREES OBSTRUCTION (All Trees To Be Removed)

OBSTRUCTION SURVEY (9-14-2017 from MTZ geospatial)



GENERAL NOTES:

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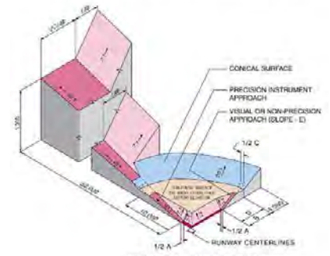
2. Depiction of features and objects within the primary, transitional, horizontal, and conical surfaces, are illustrated on the AIRPORT AIRSPACE DRAWINGS.
3. Depiction of features and objects within the inner portion of the approach surfaces, are illustrated on the INNER PORTION OF RUNWAY APPROACH SURFACE DRAWINGS.
4. Existing and future height and hazard ordinances are to be amended and/or referenced upon approval of the PART 77 AIRSPACE PLAN.
5. Obstruction survey accuracy conforms to requirements listed in AC 150/5300-18b for the Obstacle feature class.

Magnetic Declination
4° 5' East (April 2018)
Annual Rate of Change 0° 7' West

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

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



ISOMETRIC VIEW OF SECTION A-A

SOURCE: 14 CFR Part 77, Section 77.25, Civil Airport Imaginary Surfaces.

NO.	REVISIONS	DATE	BY	APP'D.
2	-	—	—	—
1	-	—	—	—

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McAllen International Airport

AIRPORT AIRSPACE DRAWING

CONICAL SURFACE

McAllen, Texas

PRELIMINARY

PLANNED BY:	Eric S. Pfeifer
DETAILED BY:	Larry D. Johnson
APPROVED BY:	Mike W. Dmyterko

May 2019 | SHEET 5 OF 22

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Airport Consultants
www.coffmanassociates.com

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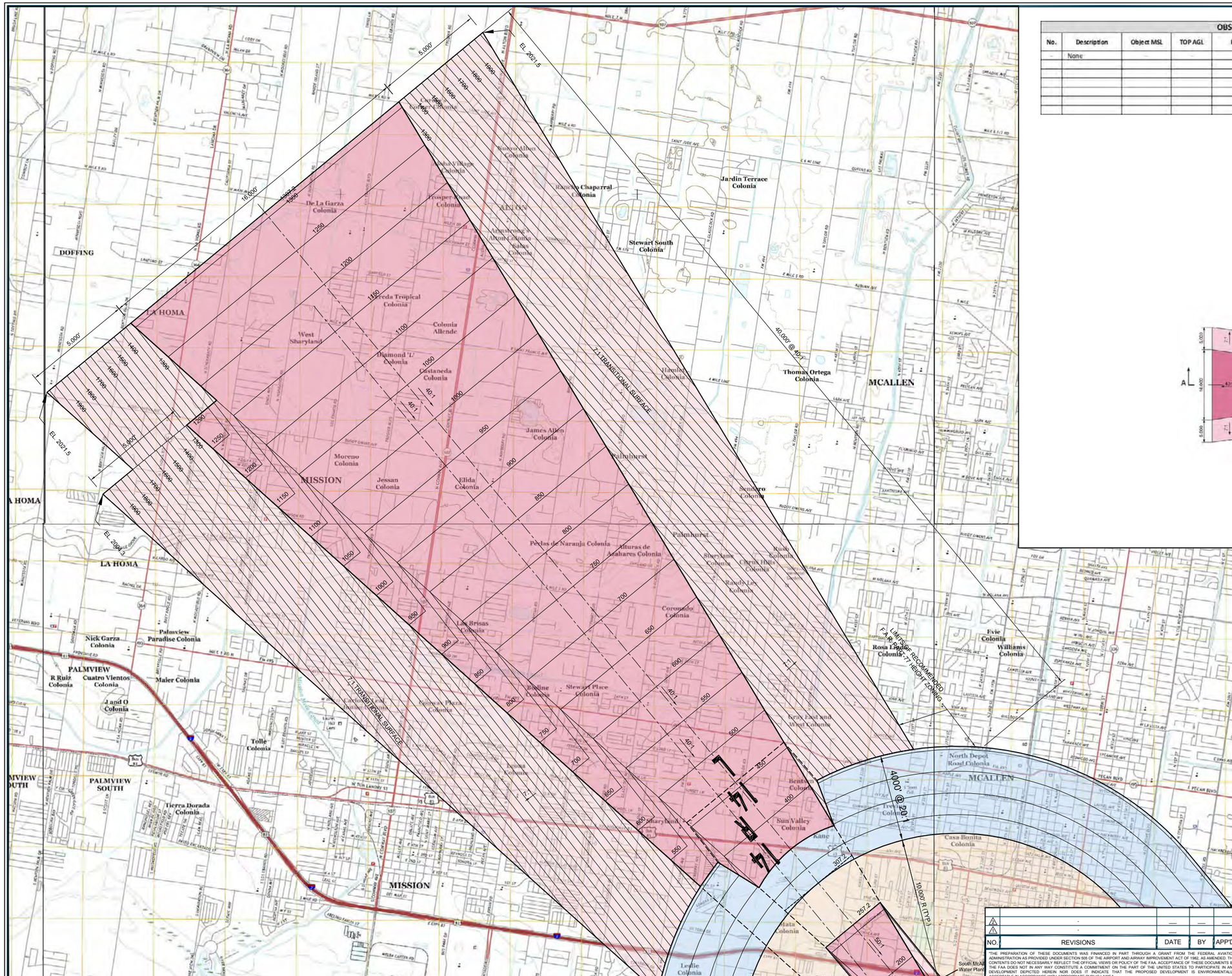
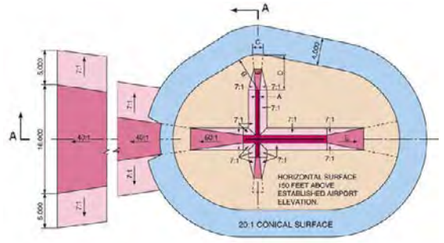


OBSTRUCTION TABLE						
No.	Description	Object MSL	TOP AGL	Part 77 Surface	Object Penetration	Remediation
-	None					



OBSTRUCTION LEGEND

1 OBSTRUCTION

3 GROUP TREES OBSTRUCTION (TBR)

OBSTRUCTION SURVEY (9-14-2017 from MTZ geospatial)

GENERAL NOTES:

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5. Obstruction survey accuracy conforms to requirements listed in AC 150/5300-18b for the Obstacle feature class.

TRUE NORTH

Magnetic Declination
4° 5' East (April 2018)
Annual Rate of Change 0° 7' West

0 2000 4000 6000
SCALE IN FEET

NO.	REVISIONS	DATE	BY	APP'D.
2		—	—	—
1		—	—	—

"THE PREPARATION OF THESE DOCUMENTS WAS FINANCED IN PART THROUGH A GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, AS AMENDED. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THESE DOCUMENTS BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS."

McAllen International Airport
AIRPORT AIRSPACE DRAWING
RUNWAY 14

McAllen, Texas

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Larry D. Johnson
APPROVED BY: Mike W. Dmyterko

May 2019

SHEET 6 OF 22

Coffman Associates
Airport Consultants
www.coffmanassociates.com

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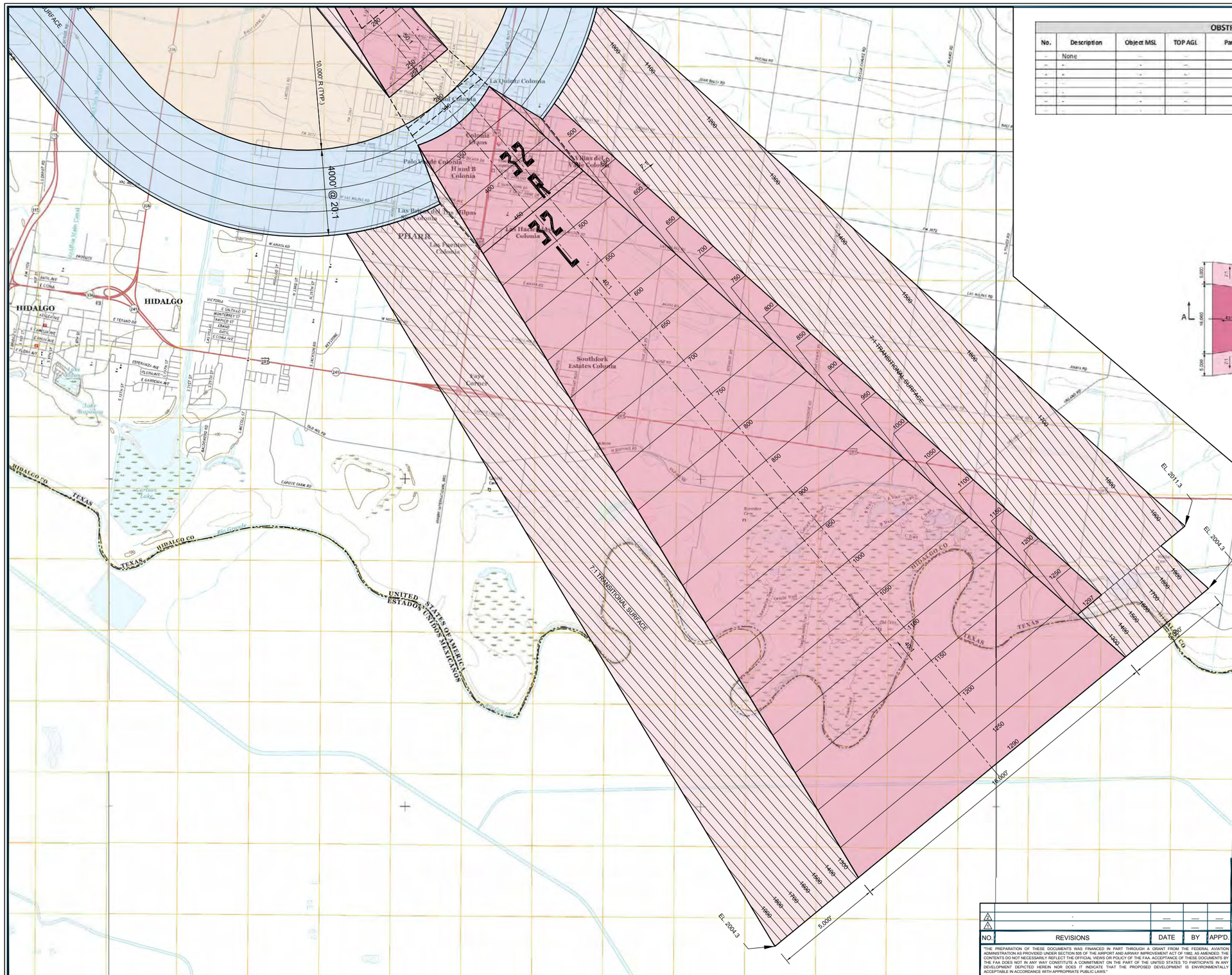

OBSTRUCTION TABLE						
No.	Description	Object MSL	TOP AGL	Part 77 Surface	Object Penetration	Remediation
-	None					
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
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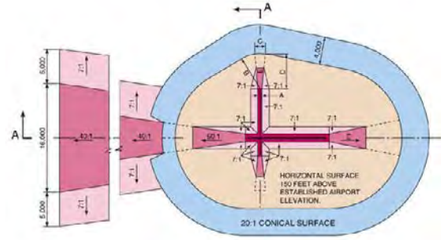
-	-	-	-	-	-	-



OBSTRUCTION LEGEND

1 OBSTRUCTION
3 GROUP TREES OBSTRUCTION (TBR)
OBSTRUCTION SURVEY (9-14-2017 from MTZ geospatial)

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TRUE NORTH

Magnetic Declination
4° 5' East (April 2018)
Annual Rate of Change 0° 7' West

0 2000 4000 6000
SCALE IN FEET

NO.	REVISIONS	DATE	BY	APP'D.
2	-	—	—	—
1	-	—	—	—

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McAllen International Airport
AIRPORT AIRSPACE DRAWING
RUNWAY 32

McAllen, Texas

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Larry D. Johnson
APPROVED BY: Mike W. Dmyterko

May 2019 SHEET 7 OF 22

Coffman Associates
Airport Consultants
www.coffmanassociates.com

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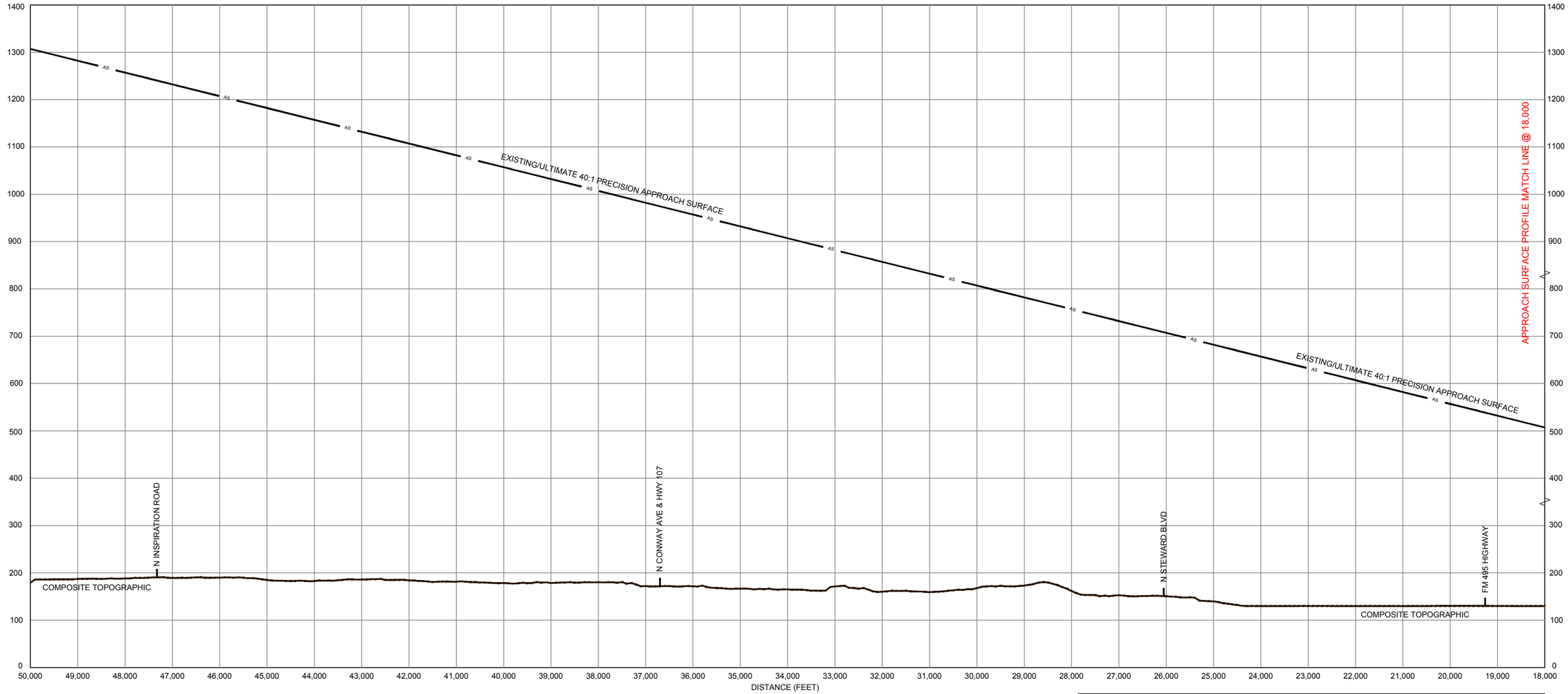

