FINAL REPORT

Brownsville South Padre Island International Airport Airport Master Plan

Prepared for

Brownsville South Padre Island International Airport

August 2019

9191 South Jamaica Street
Englewood, CO 80112
(303) 771-0900

Contents

Tables

Figures

Acronyms and Abbreviations

%	percent
AAC	Aircraft Approach Category
AC	Advisory Circular
ADG	Airplane Design Group
AGL	aboveground level
AIP	Airport Improvement Program
ALP	Airport Layout Plan
APV	Approach with Vertical Guidance
ARC	Airport Reference Code
ARFF	Aircraft Rescue and Firefighting
ATCT	Air Traffic Control Tower
BCIC	Brownsville Community Improvement Corporation
BRO	Brownsville South Padre Island International Airport
CBP	U.S. Customs and Border Protection
CFR	*Code of Federal Regulations*
CIP	Capital Improvement Plan
CPE	Airline Cost per Enplanement
CSA	combined statistical area
DME	distance measuring equipment
FAA	Federal Aviation Administration
FAR	Federal Aviatio Regulation
FBO	Fixed Base Operator
FIS	Federal Inspection Station
ft^2	square feet
FY	Fiscal Year
GA	general aviation
GBIC	Greater Brownsville Incentives Corporation
GPS	Global Positioning System
GRP	gross regional product
HRL	Valley International Airport
ICE	Immigration and Customs Enforcement
IFR	Instrument Flight Rule
lbs	pounds

LF	linear foot
LNAV	lateral navigation
LOC	Localizer
LP	Localizer Performance
LPV	Localizer Performance Vertical Guidance
MALSR	Medium-intensity Approach Lighting System
MAM	General Servando Canales International Airport
MFE	Mc Allen Miller International Airport
MHz	megahertz
MSA	metropolitan statistical area
NAVAID	navigational aid
NDB	Non-Directional Radio Beacon
NFDC	National Flight Data Center
Nm	nautical mile
NPA	Non-precision Approach
NPIAS	National Plan of Integrated Airport Systems
OIS	Obstruction Identification Services
PA	Precision Approach
PAPI	Precision Approach Path Indicator
PCI	Pavement Condition Index
PFC	Passenger Facility Charge
PUB	Brownsville Public Utilities Board
r^2	correlation factors that are statistical measurements of the relationship among variables included in the analysis
RDC	Runway Design Code
REX	Reynosa
RNAV	Area Navigation
RNP	Required Navigation Performance
RPZ	Runway Protection Zone
RVA	Robinson Aviation
RVR	Runway Visual Range
SOP	standard operating procedure
TACAN	tactical air navigation system
TAF	terminal area forecast
TDG	Taxiway Design Group

TERPS	Terminal Instrument Procedures
TexDOT	Texas Department of Transportation
USDOT	U.S. Department of Transportation
VASI	Visual Approach Slope Indicator
VFR	Visual Flight Rule
VHF	very high frequency
VNAV	vertical navigation
VOR	very high frequency omnidirectional range
VORTAC	very high frequency omnidirectional range with a tactical air navigation system
Vref	reference landing speed
W&P	Woods & Poole Economics, Inc.
WAAS	Wide Area Augmentation System

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Introduction

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Acronyms and Abbreviations

AC	Advisory Circular
ALP	Airport Layout Plan
BRO	Brownsville South Padre Island International Airport
FAA	Federal Aviation Administration

SECTION 1

Introduction

This Airport Master Plan was developed to assist the City of Brownsville in developing Brownsville South Padre Island Airport (BRO) in a manner that coincides with current and future aviation demand. This Airport Master Plan identifies new airport planning and development recommendations, consistent with the airport's present and future needs for a "20-year planning horizon" long-range plan.

1.1 Project Background

The City of Brownsville, after consultation with the Federal Aviation Administration (FAA), initiated a planning study to identify sound planning recommendations to meet FAA's requirements for safe and efficient facilities, as well as provide for a well-planned airport, and make informed decisions with regard to near-term capital improvements. The previous Airport Master Plan was out of date and did not accurately reflect many changes that had occurred, since it was completed over 20 years ago in 1997.