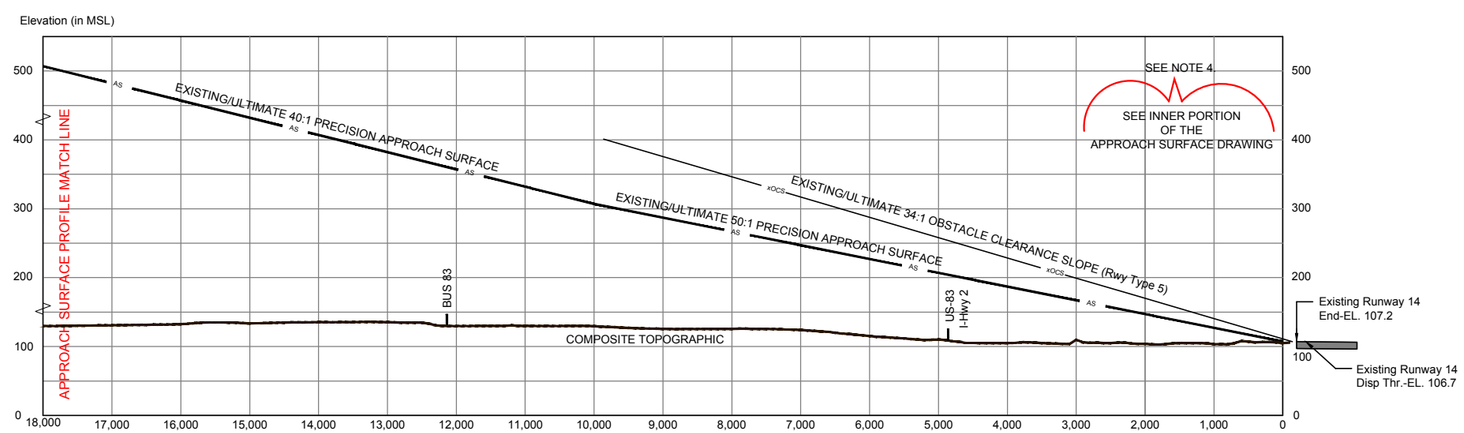

OBSTRUCTION TABLE

No.	Description	Object MSL	TOP AGL	Surface	Object Penetration	Remediation
-	None	-	-	-	-	-

GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate approach surfaces, unless otherwise noted.
2. Depiction of features and objects within the primary, transitional, horizontal, and conical surfaces, are illustrated on the AIRPORT AIRSPACE DRAWINGS.
3. Depiction of features and objects within the outer portion of the approach surfaces, are illustrated on the RUNWAY APPROACH SURFACE PROFILES.
4. Depiction of features and objects within the inner portion of the approach surfaces, are illustrated on the INNER PORTION OF RUNWAY APPROACH SURFACE DRAWINGS.

Magnetic Declination
4° 5' East (April 2018)
Annual Rate of Change 0° 7' West

HORIZONTAL SCALE IN FEET 0 1000 2000 3000

VERTICAL SCALE IN FEET 0 100 200 300

NO.	REVISIONS	DATE	BY	APP'D.
1	-	—	—	—
2	-	—	—	—

"THE PREPARATION OF THESE DOCUMENTS WAS FINANCED IN PART THROUGH A GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, AS AMENDED. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THESE DOCUMENTS BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS."

McAllen International Airport
RUNWAY 14 (14L)
APPROACH SURFACE PROFILE
DRAFT
McAllen, Texas

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Larry D. Johnson
APPROVED BY: Mike W. Dmyterko
May 2019
SHEET 8 OF 22

Coffman Associates
Airport Consultants
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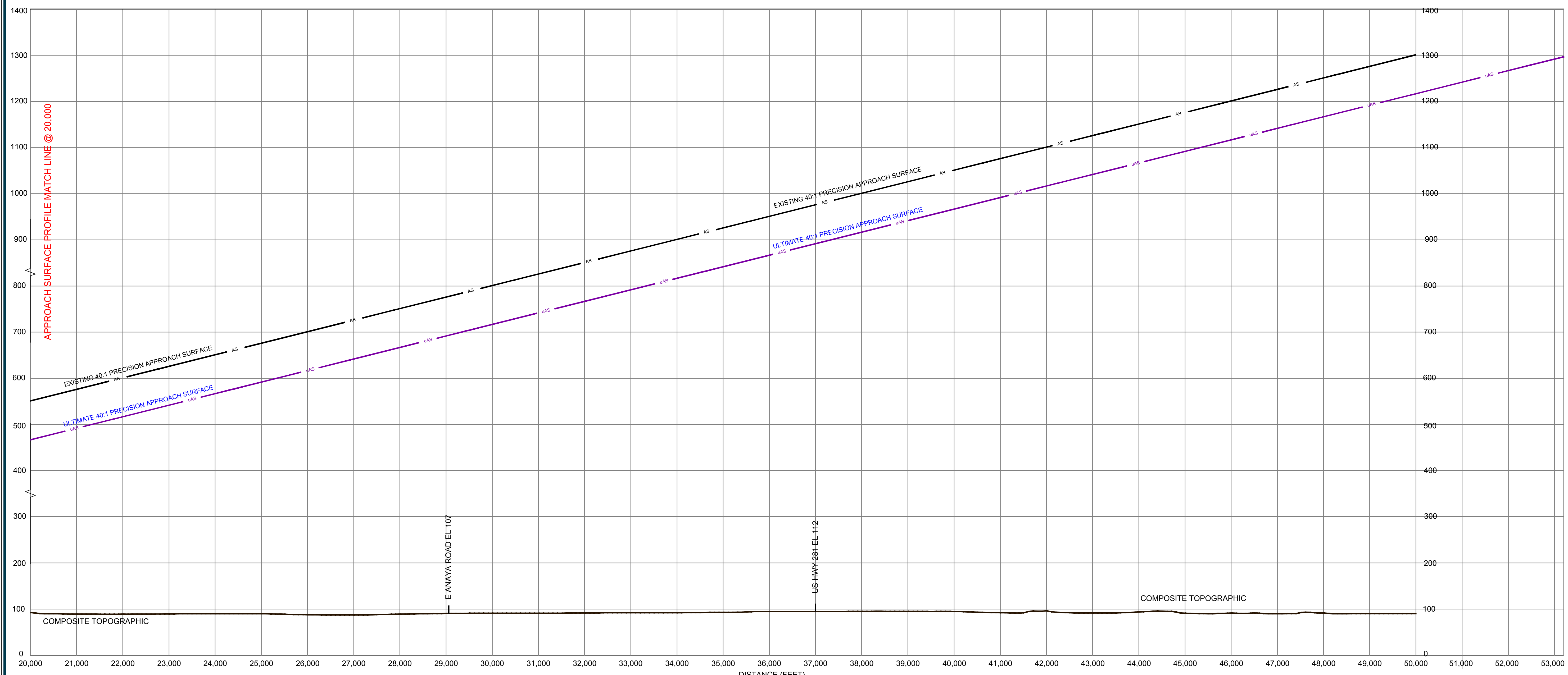
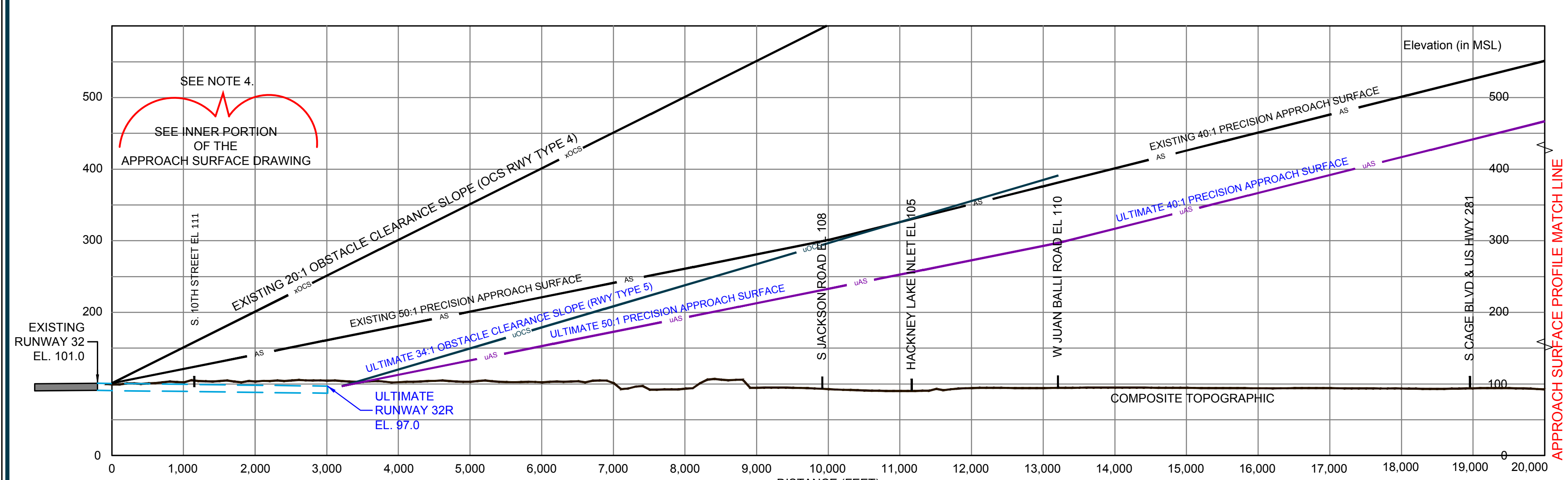
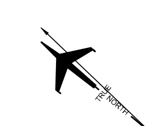




OBSTRUCTION TABLE

No.	Description	Object MSL	TOP AGL	Surface	Object Penetration	Remediation
-	None	-	-	-	-	-



Magnetic Declination
4° 5' East (April 2018)
Annual Rate of Change 0° 7' West

0 1000 2000 3000
HORIZONTAL SCALE IN FEET

0 100 200 300
VERTICAL SCALE IN FEET

NO.	REVISIONS	DATE	BY	APP'D.
2	-	—	—	—
1	-	—	—	—

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McAllen International Airport
RUNWAY 32 (32R) APPROACH SURFACE PROFILE

DRAFT

McAllen, Texas

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Larry D. Johnson
APPROVED BY: Mike W. Dmyterko

May 2019

Coffman Associates
Airport Consultants
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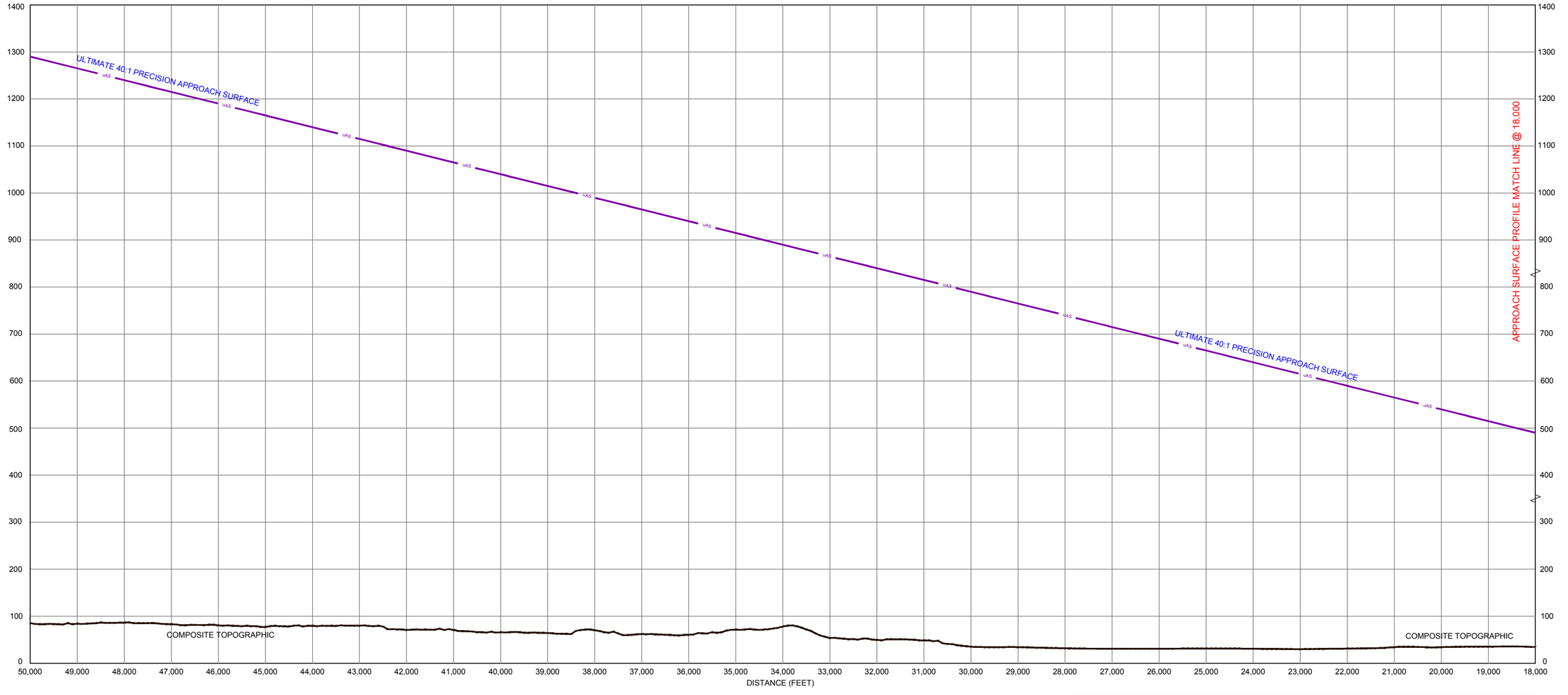
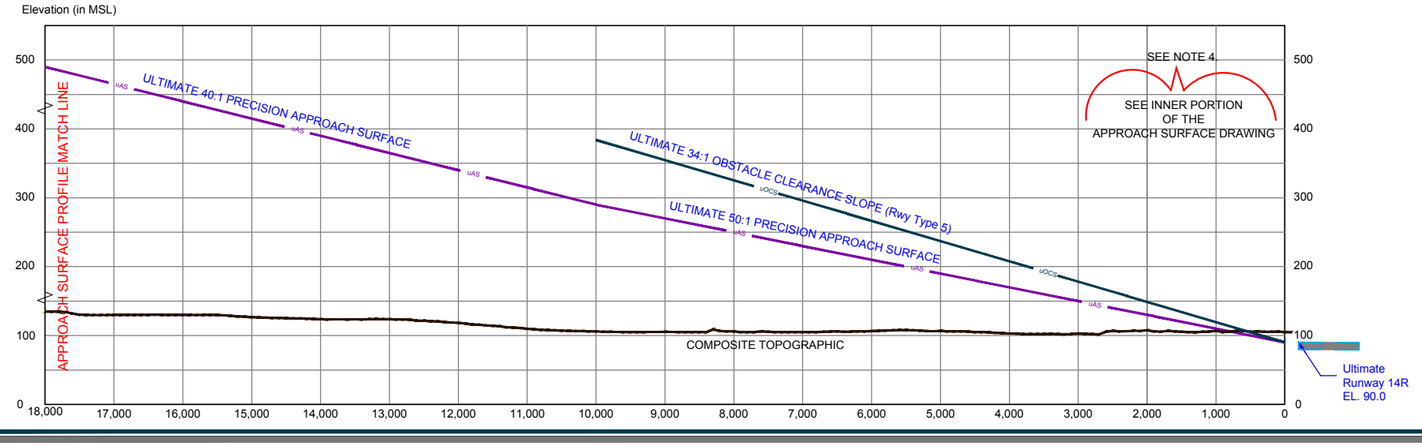
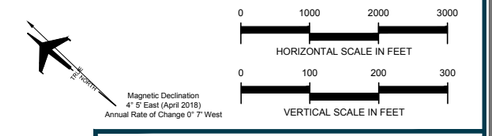




OBSTRUCTION TABLE						
No.	Description	Object MSL	TOP AGL	Surface	Object Penetration	Remediation
-	None	-	-	-	-	-

GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate approach surfaces, unless otherwise noted.
2. Depiction of features and objects within the primary, transitional, horizontal, and conical surfaces, are illustrated on the AIRPORT AIRSPACE DRAWINGS.
3. Depiction of features and objects within the outer portion of the approach surfaces, are illustrated on the RUNWAY APPROACH SURFACE PROFILES.
4. Depiction of features and objects within the inner portion of the approach surfaces, are illustrated on the INNER PORTION OF RUNWAY APPROACH SURFACE DRAWINGS.



NO.	REVISIONS	DATE	BY	APP'D.
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1	-	—	—	—

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McAllen International Airport

RUNWAY 14R

APPROACH SURFACE PROFILE

DRAFT

McAllen, Texas

PLANNED BY: Eric S. Pfeifer

DETAILED BY: Larry D. Johnson

APPROVED BY: Mike W. Dmyterko

May 2019

SHEET 10 OF 22

Coffman Associates

Airport Consultants

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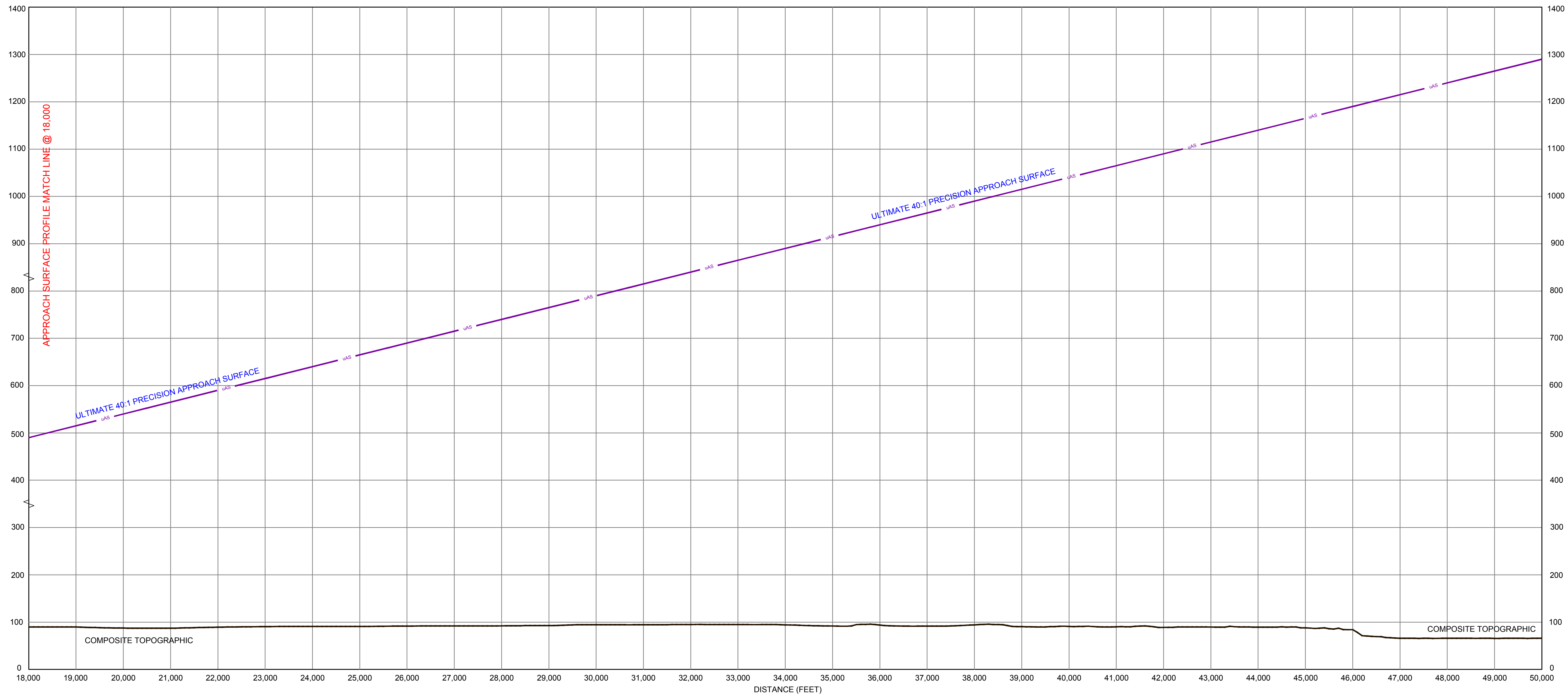
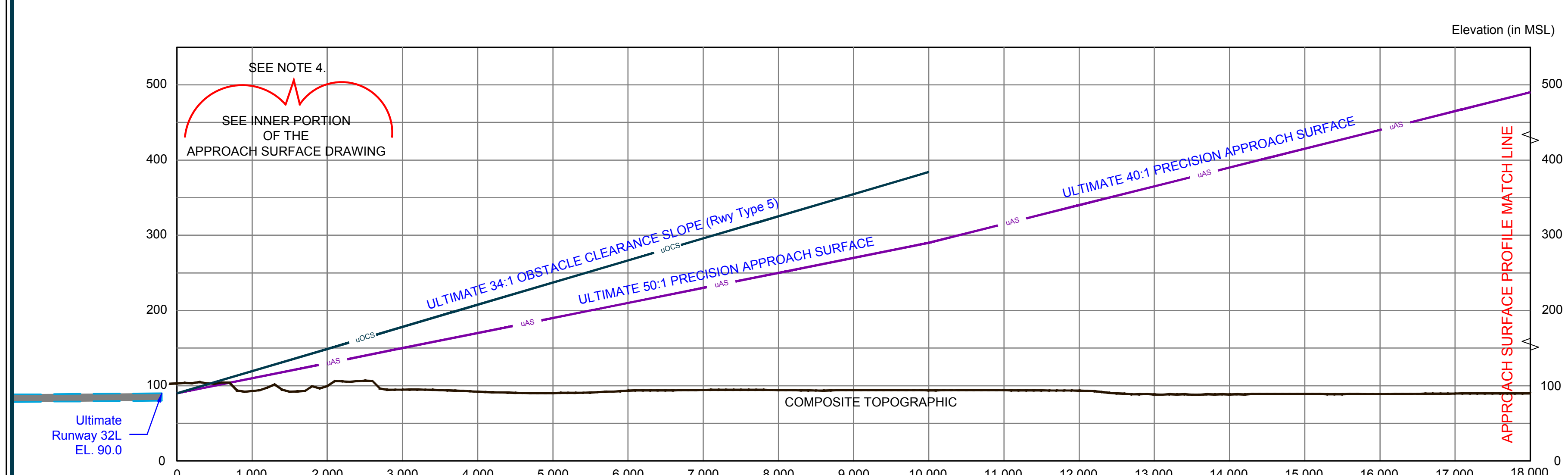
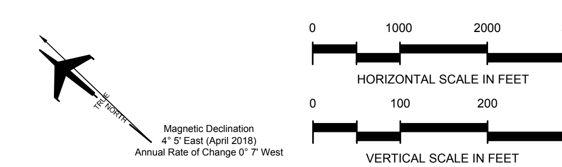




OBSTRUCTION TABLE

No.	Description	Object MSL	TOP AGL	Surface	Object Penetration	Remediation
-	None	-	-	-	-	-



GENERAL NOTES:

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3. Depiction of features and objects within the outer portion of the approach surfaces, are illustrated on the RUNWAY APPROACH SURFACE PROFILES.
4. Depiction of features and objects within the inner portion of the approach surfaces, are illustrated on the INNER PORTION OF RUNWAY APPROACH SURFACE DRAWINGS.

NO.	REVISIONS	DATE	BY	APP'D.
2	-	—	—	—
1	-	—	—	—

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McAllen International Airport

RUNWAY 32L APPROACH SURFACE PROFILE

DRAFT

McAllen, Texas

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Larry D. Johnson
APPROVED BY: Mike W. Dmyterko

May 2019

SHEET 11 OF 22

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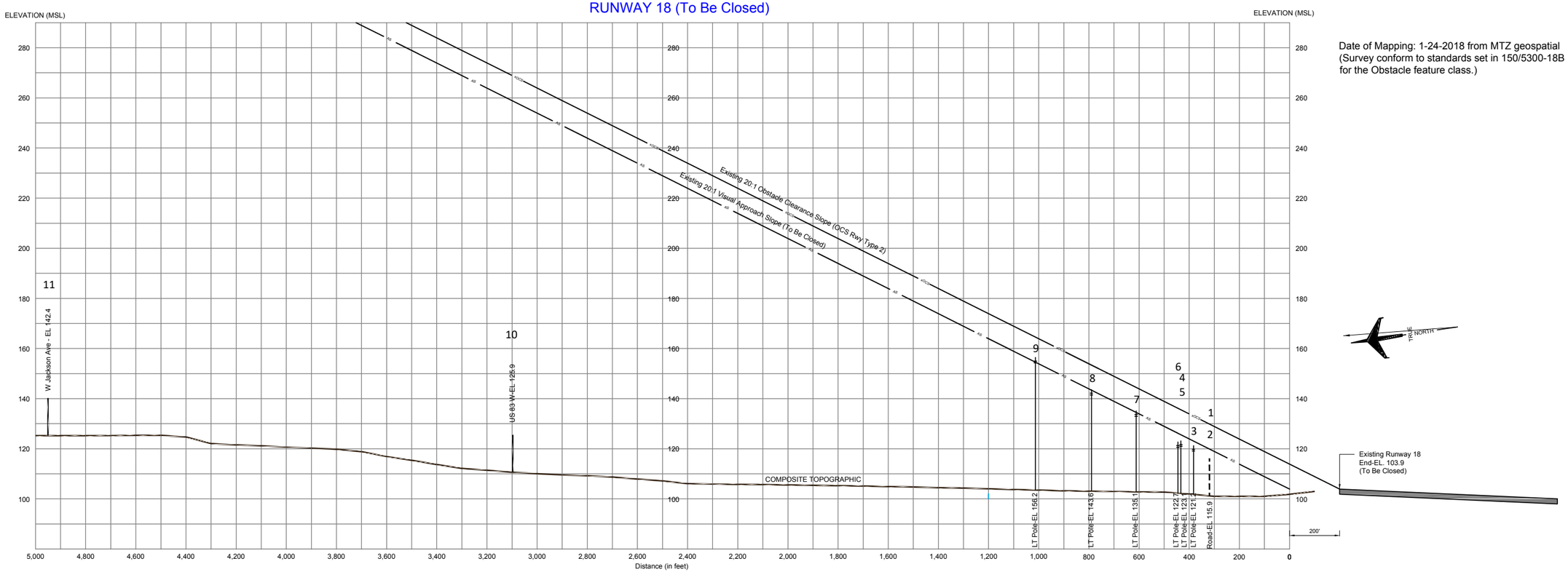
RUNWAY 18 (To Be Closed)



Date of Mapping: 1-24-2018 from MTZ geospatial (Survey conform to standards set in 150/5300-18B for the Obstacle feature class.)

OBSTRUCTION TABLE

No.	Object Name	Elevation TOP MSL	Existing 20:1 Approach	Existing 20:1 OCS	Ultimate 20:1 Approach	Ultimate 20:1 OCS	Remediation
7	Pole	135.1	1.8'	0'	N/A	N/A	To Be Closed
8	Pole	143.6	0.2'	0'	N/A	N/A	To Be Closed
9	Pole	156.4	0.6'	0'	N/A	N/A	To Be Closed

GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate Part 77 surfaces, unless otherwise noted. Road obstructions reflect a safety clearance of 10' for dirt roads or private roads, 15' for noninterstate roads, 17' for interstate roads, and 23' for railroad.
2. Depiction of features and objects within the Part 77 outer portion of the approach, primary, transitional, horizontal, and conical surfaces, are illustrated on the AIRPORT AIRSPACE DRAWING.
3. Airport Design Advisory Circular No. 150/5300-13A Chg 1, dated 2/26/2014 and EB #99.

Magnetic Declination
4° 5' East (April 2018)
Annual Rate of Change 0° 7' West

HORIZONTAL SCALE IN FEET (0, 200, 400, 600)

VERTICAL SCALE IN FEET (0, 20, 40, 60)

NO.	REVISIONS	DATE	BY	APP'D.
1	-	—	—	—
2	-	—	—	—

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McAllen International Airport
RUNWAY 18
APPROACH SURFACE DRAWING
DRAFT
McAllen, Texas

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Larry D. Johnson
APPROVED BY: Mike W. Dmyterko

May 2019 | SHEET 12 OF 22

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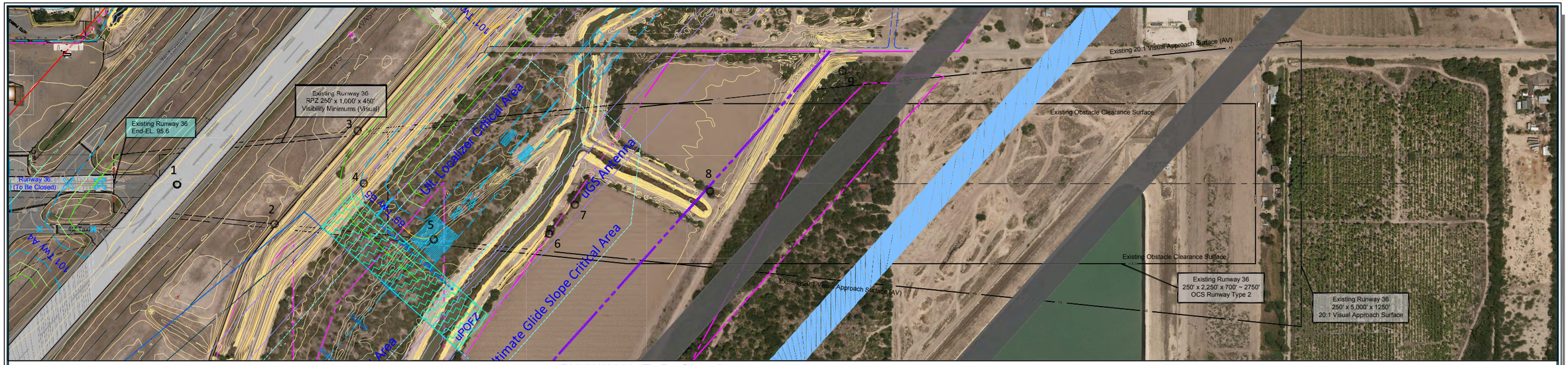