1.2 Compliance with FAA and other Federal Guidance and Requirements

This narrative report, Airport Layout Plan (ALP) drawing set sheet, and analysis were developed in compliance with various FAA and other federal guidance including:

- FAA/Federal Aviation Regulations
- Current FAA Standard Operating Procedures (Nos. 2.00 and 3.00) checklists dated October 1, 2013
- FAA Advisory Circulars (ACs):
  - AC 150/5070-6B, Master Plans, Change 2
  - AC 150/5300-13A, Airport Design, Change 1
  - AC 150/5060-5, Airport Capacity and Delay
  - AC 150/5325-4B, Runway Length Requirements for Airport Design
  - AC 150/5200-36A, Qualifications for Wildlife Biologist
- Engineering Brief 75, Incorporation of Runway Incursion Prevention into Taxiway and Apron Design
- FAA Interim Guidance Memorandum on Land Uses within the Runway Protection Zone
- 14 Code of Federal Regulations Part 77, Safe, Efficient Use, and Preservation of the Navigable Airspace
- FAA Order 5100.38D, Airport Improvement Plan Handbook
- FAA Order 1050.1F, Environmental Impacts Policies and Procedures
- FAA Order 5050.4B, National Environmental Policy Act Implementing Instructions for Airport Actions
- FAA Order 5090.3C, Field Formulation of the National Plan of Integrated Airport Systems
- Other applicable ACs and changes, FAA Orders and Federal Aviation Regulations

1.3 Previous Studies

Several planning efforts were completed at BRO in the past and are referenced to provide a consistent approach to future development at the airport. Previous planning documents referenced include:

- Airport Master Plan last updated in 1997
- ALP Updates in 2000 and 2007
- Property Acquisition Plan completed in 2007
- Terminal Optimization Study completed in 2012
- Terminal Area Master Plan in 2014
- ALP Update and Runway Length and Strength Analysis completed in 2016
- Airfield Optimization Study completed in 2013 as the first phase of the Master Plan Update
- Environmental Assessment for New Passenger Terminal Building in 2015

1.4 Public Outreach

Understanding the needs, desires, and concerns of stakeholders who may rely on or be impacted by future airport development is critical to the overall success of a project. A successful public outreach program provides a format for a meaningful exchange of thoughts and ideas that shape the eventual outcome of a project.

Five meetings were held as part of this project during regularly scheduled Airport Board meetings:

- November 2016
- December 2016
- January 2017
- April 2017
- November 2017

1.5 Project Goals

- Document existing airport facilities and activity levels
- Update aviation demand and fleet mix forecasts for the airport
- Identify layout and size of airside and landside facilities to accommodate projected aircraft demand and FAA airport design standards
- Develop realistic phased development and financial plans for the airport
- Evaluate potential environmental impacts of proposed development projects
- Prepare an ALP drawing set and associated Master Plan narrative report that meets current FAA standards

1.6 Steps

Developing the Airport Master Plan with ALP requires a series of specific steps. The planning process addresses several basic elements in the following chapters.

1.6.1 Inventory

The airport inventory collects information about the existing airport facilities, including characteristics of the existing runways and taxiways, hangars, aircraft parking aprons, passenger terminal building, airport access, and airport users, as well as airport services.

1.6.2 Aviation Demand Forecasts

The aviation demand forecasts chapter predicts future aircraft operation levels and future enplanements, as well as future based aircraft. Aviation demand forecasts also consider the types of aircraft that will operate at the airport.

All predictions are made based on the accepted statistical methods practiced within the aviation planning industry, recognizing that no method for predicting future events exists that produces 100% accurate results. Anticipated levels of airport activity at the airport are organized in set intervals, and the FAA must approve aviation demand forecasts.

1.6.3 Demand/Capacity and Facility Requirements

The demand/capacity and facility requirements chapter compares existing airport conditions to the expected future demand and identifies where there are deficiencies or excesses within the airport facility.