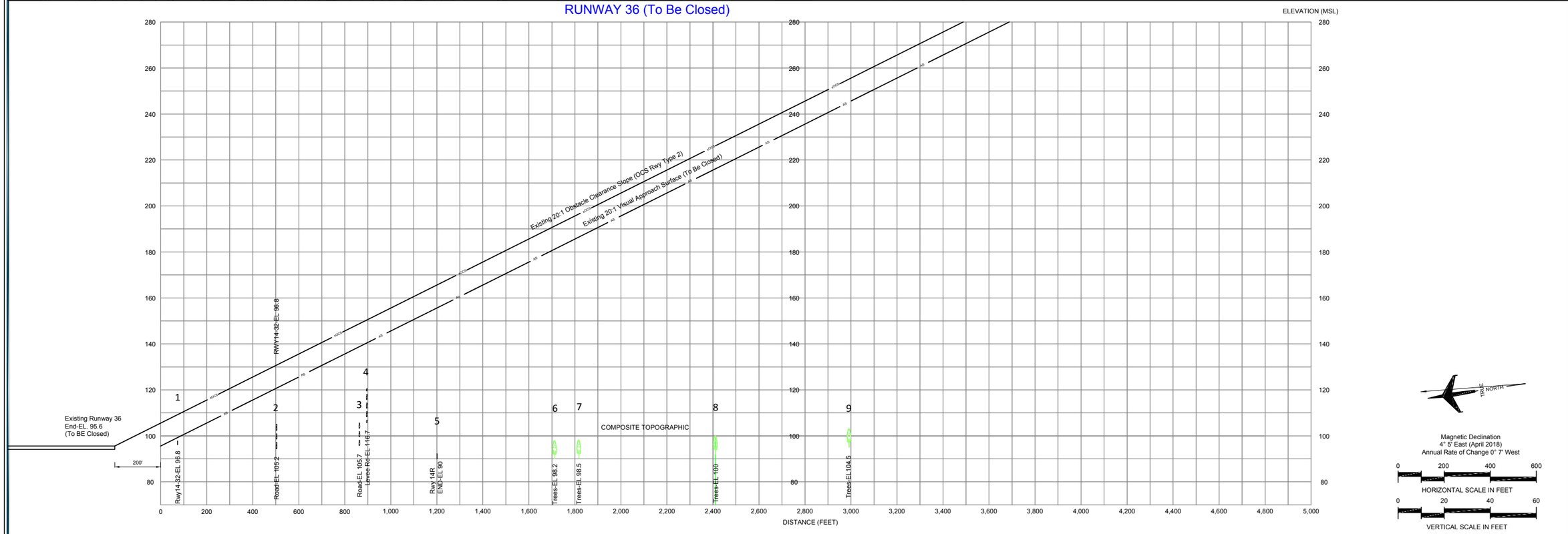

Magnetic Declination
4° 5' East (April 2018)
Annual Rate of Change 0° 7' West

HORIZONTAL SCALE IN FEET

VERTICAL SCALE IN FEET

OBSTRUCTION TABLE							
No.	Object Name	Elevation TOP MSL	Existing 20:1 Approach	Existing 20:1 OCS	Ultimate 20:1 Approach	Ultimate 20:1 OCS	Remediation
-	None	-	-	-	N/A	N/A	-

GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate Part 77 surfaces, unless otherwise noted. Road obstructions reflect a safety clearance of 10' for dirt roads or private roads, 15' for noninterstate roads, 17' for interstate roads, and 23' for railroad.
2. Depiction of features and objects within the Part 77 outer portion of the approach, primary, transitional, horizontal, and conical surfaces, are illustrated on the AIRPORT AIRSPACE DRAWING.
3. Airport Design Advisory Circular No. 150/5300-13A Chg 1, dated 2/26/2014 and EB #99.

NO.	REVISIONS	DATE	BY	APP'D.
2	-	—	—	—
1	-	—	—	—

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McAllen International Airport
RUNWAY 36
APPROACH SURFACE DRAWING
McAllen, Texas

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Larry D. Johnson
APPROVED BY: Mike W. Dmyterko
May 2019
SHEET 13 OF 22

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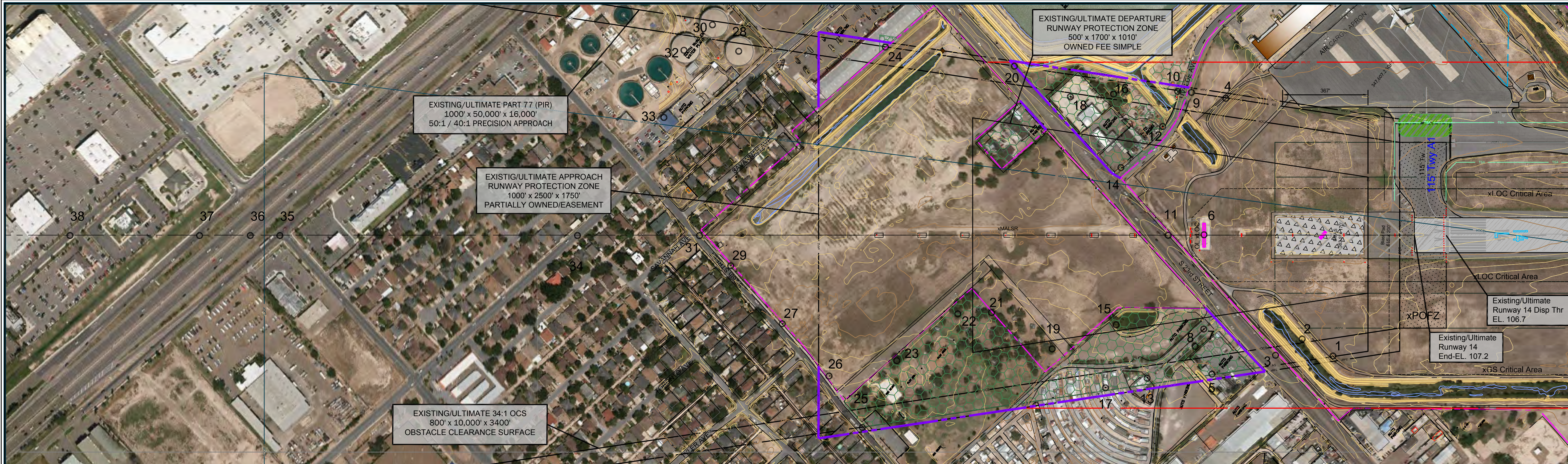

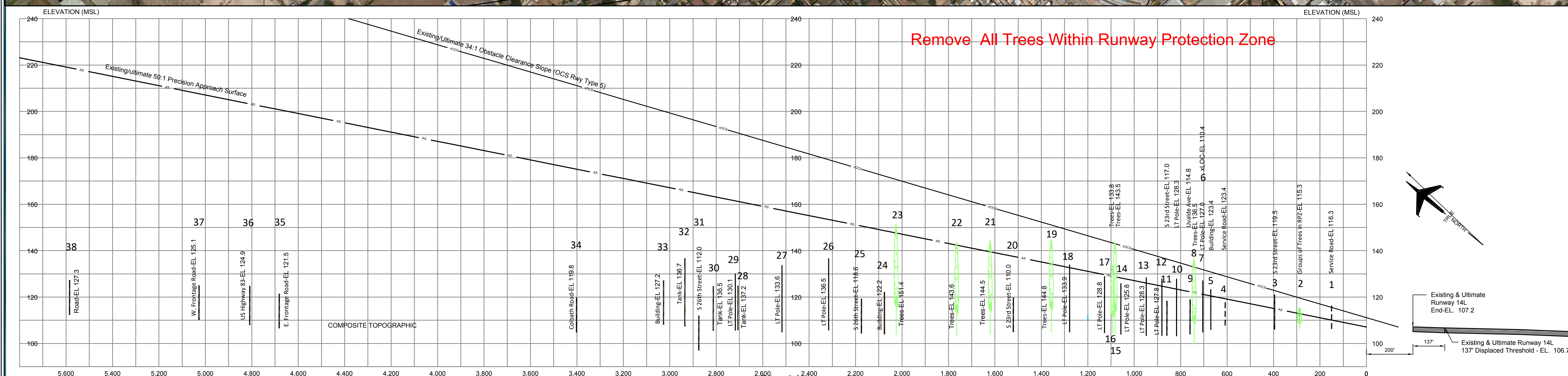

OBSTRUCTION TABLE							
No.	Object Name	Elevation TOP MSL	Existing 50:1 Approach	Existing 34:1 OCS	Ultimate 50:1 Approach	Ultimate 34:1 OCS	Remediation
1	Service Road	116.4	6.2'	0'	6.2'	0'	No Action (Private/Control Road)
2	Groups of Trees in RPZ	115.3+	2.3'+	0'	2.4'+	0'	Remove All Trees in RPZ
3	S 23rd Street	119.5	5.1'	0'	5.1'	0'	No Action
5	Building	123.4	2.9'	0'	2.9'	0'	Remove Buildings
7	LT Pole	127	5.8'	0'	5.8'	0'	Bury Lines Remove Poles
8	Trees	136.5	14.5'	3.5'	14.5'	3.5'	Remove All Trees in RPZ
10	LT Pole	128.3	4.3'	0'	4.3'	0'	Bury Lines Remove Poles
12	LT Pole	127.8	3'	0'	3'	0'	Bury Lines Remove Poles
13	LT Pole	128.3	2.1'	0'	2.1'	0'	Bury Lines Remove Poles
14	LT Pole	125.8	0'	0'	0'	0'	Bury Lines Remove Poles
15	Trees	143.5	14.7'	1'	14.7'	1'	Remove All Trees in RPZ
16	Trees	133.8	4.7'	0'	4.7'	0'	Remove All Trees in RPZ
18	LT Pole	133.9	1.2'	0'	1.2'	0'	Bury Lines Remove Poles
19	Trees	144.8	10.5'	0'	10.5'	0'	Remove All Trees in RPZ
21	Trees	144.5	4.9'	0'	4.9'	0'	Remove All Trees in RPZ
22	Trees	143.6	1.1'	0'	1.1'	0'	Remove All Trees in RPZ
23	Trees	151.4	3.7'	0'	3.7'	0'	Remove All Trees in RPZ

GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate Part 77 surfaces, unless otherwise noted. Road obstructions reflect a safety clearance of 10' for dirt roads or private roads, 15' for noninterstate roads, 17' for interstate roads, and 23' for railroad.
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3. Airport Design Advisory Circular No. 150/5300-13A Chg 1, dated 2/26/2014 and EB #99.

Magnetic Declination
4° 5' East (April 2018)
Annual Rate of Change 0° 7' West

0 200 400 600
HORIZONTAL SCALE IN FEET

0 20 40 60
VERTICAL SCALE IN FEET

NO.	REVISIONS	DATE	BY	APP'D.
2	-	—	—	—
1	-	—	—	—

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McAllen International Airport

INNER PORTION OF RUNWAY 14L APPROACH SURFACE DRAWING

DRAFT

McAllen, Texas

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Larry D. Johnson
APPROVED BY: Mike W. Dmyterko

May 2019

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Date of Survey: 9/13/2017

OBSTRUCTION TABLE							
No.	Object Name	Elevation TOP MSL	Existing 50:1 Approach	Existing 20:1 OCS	Ultimate 50:1 Approach	Ultimate 34:1 OCS	Remediation
12	LT Pole	173.1	8.2'	0'	77'	77'	Remove Light Pole
13	Trees	136.9	0'	0'	36.3'	34'	Remove All Trees in RPZ

GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate Part 77 surfaces, unless otherwise noted. Road obstructions reflect a safety clearance of 10' for dirt roads or private roads, 15' for noninterstate roads, 17' for interstate roads, and 23' for railroad.
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Magnetic Declination
4° 5' East (April 2018)
Annual Rate of Change 0° 7' West

0 200 400 600
HORIZONTAL SCALE IN FEET

0 20 40 60
VERTICAL SCALE IN FEET

NO.	REVISIONS	DATE	BY	APP'D.
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McAllen International Airport
INNER PORTION OF RUNWAY 32R
APPROACH SURFACE DRAWING
DRAFT
McAllen, Texas

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Larry D. Johnson
APPROVED BY: Mike W. Dmyterko

May 2019 SHEET 15 OF 22

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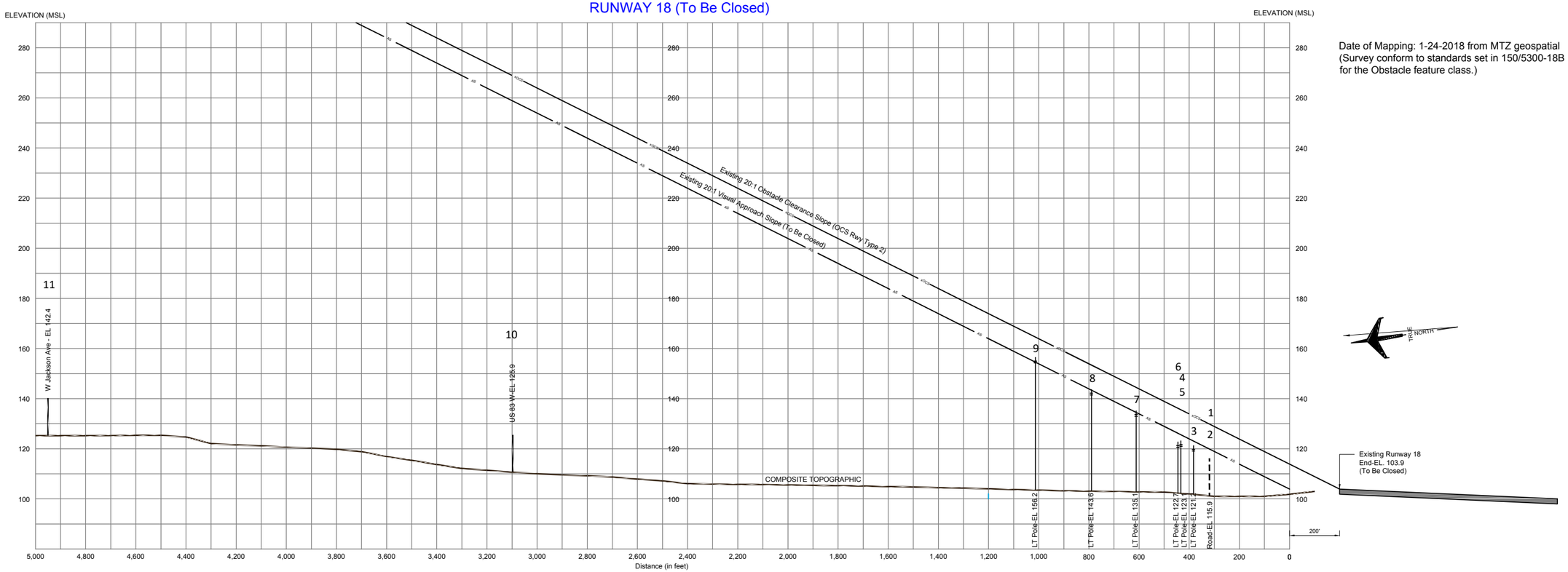
RUNWAY 18 (To Be Closed)



Date of Mapping: 1-24-2018 from MTZ geospatial (Survey conform to standards set in 150/5300-18B for the Obstacle feature class.)

OBSTRUCTION TABLE

No.	Object Name	Elevation TOP MSL	Existing 20:1 Approach	Existing 20:1 OCS	Ultimate 20:1 Approach	Ultimate 20:1 OCS	Remediation
7	Pole	135.1	1.8'	0'	N/A	N/A	To Be Closed
8	Pole	143.6	0.2'	0'	N/A	N/A	To Be Closed
9	Pole	156.4	0.6'	0'	N/A	N/A	To Be Closed

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Magnetic Declination
4° 5' East (April 2018)
Annual Rate of Change 0° 7' West

HORIZONTAL SCALE IN FEET (0, 200, 400, 600)

VERTICAL SCALE IN FEET (0, 20, 40, 60)

NO.	REVISIONS	DATE	BY	APP'D.
1	-	—	—	—
2	-	—	—	—

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McAllen International Airport
RUNWAY 18
APPROACH SURFACE DRAWING
DRAFT
McAllen, Texas

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Larry D. Johnson
APPROVED BY: Mike W. Dmyterko

May 2019 | SHEET 12 OF 22

Coffman Associates
Airport Consultants
www.coffmanassociates.com

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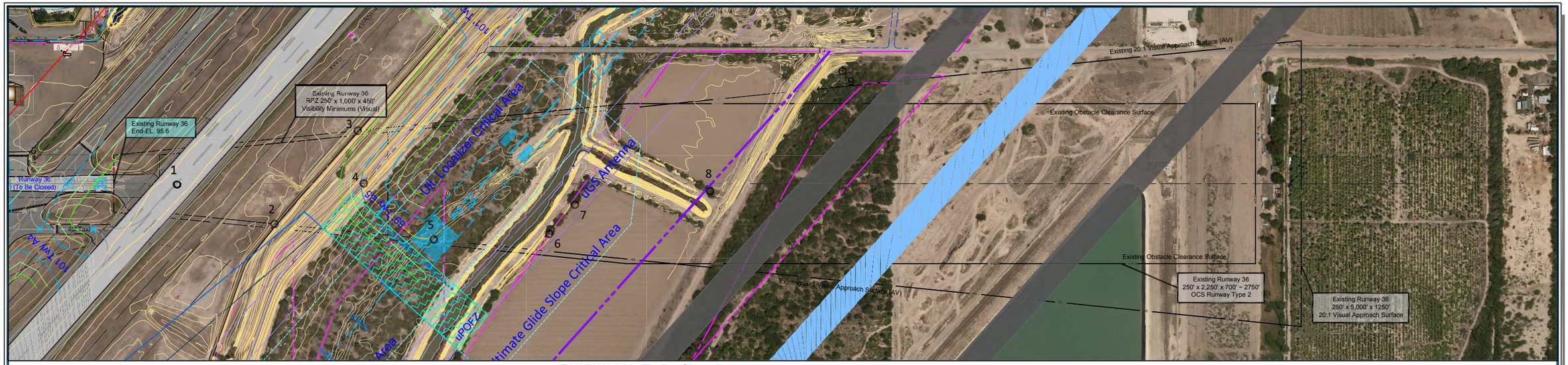

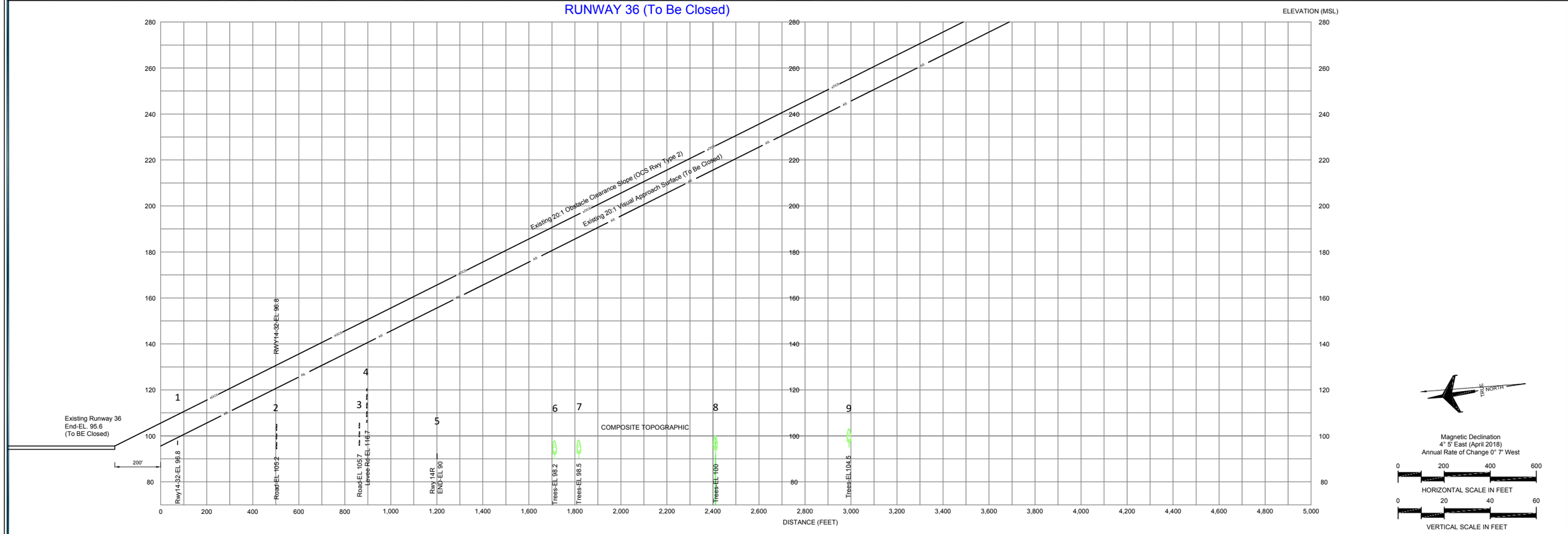

Magnetic Declination
4° 5' East (April 2018)
Annual Rate of Change 0° 7' West

HORIZONTAL SCALE IN FEET

VERTICAL SCALE IN FEET

OBSTRUCTION TABLE							
No.	Object Name	Elevation TOP MSL	Existing 20:1 Approach	Existing 20:1 OCS	Ultimate 20:1 Approach	Ultimate 20:1 OCS	Remediation
-	None	-	-	-	N/A	N/A	-

GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate Part 77 surfaces, unless otherwise noted. Road obstructions reflect a safety clearance of 10' for dirt roads or private roads, 15' for noninterstate roads, 17' for interstate roads, and 23' for railroad.
2. Depiction of features and objects within the Part 77 outer portion of the approach, primary, transitional, horizontal, and conical surfaces, are illustrated on the AIRPORT AIRSPACE DRAWING.
3. Airport Design Advisory Circular No. 150/5300-13A Chg 1, dated 2/26/2014 and EB #99.

NO.	REVISIONS	DATE	BY	APP'D.
2	-	—	—	—
1	-	—	—	—

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McAllen International Airport
RUNWAY 36
APPROACH SURFACE DRAWING
McAllen, Texas

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Larry D. Johnson
APPROVED BY: Mike W. Dmyterko
May 2019
SHEET 13 OF 22

Coffman Associates
Airport Consultants
www.coffmanassociates.com

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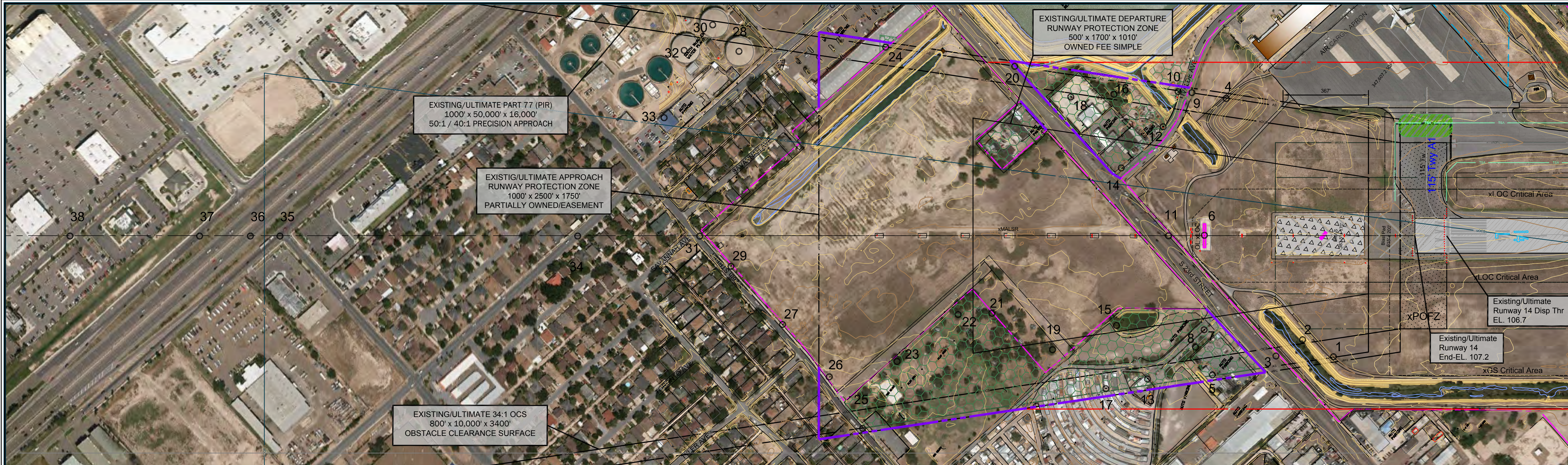

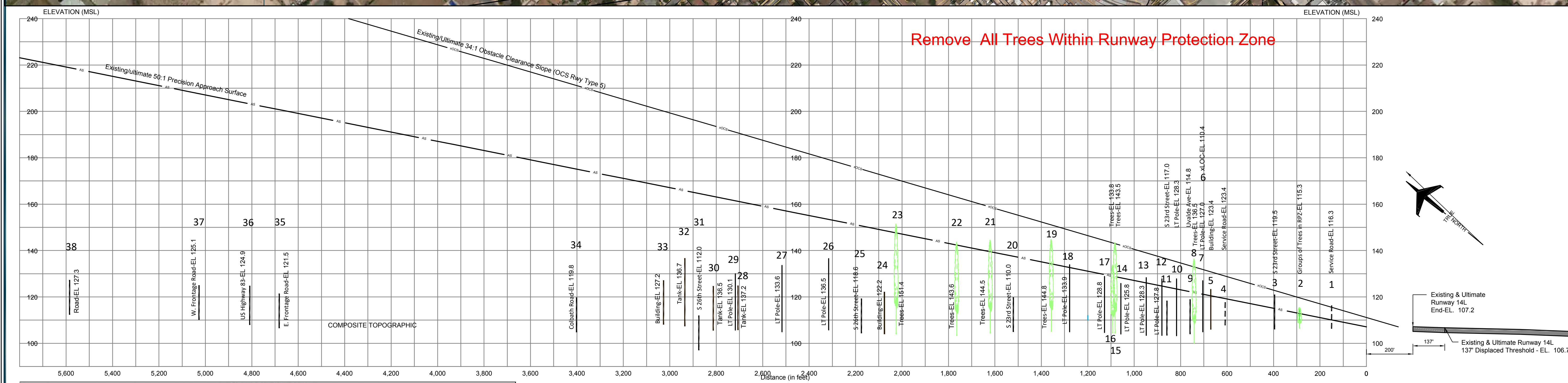

OBSTRUCTION TABLE							
No.	Object Name	Elevation TOP MSL	Existing 50:1 Approach	Existing 34:1 OCS	Ultimate 50:1 Approach	Ultimate 34:1 OCS	Remediation
1	Service Road	116.4	6.2'	0'	6.2'	0'	No Action (Private/Control Road)
2	Groups of Trees in RPZ	115.3+	2.3'+	0'	2.4'+	0'	Remove All Trees in RPZ
3	S 23rd Street	119.5	5.1'	0'	5.1'	0'	No Action
5	Building	123.4	2.9'	0'	2.9'	0'	Remove Buildings
7	LT Pole	127	5.8'	0'	5.8'	0'	Bury Lines Remove Poles
8	Trees	136.5	14.5'	3.5'	14.5'	3.5'	Remove All Trees in RPZ
10	LT Pole	128.3	4.3'	0'	4.3'	0'	Bury Lines Remove Poles
12	LT Pole	127.8	3'	0'	3'	0'	Bury Lines Remove Poles
13	LT Pole	128.3	2.1'	0'	2.1'	0'	Bury Lines Remove Poles
14	LT Pole	125.8	0'	0'	0'	0'	Bury Lines Remove Poles
15	Trees	143.5	14.7'	1'	14.7'	1'	Remove All Trees in RPZ
16	Trees	133.8	4.7'	0'	4.7'	0'	Remove All Trees in RPZ
18	LT Pole	133.9	1.2'	0'	1.2'	0'	Bury Lines Remove Poles
19	Trees	144.8	10.5'	0'	10.5'	0'	Remove All Trees in RPZ
21	Trees	144.5	4.9'	0'	4.9'	0'	Remove All Trees in RPZ
22	Trees	143.6	1.1'	0'	1.1'	0'	Remove All Trees in RPZ
23	Trees	151.4	3.7'	0'	3.7'	0'	Remove All Trees in RPZ

GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate Part 77 surfaces, unless otherwise noted. Road obstructions reflect a safety clearance of 10' for dirt roads or private roads, 15' for noninterstate roads, 17' for interstate roads, and 23' for railroad.
2. Depiction of features and objects within the Part 77 outer portion of the approach, primary, transitional, horizontal, and conical surfaces, are illustrated on the AIRPORT AIRSPACE DRAWING.
3. Airport Design Advisory Circular No. 150/5300-13A Chg 1, dated 2/26/2014 and EB #99.

Magnetic Declination
4° 5' East (April 2018)
Annual Rate of Change 0° 7' West

0 200 400 600
HORIZONTAL SCALE IN FEET

0 20 40 60
VERTICAL SCALE IN FEET

NO.	REVISIONS	DATE	BY	APP'D.
2	-	—	—	—
1	-	—	—	—

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McAllen International Airport

INNER PORTION OF RUNWAY 14L APPROACH SURFACE DRAWING

DRAFT

McAllen, Texas

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Larry D. Johnson
APPROVED BY: Mike W. Dmyterko

May 2019

Coffman Associates
Airport Consultants
www.coffmanassociates.com

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Date of Survey: 9/13/2017

OBSTRUCTION TABLE							
No.	Object Name	Elevation TOP MSL	Existing 50:1 Approach	Existing 20:1 OCS	Ultimate 50:1 Approach	Ultimate 34:1 OCS	Remediation
12	LT Pole	173.1	8.2'	0'	77'	77'	Remove Light Pole
13	Trees	136.9	0'	0'	36.3'	34'	Remove All Trees in RPZ

GENERAL NOTES:

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Magnetic Declination
4° 5' East (April 2018)
Annual Rate of Change 0° 7' West

0 200 400 600
HORIZONTAL SCALE IN FEET

0 20 40 60
VERTICAL SCALE IN FEET

NO.	REVISIONS	DATE	BY	APP'D.
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McAllen International Airport
INNER PORTION OF RUNWAY 32R APPROACH SURFACE DRAWING
DRAFT
McAllen, Texas

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Larry D. Johnson
APPROVED BY: Mike W. Dmyterko