1.6.4 Alternatives Analysis

This portion of the Airport Master Plan proposes and compares possible options to meet the needs of the airport. The preferred alternatives form the basis for future airport development at BRO.

1.6.5 Implementation/Phasing Plan and Cost Estimates

The implementation/phasing plan and associated financial chapter provides a phased listing of projects required to meet future needs as well as cost estimates. The financial chapter identifies potential sources of funding.

1.6.6 Environmental Overview and Solid Waste and Recycling Plan

The environmental overview chapter evaluates potential environmental impacts of proposed development projects.

The Solid Waste and Recycling Plan is needed to meet requirements of Public Law 112-95, FAA Modernization and Reform Act of 2012, which requires airport sponsors complete a Solid Waste and Recycling Plan as part of the master planning process.

1.6.7 Airport Layout Plan Drawing Set

The ALP is a series of drawings depicting the existing airport and the proposed changes to the airport over the next 20 years.

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CFR	*Code of Federal Regulations*
DME	distance measuring equipment
FAA	Federal Aviation Administration
FAR	Federal Aviatio Regulation
FBO	Fixed Base Operator
FIS	Federal Inspection Station
ft^2	square feet
GA	general aviation
GPS	Global Positioning System
ICE	Immigration and Customs Enforcement
IFR	Instrument Flight Rule
ILS	Instrument Landing System
lbs	pounds
LF	linear foot
LNAV	lateral navigation
LOC	Localizer
LP	Localizer Performance
LPV	Localizer Performance Vertical Guidance
MALSR	Medium-intensity Approach Lighting System
MHz	megahertz
NAVAID	navigational aid

NDB	Non-Directional Radio Beacon
NFDC	National Flight Data Center
Nm	nautical mile
NPA	Non-precision Approach
NPIAS	National Plan of Integrated Airport Systems
OIS	Obstruction Identification Services
PA	Precision Approach
PAPI	Precision Approach Path Indicator
PCI	Pavement Condition Index
PUB	Brownsville Public Utilities Board
RDC	Runway Design Code
REX	Reynosa
RNAV	Area Navigation
RNP	Required Navigation Performance
RVA	Robinson Aviation
RVR	Runway Visual Range
TACAN	tactical air navigation system
TDG	Taxiway Design Group
TERPS	Terminal Instrument Procedures
VASI	Visual Approach Slope Indicator
VFR	Visual Flight Rule
VHF	very high frequency
VNAV	vertical navigation
VOR	very high frequency omnidirectional range
VORTAC	very high frequency omnidirectional range with a tactical air navigation system
Vref	reference landing speed
WAAS	Wide Area Augmentation System

SECTION 2

Inventory of Existing Conditions

2.1 Airport Background

2.1.1 Airport Vicinity

Brownsville South Padre Island International Airport (BRO) is located at the southern tip of Texas, approximately 280 miles south of San Antonio in Cameron County. BRO is situated within the city limits of Brownsville, Texas, 4 miles east of downtown Brownsville.

The airport acts as a gateway to South Padre Island, a summer vacation area for many. In addition, BRO is the closest state commercial-service airport to the Matamoros region of Mexico, hence serving as the front door to the U.S. from Mexico. It is a key airport facilitating trade between the U.S. and Mexico, supporting the North American Free Trade Agreement; a Free Trade Zone is located at BRO. Figure 2-1 shows the airport's general location.