May 2019 SHEET 15 OF 22

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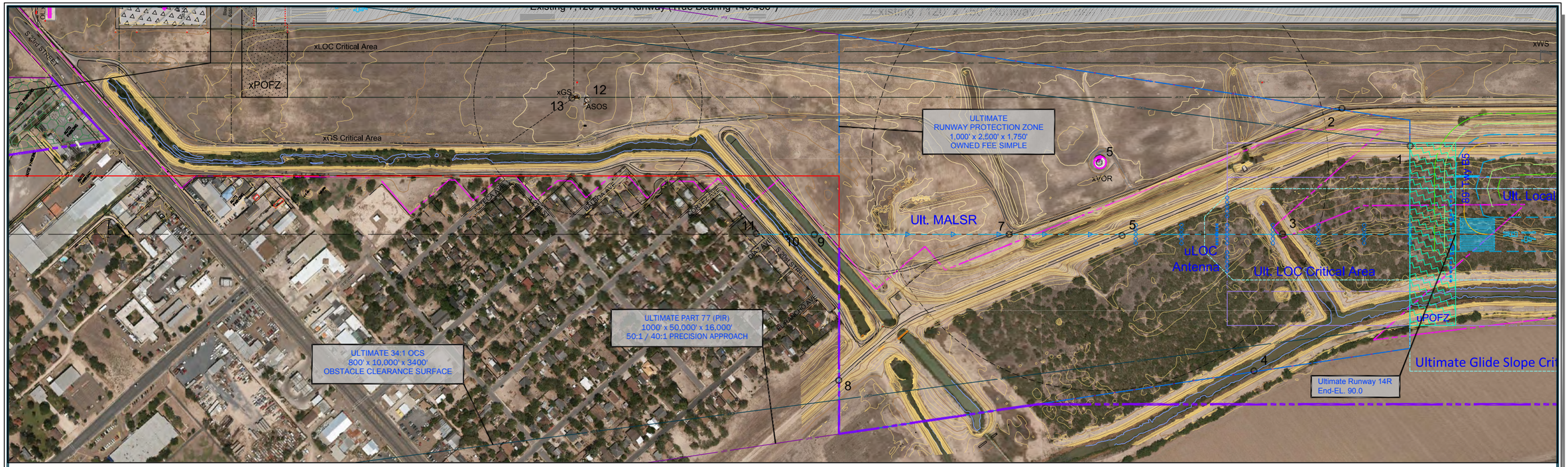

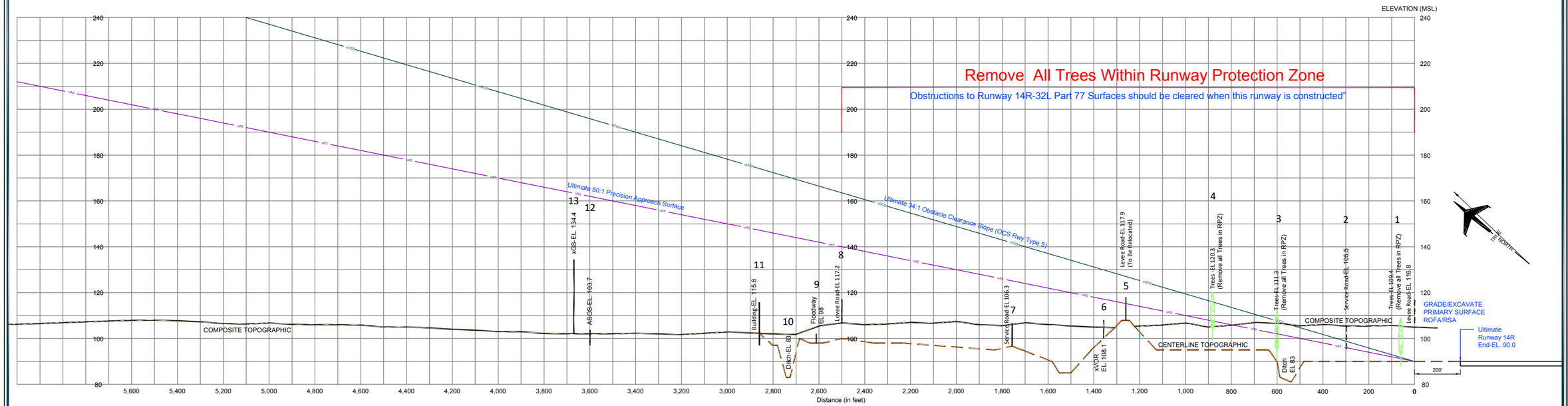

OBSTRUCTION TABLE							
No.	Object Name	Elevation TOP MSL	Existing 50:1 Approach	Existing 34:1 OCS	Ultimate 50:1 Approach	Ultimate 34:1 OCS	Remediation
1	Trees	109.4	N/A	N/A	18.2'	17.1'	Remove all Trees in RPZ
3	Trees	111.3	N/A	N/A	9.2'	3.6'	Remove all Trees in RPZ
4	Trees	120.3	N/A	N/A	12.6'	4.3'	Remove all Trees in RPZ
5	Levee Road	117.9	N/A	N/A	2.7'	0'	To Be Graded

GENERAL NOTES:

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3. Airport Design Advisory Circular No. 150/5300-13A Chg 1, dated 2/26/2014 and EB #99.

Magnetic Declination
4° 5' East (April 2018)
Annual Rate of Change 0° 7' West

0 200 400 600
HORIZONTAL SCALE IN FEET

0 20 40 60
VERTICAL SCALE IN FEET

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McAllen International Airport

INNER PORTION OF RUNWAY 14R APPROACH SURFACE DRAWING

DRAFT

McAllen, Texas

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Larry D. Johnson
APPROVED BY: Mike W. Dmyterko

May 2019 | SHEET 16 OF 22

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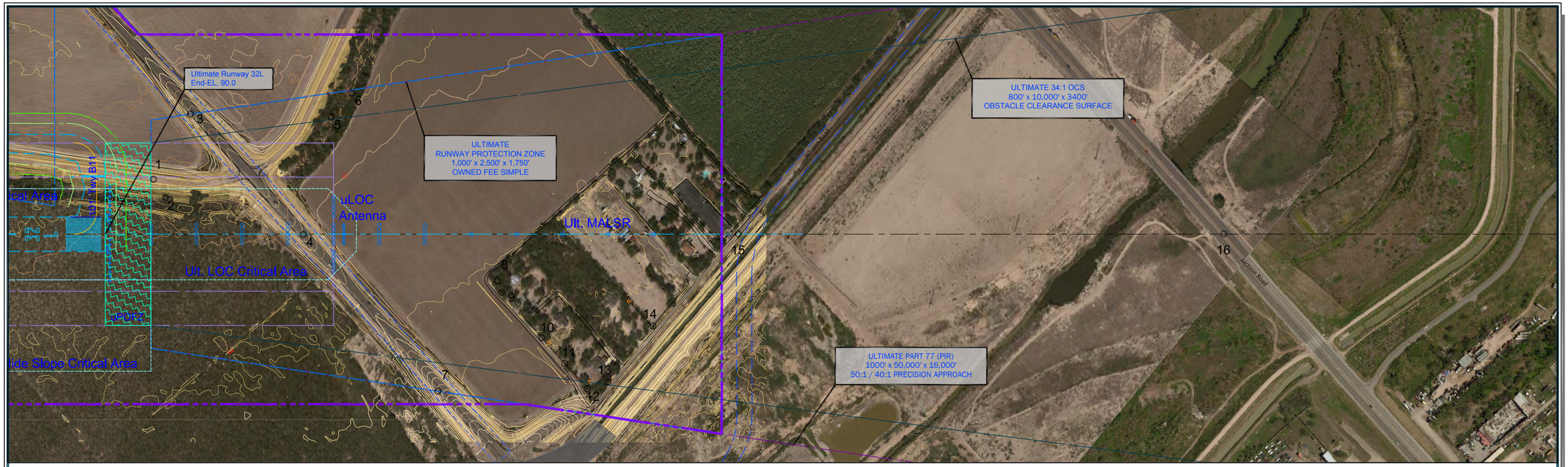
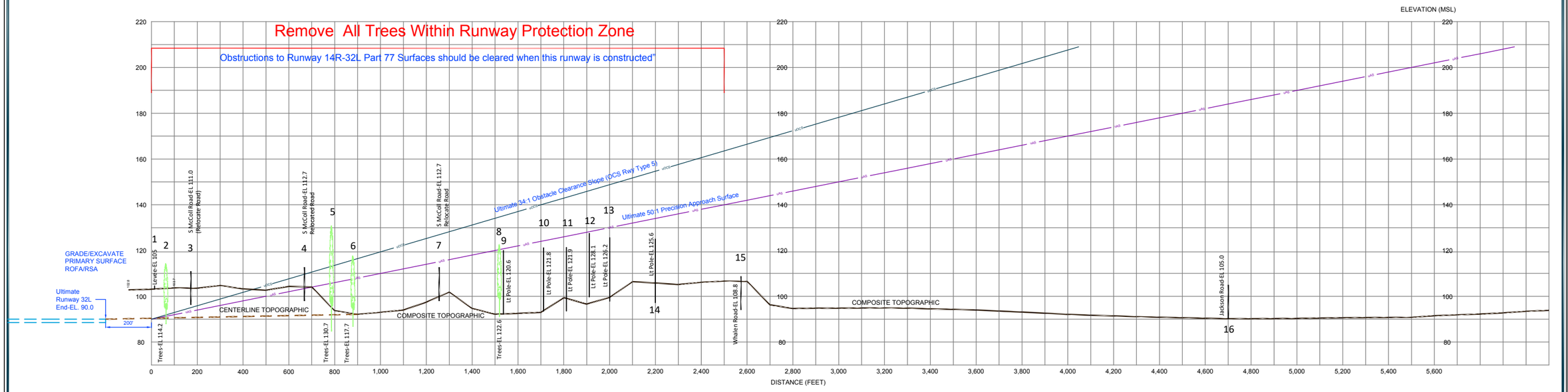


Date of Survey: 9/13/2017



OBSTRUCTION TABLE							
No.	Object Name	Elevation TOP MSL	Existing 50:1 Approach	Existing 34:1 OCS	Ultimate 50:1 Approach	Ultimate 34:1 OCS	Remediation
1	Levee	105	N/A	N/A	15'	15'	Area to Be Graded
2	Trees	114.2	N/A	N/A	23'	22'	Remove All Trees in RPZ
5	Trees	130.7	N/A	N/A	25'	18'	Remove All Trees in RPZ
6	Trees	117.7	N/A	N/A	10.1'	2'	Remove All Trees in RPZ
8	Trees	122.6	N/A	N/A	2.3'	0'	Remove All Trees in RPZ

GENERAL NOTES:

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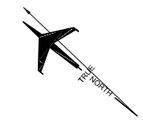
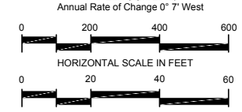


Magnetic Declination
4° 5' East (April 2018)
Annual Rate of Change 0° 7' West



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McAllen International Airport

INNER PORTION OF RUNWAY 32L APPROACH SURFACE DRAWING

DRAFT

McAllen, Texas

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Larry D. Johnson
APPROVED BY: Mike W. Dmyterko

May 2019

Coffman Associates
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EXISTING BUILDINGS/FACILITIES			
NO.	DESCRIPTION	ELEVATION TOP (MSL)	OL LIGHTED
1	Building (Vacant)		
2	McCreery Aviation, Inc.	122.7	
3	McCreery Aviation, Inc.	115.9	
4	McCreery Aviation, Inc.	110.8	
5	McCreery Aviation, Inc.	121.6	
6	McCreery Aviation, Inc.	123.9	
7	McCreery Aviation, Inc.	133.7	
8	Aircraft Rescue and Firefighting Station	124.6	
9	FNBG Financial Group, LP	125.3	
10	FNBG Financial Group, LP	130.8	
11	McCreery Aviation, Inc.	129	
12	Wash Rack		
13	McCreery Aviation, Inc.	131.8	
14	McCreery Aviation, Inc.	131.7	
15	McCreery Aviation, Inc.	135.3	
16	Fuel Farm		
17	McCreery Aviation, Inc.	138.1	
18	McCreery Aviation, Inc.	131.4	
19	McCreery Aviation, Inc.	131.4	
20	Airport Rotating Beacon	160.5	NO
21	Terminal/Administration Building	173.6	

EXISTING BUILDINGS/FACILITIES			
NO.	DESCRIPTION	ELEVATION TOP (MSL)	OL LIGHTED
22	Rio Grande Railcar, LLC	127.8	
23	Craftech Enterprises, Inc.	126.5	
24	Walter J. Passmore	127.7	
25	MFE Aviation, LLC	119.5	
26	Thomas Michael Stanton Dba Western Flyers	121.3	
27	Thomas Michael Stanton Dba Western Flyers	129.3	
28	Thomas Michael Stanton Dba Western Flyers	143.8	
29	Thomas Michael Stanton Dba Western Flyers	126.9	
30	Freedom Aero, LLC	128.4	
31	Electrical Vault	121.6	
32	Mayfair Properties, LLC	129.4	
33	Airport Traffic Control Tower (ATCT)	173.7	OL
34	Segmented Circle/Windsock	112.4	
35	Fuel Tanks (McCreery Aviation)	107.7	
36	Windsock	106.3	OL
37	Fuel Tanks	115.8	
38	Air Cargo Facility	138.3	
39	ASOS	130.6	
40	VOR	126.7	OL
41	Windsock	102.1	OL

ULTIMATE BUILDINGS/FACILITIES		
NO.	DESCRIPTION	ELEVATION TOP (MSL)
50	TERMINAL EXPANSION A	25' AGL
51	TERMINAL EXPANSION B	25' AGL
52	TERMINAL EXPANSION C	25' AGL
53	ARFF	42' AGL
54	CONVENTIONAL HANGAR	35' AGL
55	CONVENTIONAL HANGAR	35' AGL
56	CONVENTIONAL HANGAR	35' AGL
57	CONVENTIONAL HANGAR	35' AGL
58 - 76	EXECUTIVE HANGARS	25' AGL
77 - 95	EXECUTIVE HANGARS	25' AGL
96	CONVENTIONAL HANGAR	35' AGL
97	CONVENTIONAL HANGAR	35' AGL
98	CONVENTIONAL HANGAR	35' AGL
99	CONVENTIONAL HANGAR	35' AGL
100	CONVENTIONAL HANGAR	35' AGL
101	CONVENTIONAL HANGAR	35' AGL
102	CONVENTIONAL HANGAR	35' AGL
103	CONVENTIONAL HANGAR	35' AGL
104	CONVENTIONAL HANGAR	35' AGL
105	PARKING GARAGE	50' AGL
106	ATCT	60' AGL
107	CONSOLIDATED RENTAL CAR CENTER	25' AGL

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
	SAME	ABANDONED PAVEMENT (To Be Removed)
		AIRPORT PROPERTY LINE
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
	SAME	BUILDING ABANDONMENT (To Be Removed)
		BUILDING / MISC. FACILITIES
	SAME	DRAINAGE
		PAVEMENT
		FENCING (up to 10 AGL)
PAPI-4	PAPI-4	NAVIGATIONAL AID INSTALLATION (PAPI)
		RUNWAY THRESHOLD LIGHTS and REIL
	SAME	SECTION CORNER
		SEGMENTED CIRCLE/WIND INDICATOR
	SAME	TOPOGRAPHY (NAVD 88)
		HOLDING POSITION MARKING
		ROAD and PARKING
TOFA	TOFA	TAXIWAY OBJECT FREE AREA
TSA	TSA	TAXIWAY SAFETY AREA
Extd OFA	SAME	EXTENDED OBJECT FREE AREA
xOFZ	uOFZ	RUNWAY OBSTACLE FREE ZONE
xRSA	uRSA	RUNWAY SAFETY AREA
xOFA	uOFA	RUNWAY OBJECT FREE AREA
		RUNWAY PROTECTION ZONE
BRL	SAME	BUILDING RESTRICTION LINE (BRL)
PAPI-4	PAPI-4	NAVIGATIONAL AID INSTALLATION (PAPI)
	SAME	AWOS
xLOC	uLOC	LOCALIZER CRITICAL AREA
xGS	uGS	GLIDE SLOPE CRITICAL AREA
		LOCALIZER ANTENNA
		GLIDE SLOPE ANTENNA
		MALSR APPROACH LIGHT SYSTEM
		PRECISION OBSTACLE FREE ZONE (POFZ)
		TIE-DOWNS
N/A		RUNWAY SHADE
	SAME	TREES
N/A		ISLAND (PAVEMENT MARKING)
xVASI-4	N/A	NAVIGATIONAL AID INSTALLATION (VASI-4)
		WIND INDICATOR/WINDSOCK (WS)
	N/A	EASEMENT