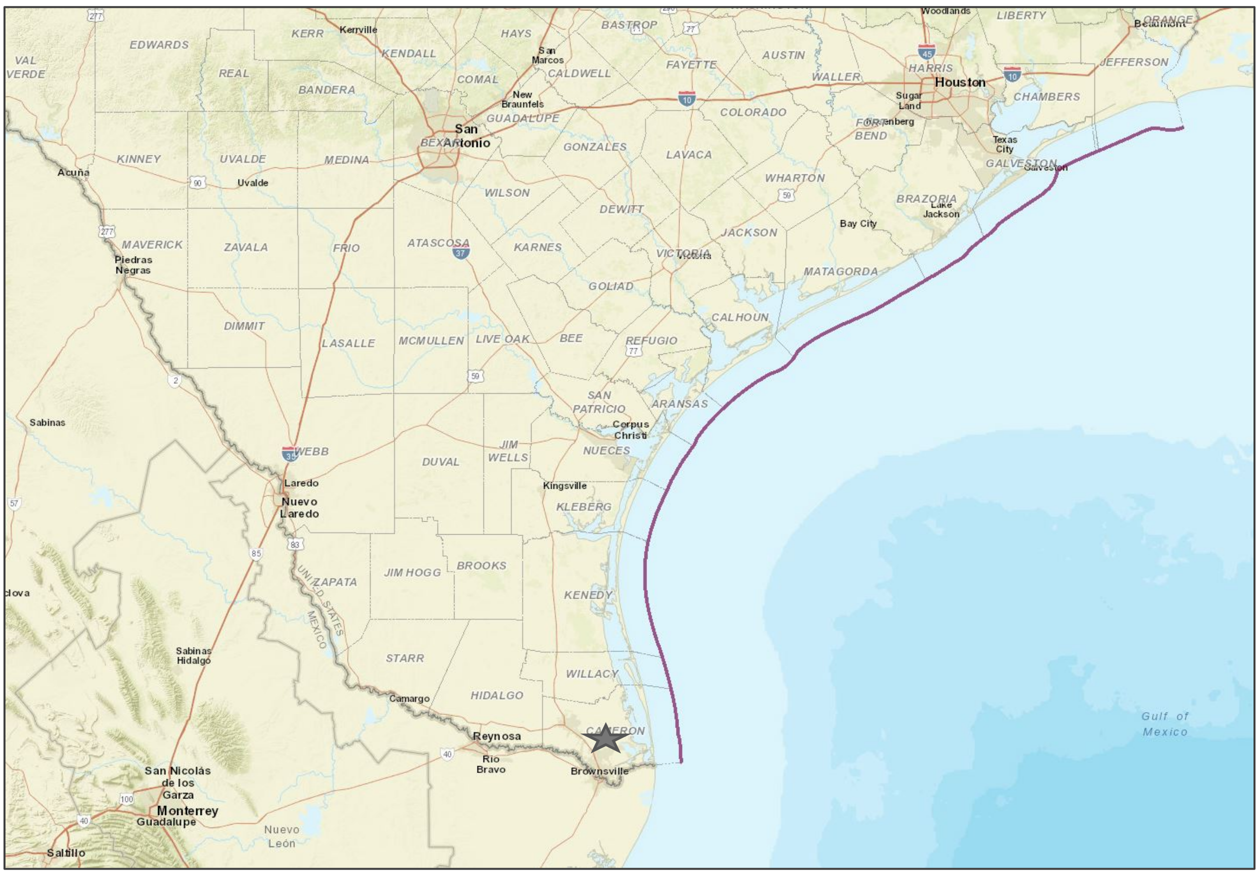


Figure 2-1. Vicinity Map
Data Source: Texas General Land Office

2.1.2 Airport History

On March 9, 1929, Charles Lindberg landed in Brownsville on the first leg of the historic flight that brought air mail service to Mexico. The event served as the official opening of the airport. Pan American Airways (now known as Pan American World Airways) was the first airline to use the airport 2 months after the official opening, and the airport was officially named the Brownsville-Pan American Municipal

Airport. The airport was designated imperative to National Defense during World War II, and the 201st Fighter Squadron, a Mexican military unit, was based there. After the war, commercial operations took off with Pan American offering more flights in and out of BRO as well as new flights from Trans Texas Airways.

In the 1980s, the airport changed its name to Brownsville South Padre Island International Airport; Continental Airlines began serving the airport in the early 1990s. In 2015, Allegiant Air briefly offered low-cost service between Brownsville and Las Vegas. As of 2016, American Airlines provided direct service to Dallas/Fort Worth International Airport, and United Airlines provided direct service to George Bush Intercontinental Airport in Houston.