Magnetic Declination
4° 5' East (April 2018)
Annual Rate of Change 0° 7' West

0 200 400 600
SCALE IN FEET

NO.	REVISIONS	DATE	BY	APP'D.
1	-			
2	-			

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McAllen International Airport

TERMINAL AREA DRAWING

DRAFT

McAllen, Texas

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Larry D. Johnson
APPROVED BY: Mike W. Dmyterko

May 2019 | SHEET 18 OF 22

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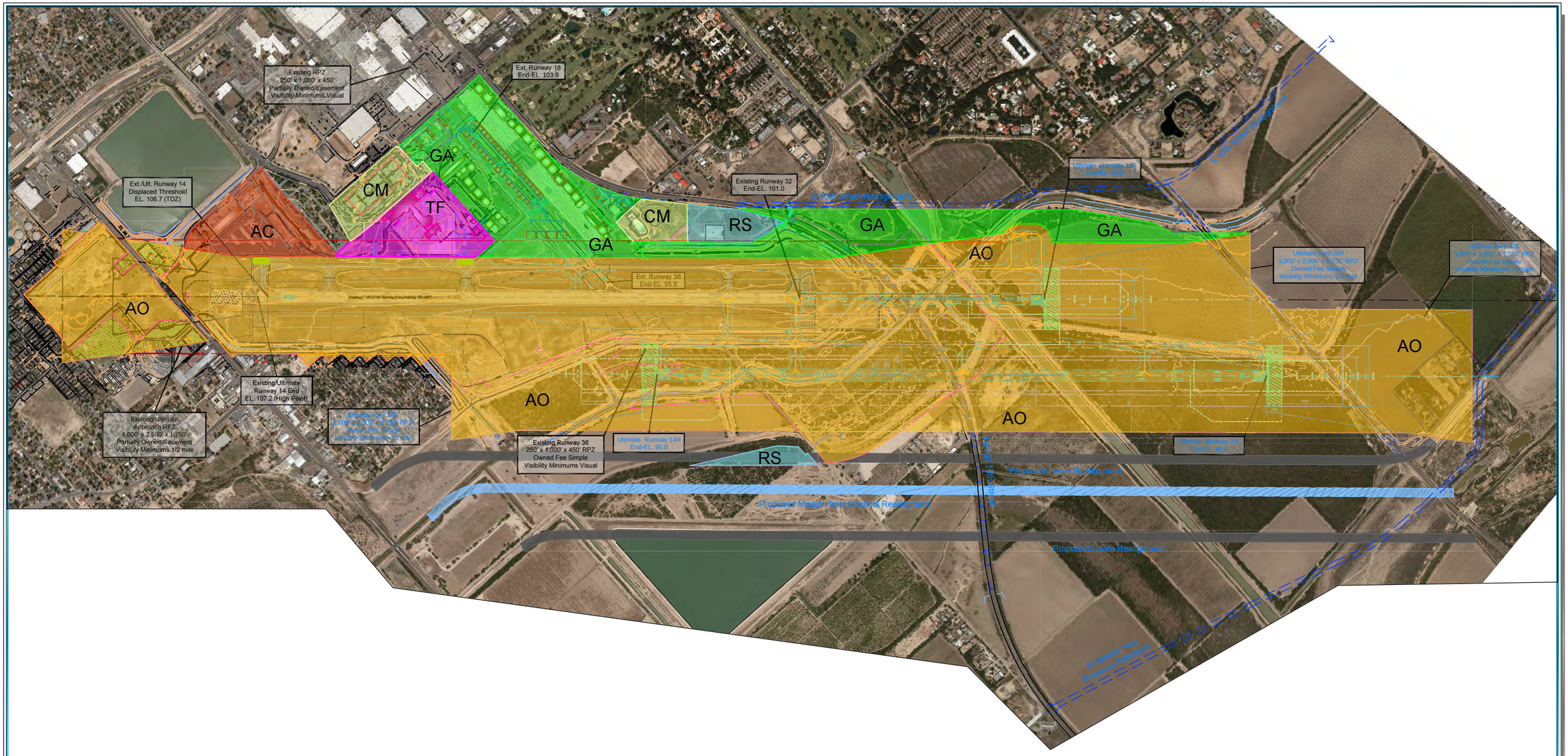

AO	AIRPORT OPERATION / RPZ
AC	AIR CARGO
GA	GENERAL AVIATION
TA	TERMINAL FACILITIES
CM	AIRPORT COMMERCIAL
RS	AIRPORT REVENUE SUPPORT

GENERAL NOTES:

1. Depiction of features and objects, including related elevations and clearances, within the RPZ are depicted on the INNER PORTION OF RUNWAY APPROACH SURFACE DRAWINGS.
2. Details concerning terminal improvements depicted on the TERMINAL AREA DRAWING.
3. Recommended land uses within the airport environs are depicted on the AIRPORT LAND USE DRAWING.
4. NAVD 88 Datum was used for all vertical elevations and NAD 83 for all horizontal elevations.
5. Runway 18 RPZ Variance (V1) over La Plaza Shopping Center allowed by FAA.

Magnetic Declination
4° 5' East (April 2018)
Annual Rate of Change 0° 7' West

0 600 1200 1800

SCALE IN FEET

NO.	REVISIONS	DATE	BY	APP'D.
2	-	—	—	—
1	-	—	—	—

"THE PREPARATION OF THESE DOCUMENTS WAS FINANCED IN PART THROUGH A GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, AS AMENDED. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THESE DOCUMENTS BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS."

McAllen International Airport

AIRPORT LAND USE DRAWING

DRAFT

McAllen, Texas

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Larry D. Johnson
APPROVED BY: Mike W. Dmyterko

May 2019

SHEET 19 OF 22

Coffman Associates
Airport Consultants
www.coffmanassociates.com

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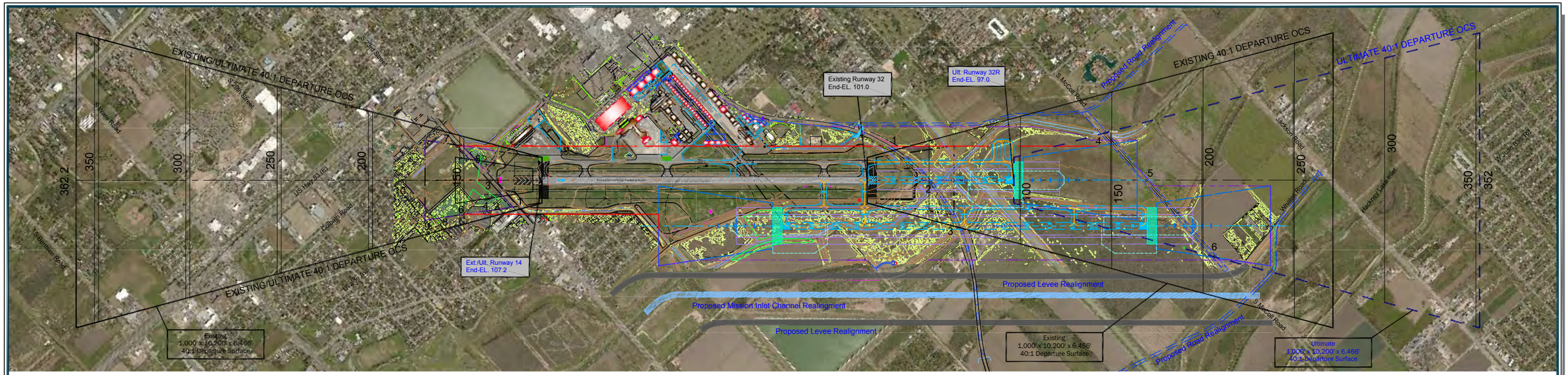
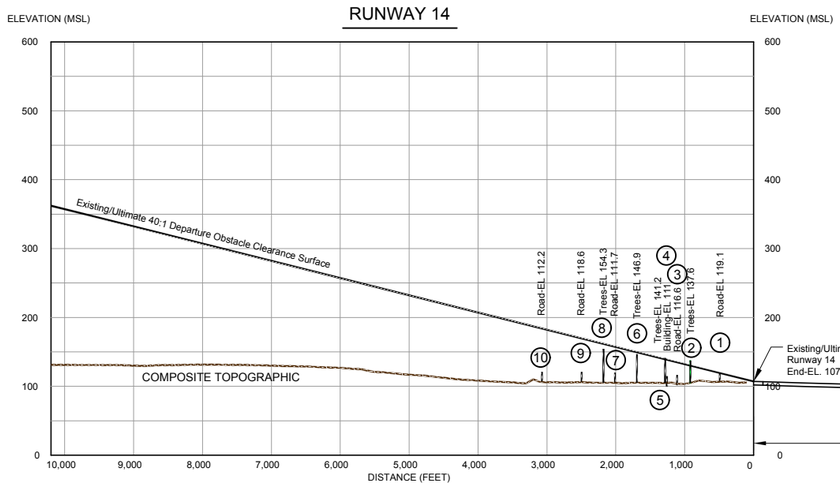
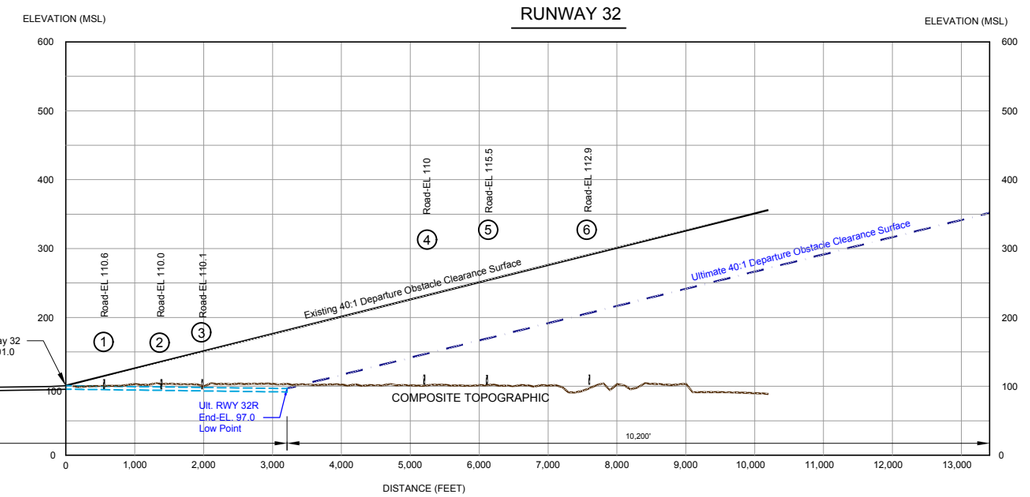


Obstructions to Runway 14L-32R Part 77 Surfaces should be cleared when this runway Extension is constructed"





Magnetic Declination
4° 5' East (April 2018)
Annual Rate of Change 0° 7' West

HORIZONTAL SCALE IN FEET: 0 1000 2000 3000

VERTICAL SCALE IN FEET: 0 100 200 300

Runway 14L OBSTRUCTION TABLE

No.	Object Name	Elevation TOP MSL	Departure OCS Penetration	Remediation
2	Trees	137.6	7.5'	Remove All Trees
5	Trees	141.2	2'	Remove All Trees

Runway 32R OBSTRUCTION TABLE

No.	Object Name	Elevation TOP MSL	Departure OCS Penetration	Remediation
	None			

GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate approach surfaces, unless otherwise noted.
2. Depiction of features and objects within the primary, transitional, horizontal, and conical surfaces, are illustrated on the AIRPORT AIRSPACE DRAWINGS.
3. Depiction of features and objects within the outer portion of the approach surfaces, are illustrated on the RUNWAY APPROACH SURFACE PROFILES.
4. Depiction of features and objects within the inner portion of the approach surfaces, are illustrated on the INNER PORTION OF RUNWAY APPROACH SURFACE DRAWINGS.
5. Roads and Buildings Clearance of more than 50 feet AGL are not detail in Departure Surface Profiles.

NO.	REVISIONS	DATE	BY	APP'D.
1	-	—	—	—
2	-	—	—	—

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McAllen International Airport
RUNWAY 14L-32R
DEPARTURE SURFACE DRAWING
McAllen, Texas

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Larry D. Johnson
APPROVED BY: Mike W. Dmyterko

May 2019 | SHEET 20 OF 22

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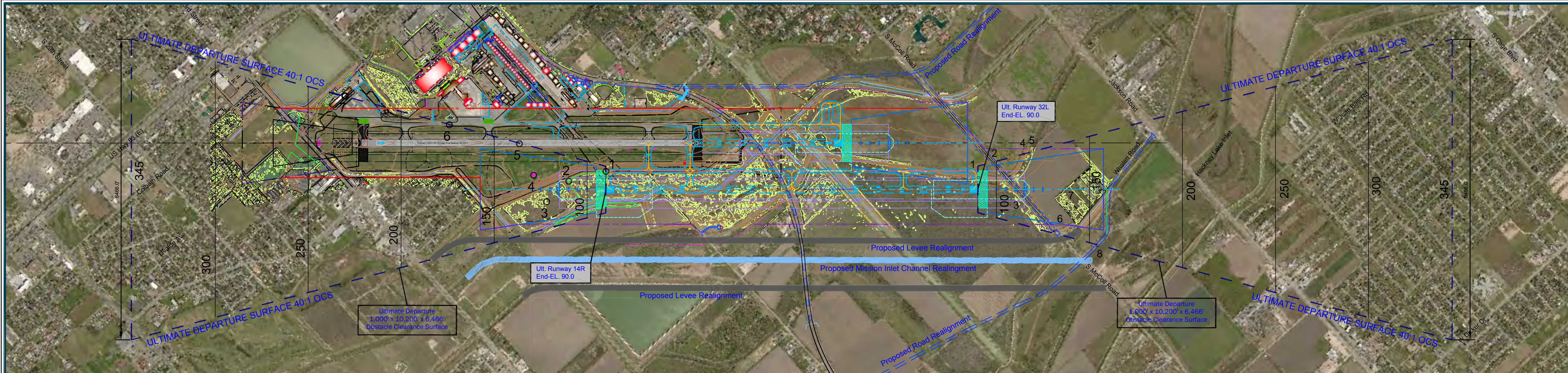
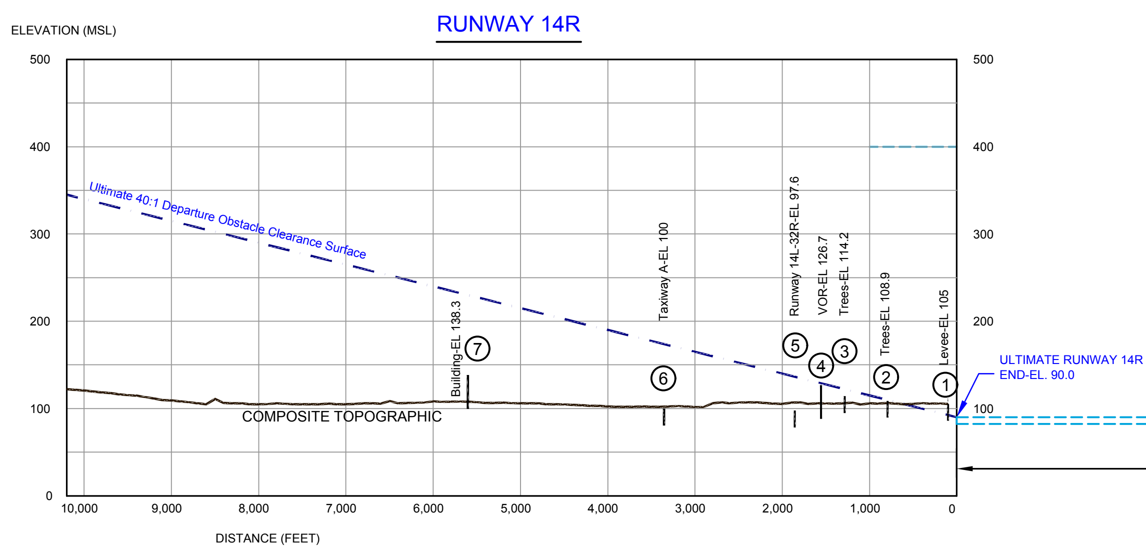
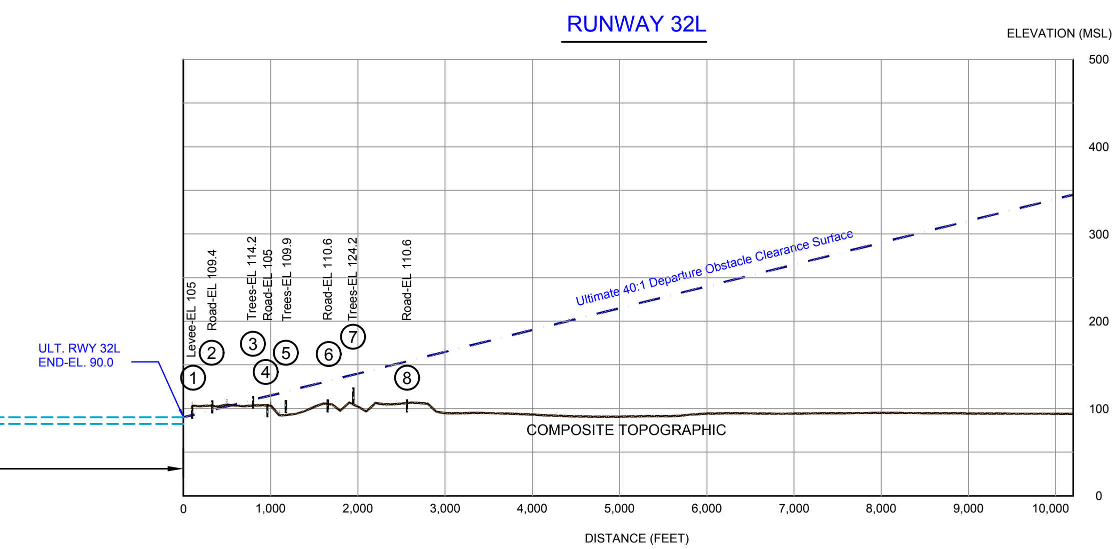


Obstructions to Runway 14R-32L Part 77 Surfaces should be cleared when this runway is constructed"





Magnetic Declination
4° 5' East (April 2018)
Annual Rate of Change 0° 7' West

0 1000 2000 3000
HORIZONTAL SCALE IN FEET

0 100 200 300
VERTICAL SCALE IN FEET

Runway 14R OBSTRUCTION TABLE

No.	Object Name	Elevation TOP MSL	Departure OCS Penetration	Remediation
1	Levee	105	15'	Area To Be Graded

Runway 32L OBSTRUCTION TABLE

No.	Object Name	Elevation TOP MSL	Departure OCS Penetration	Remediation
1	Levee	105	15'	Area To Be Graded
2	S McColl Road	109.4	11.1'	Road To Be Relocated
3	Trees	114.2	4.3'	Remove All Trees

GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate approach surfaces, unless otherwise noted.
2. Depiction of features and objects within the primary, transitional, horizontal, and conical surfaces, are illustrated on the AIRPORT AIRSPACE DRAWINGS.
3. Depiction of features and objects within the outer portion of the approach surfaces, are illustrated on the RUNWAY APPROACH SURFACE PROFILES.
4. Depiction of features and objects within the inner portion of the approach surfaces, are illustrated on the INNER PORTION OF RUNWAY APPROACH SURFACE DRAWINGS.
5. Roads and Buildings Clearance of more than 50 feet AGL are not detail in Departure Surface Profiles.

NO.	REVISIONS	DATE	BY	APP'D.
2	-	—	—	—
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McAllen International Airport
RUNWAY 14R-32L
DEPARTURE SURFACE DRAWING
DRAFT
McAllen, Texas

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Larry D. Johnson
APPROVED BY: Mike W. Dmyterko

May 2019

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EXISTING EASEMENT TABLE

Tract	APN	Grantor	Grantee	Acreage	Instrument	Conveyance	Book/Page	Date	FAA Grant No.
909G				0.99	AVIGATION EASEMENT				FAAP 9-41-053-C909
909F				4.77	AVIGATION EASEMENT				FAAP 9-41-053-C909
909E				11.43	AVIGATION EASEMENT				FAAP 9-41-053-C909
909H				0.25	AVIGATION EASEMENT				FAAP 9-41-053-C909

ULTIMATE AIRPORT PROPERTY DATA TABLE

Tract	Grantor	Grantee	Acreage	Instrument	Conveyance	Book/Page	Date	FAA Grant No.
A1		City of McAllen	0.99	TBD	Fee Simple	TBD	TBD	TBD
A2		City of McAllen	7.46	TBD	Fee Simple	TBD	TBD	TBD
A3		City of McAllen	8.19	TBD	Fee Simple	TBD	TBD	TBD
A4		City of McAllen	4.89	TBD	Fee Simple	TBD	TBD	TBD
A5		City of McAllen	91.00	TBD	Fee Simple	TBD	TBD	TBD
A6		City of McAllen	307.00	TBD	Fee Simple	TBD	TBD	TBD
A7		City of McAllen	72.00	TBD	Fee Simple	TBD	TBD	TBD
A7		City of McAllen	72.00	TBD	Fee Simple	TBD	TBD	TBD
A7		City of McAllen	72.00	TBD	Fee Simple	TBD	TBD	TBD
A8		City of McAllen	2.61	TBD	Fee Simple	TBD	TBD	TBD
A9		City of McAllen	2.29	TBD	Fee Simple	TBD	TBD	TBD

EXISTING PROPERTY TABLE

Tract	APN	Grantor	Grantee	Acreage	Instrument	Conveyance	Book/Page	Date	FAA Grant No.
UNK	151316		City of McAllen	0.00		Fee Simple			
909D	211099		City of McAllen	19.65		Fee Simple			FAAP-9-41-053-C909
5804A	211100		City of McAllen	17.69		Fee Simple			FAAP-9-41-053-5804
5804A	211106		City of McAllen	17.69		Fee Simple			FAAP-9-41-053-5804
6808B	211108		City of McAllen	0.82		Fee Simple			FAAP-9-41-053-6808
UNK	0		City of McAllen	0.00		Fee Simple			
UNK	0		City of McAllen	0.00		Fee Simple			
UNK	0		City of McAllen	0.00		Fee Simple			
UNK	0		City of McAllen	0.00		Fee Simple			
UNK	902495		City of McAllen	0.00		Fee Simple			
1447C	149403		City of McAllen	4.05		Fee Simple			ADAP 6-48-0144-07
909B	0		City of McAllen	10.13		Fee Simple			FAAP 9-41-053-C909
909B	0		City of McAllen	10.13		Fee Simple			FAAP 9-41-053-C909
909B	189370		City of McAllen	10.13		Fee Simple			FAAP 9-41-053-C909
909B	189370		City of McAllen	10.13		Fee Simple			FAAP 9-41-053-C909
909B	0		City of McAllen	10.13		Fee Simple			FAAP 9-41-053-C909
909B	151392		City of McAllen	10.13		Fee Simple			FAAP 9-41-053-C909
UNK	189394		City of McAllen	0.00		Fee Simple			
UNK	0		City of McAllen	0.00		Fee Simple			
701A	189370		City of McAllen	185.38		Fee Simple			FAAP 9-41-053-701
UNK	0		City of McAllen	0.00		Fee Simple			
UNK	0		City of McAllen	0.00		Fee Simple			
UNK	0		City of McAllen	0.00		Fee Simple			
UNK	0		City of McAllen	0.00		Fee Simple			
UNK	0		City of McAllen	0.00		Fee Simple			
UNK	0		City of McAllen	0.00		Fee Simple			
UNK	0		City of McAllen	0.00		Fee Simple			
6006A	211106		City of McAllen	17.69		Fee Simple			FAAP-9-41-053-6808
5804A	211099		City of McAllen	17.69		Fee Simple			FAAP-9-41-053-C909
5804B	189370		City of McAllen	2.89		Fee Simple			FAAP-9-41-053-5804
5905A	189370		City of McAllen	0.77		Fee Simple			FAAP-9-41-053-5905 & 6006
UNK	189370		City of McAllen	0.00		Fee Simple			
5603A	189370		City of McAllen	12.15		Fee Simple			FAAP 9-41-053-5603
5905B	189370		City of McAllen	1.63		Fee Simple			FAAP-9-41-053-5905 & 6006
UNK	189370		City of McAllen	0.00		Fee Simple			
909C	189370		City of McAllen	8.69		Fee Simple			FAAP 9-41-053-C909
909B	189370		City of McAllen	10.13		Fee Simple			FAAP 9-41-053-C909
UNK	189370		City of McAllen	0.00		Fee Simple			
102A	189370		City of McAllen	52.25		Fee Simple			FAAP 9-41-053-102
1441B	189370		City of McAllen	0.92		Fee Simple			ADAP 8-48-0144-01
102A	189370		City of McAllen	52.25		Fee Simple			FAAP 9-41-053-102
1441A	189370		City of McAllen	4.24		Fee Simple			ADAP 8-48-0144-01
UNK	189370		City of McAllen	0.00		Fee Simple			
UNK	189370		City of McAllen	0.00		Fee Simple			
6808A	189370		City of McAllen	2.26		Fee Simple			FAAP 9-41-053-6808
1447A	683459		City of McAllen	3.45		Fee Simple			ADAP 6-48-0144-07
1447B	683459		City of McAllen	7.25		Fee Simple			ADAP 6-48-0144-07
V1	0		City of McAllen	6.00		Variance			

LINE SEG	BEARING	DISTANCE
L1	N 81°17'00" W	223.42'
L2	N 08°43'00" E	221.33'
L3	N 39°32'00" W	810.74'
L4	N 81°17'00" W	74.40'
L5	N 08°16'00" E	1388.60'
L6	S 81°17'00" E	187.80'
L7	N 68°54'19" E	194.94'
L8	S 81°49'41" E	1129.39'
L9	S 08°38'55" W	1504.93'
L10	S 81°21'05" E	253.19'
L11	N 20°03'30" E	557.11'
L12	S 81°21'05" E	1171.03'
L13	S 08°38'55" W	383.00'
L14	S 81°21'05" E	620.00'
L15	N 08°38'55" E	363.00'
L16	S 81°21'05" E	809.00'
L17	S 08°38'55" W	2640.00'
L18	S 81°21'05" E	80.00'
L19	S 08°38'55" W	352.38'
L20	S 39°32'05" E	431.13'
L21	S 81°21'05" E	366.04'
L22	S 50°27'55" W	244.06'
L23	S 39°32'05" E	844.83'
L24	S 71°15'55" E	142.02'
L25	S 63°33'05" E	131.14'
L26	S 87°30'35" E	132.80'
L27	S 64°32'35" E	78.07'
L28	S 64°32'35" E	136.46'
L29	S 72°06'05" E	68.44'
L30	S 39°32'05" E	565.97'
L31	S 81°21'05" E	346.39'
L32	S 08°36'50" W	1320.33'
L33	N 81°22'40" W	70.00'
L34	S 08°38'55" W	598.43'
L35	N 69°13'45" W	190.98'
L36	S 74°59'10" W	70.00'
L37	N 15°00'50" W	13.10'
L38	S 74°59'10" W	356.31'
L39	N 75°55'05" W	203.54'
L40	N 75°55'05" W	244.00'
L41	N 75°55'05" W	1041.09'
L42	N 08°38'47" E	1231.83'
L43	N 46°33'21" W	1783.62'
L44	S 81°21'05" E	890.09'
L45	N 39°56'25" W	708.87'
L46	N 61°32'55" W	380.98'

LINE SEG	BEARING	DISTANCE
L47	N 08°38'55" E	62.04'
L48	S 81°21'05" E	663.37'
L49	N 39°56'41" W	481.61'
L50	N 61°41'31" W	320.85'
L51	N 61°41'31" W	694.12'
L52	N 64°01'05" W	550.76'
L53	N 08°38'55" E	120.60'
L54	N 81°21'05" W	284.60'
L55	N 08°38'55" E	644.50'
L56	N 81°17'00" W	196.70'
L57	N 08°43'00" E	179.00'
L58	N 81°17'00" W	90.00'
L59	N 08°43'00" E	60.92'
L60	N 39°32'00" W	117.25'
L61	N 81°17'00" W	112.52'
L62	N 08°43'00" E	127.24'
L63	N 39°32'00" W	77.73'
L64	N 81°17'00" W	142.01'
L65	N 08°43'00" E	99.04'
L66	N 39°32'00" W	58.66'
L67	N 81°17'00" W	125.73'
L68	N 08°43'00" E	139.04'
L69	N 39°32'00" W	60.02'
L70	N 81°17'00" W	164.71'
L71	N 08°43'00" E	120.20'
L72	N 39°32'00" W	28.23'
L73	N 39°56'25" W	1685.70'
L74	S 52°34'05" E	1175.52'
L75	S 36°31'05" E	282.80'
L76	S 08°38'55" W	140.00'
L77	S 81°22'40" E	33.42'
L78	S 08°38'58" W	208.98'
L79	N 39°21'00" W	421.90'
L80	N 81°16'30" W	416.80'
L81	N 08°39'30" E	478.50'
L82	N 81°20'30" W	730.10'
L83	N 13°56'54" E	271.16'
L84	N 08°39'30" E	690.00'
L85	S 81°20'30" E	575.00'
L86	N 08°39'30" E	60.00'
L87	S 81°20'30" E	816.17'
L88	S 08°03'28" W	551.23'
L89	N 81°20'30" W	253.75'
L90	S 08°39'30" W	169.70'
L91	S 81°20'30" E	254.91'
L92	S 08°16'02" W	1031.74'

NUMBER	CHORD BEARING	RADIUS	AL
C1	N 83°35'10" E	475.00'	243.42'
C2	N 83°32'18" E	425.00'	217.08'
C3	S 12°58'21" E	4220.51'	790.57'
C4	N 60°11'35" W	1570.00'	861.78'

TRUE NORTH

Magnetic Declination
4° 5' East (April 2018)
Annual Rate of Change 0° 7' West

0 600 1200 1800
SCALE IN FEET

FOR APPROVAL BY:

Airport Manager: Elizabeth Suarez DATE

FAA APPROVAL STAMP

NO.	REVISIONS	DATE	BY	APP'D.
2	-	—	—	—
1	-	—	—	—

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McAllen International Airport

EXHIBIT A AIRPORT PROPERTY MAP

DRAFT

McAllen, Texas

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Larry D. Johnson
APPROVED BY: Mike W. Dmyterko

May 2019 SHEET 22 OF 22

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www.coffmanassociates.com

KANSAS CITY
(816) 524-3500

237 N.W. Blue Parkway
Suite 100
Lee's Summit, MO 64063

PHOENIX
(602) 993-6999

4835 E. Cactus Road
Suite 235
Scottsdale, AZ 85254