The Federal Aviation Administration (FAA) defines BRO as a nonhub primary airport in the 2017-2021 National Plan of Integrated Airport Systems (NPIAS). The NPIAS defines nonhub primary airports as those with commercial services that enplane less than 0.05% of all commercial passenger enplanements but have more than 10,000 annual enplanements. American Airlines and United Airlines currently provide year-round service at BRO. Airlines schedule may include short-term seasonal variations during the spring break period, for instance. Currently, the airlines operate mostly ERJ135/145, as well as ERJ175 and CRJ-900 to a lower extent.

2.1.3 Recent Projects

Table 2-1 lists projects eligible for FAA Airport Improvement Program (AIP) funding completed at the airport since 2005. Since 2005, the airport has received nearly $39 million of AIP fund, allowing for numerous runway and taxiway rehabilitations and the studies and design necessary for construction of a new terminal building.

Table 2-1. Airport Improvement Program Grant History

Year	Project Description	AIP Federal Funds
2005	Acquire Land for Noise Compatibility within 65-69 DNL	$955,349
2005	Expand Apron	$1,504,548
2006	Conduct Noise Compatibility Plan Study	$320,602
2006	Construct Apron, Improve Airport Drainage, Rehab Apron, Rehab Runway 13R/31L	$1,000,000
2007	Conduct Miscellaneous Study, Improve Runway Safety Area 17/35, Rehab Apron, Rehab Taxiway	$4,926,359
2008	Improve Airport Drainage, Install Airfield Guidance Signs, Install Apron Lighting, Install Perimeter Fencing	$632,500
2008	Improve Airport Drainage	$1,995,000
2008	Rehab Taxiway	$8,891,464
2009	Improve Terminal Building, Install Emergency Generator, Rehab Runway Lighting - 13R/31L, Rehabilitate Taxiway	$999,778
2010	Conduct Miscellaneous Study, Install Airport Beacons, Rehab Taxiway, Rehabilitate Terminal Building, Wildlife Hazard Assessments	$795,110
2010	Rehab Taxiway, Rehabilitate Taxiway	$3,902,621
2011	Conduct Miscellaneous Study, Improve Airport Drainage, Improve Terminal Building, Install Airport Beacons, Rehab Taxiway, Remove Obstructions	$914,000
2012	Improve Terminal Building, Install Airfield Guidance Signs, Rehabilitate Apron	$646,178

Table 2-1. Airport Improvement Program Grant History

Year	Project Description	AIP Federal Funds
2013	Install Airfield Guidance Signs, Rehab Apron, Rehab Runway 13R/31L, Rehab Taxiway “B”	$7,973,523
2014	Acquire Aircraft Rescue & Fire Fighting Vehicle, Construct Terminal Building, Update Airport Master Plan Study	$1,088,100
2015	Construct Terminal Building	$1,200,000
2016	Conduct Airport Master Plan Study, Install Airport Beacons	$837,000

Source: FAA AIP Grant History

2.1.4 Airport Needs and Opportunities

Major needs at BRO include a new terminal building, which is in the design phase, as well as pavement maintenance and rehabilitation of both the runways. In addition, the airport would like to improve passenger experience and airport appeal, mainly by improving airport access and landside functions.

One opportunity for BRO and the region is linked to SpaceX selecting a location near Brownsville for its space launch facility. SpaceX has a contract with NASA to fly cargo resupply missions to the International Space Station. A final environmental impact statement was completed in May 2014 and allows SpaceX to build a privately owned launch site for Falcon 9 and Falcon Heavy orbital vertical launch vehicles, as well as variety of reusable suborbital launch vehicles. Construction for the launch site has already begun. The site is in Cameron County, approximately 17 miles east-northeast of BRO and approximately 5 miles south of South Padre Island. It is anticipated SpaceX will be using BRO as one of the airports to accommodate heavy cargo aircraft operations in support of its space program shortly after the launch site is completed.

Other opportunities include the Port of Brownsville, which is near the airport. Better connectivity between the port and the airport could encourage industrial development and stimulate cargo at the airport. Roads and rail improvements are planned in Cameron County, and a connection between the Port of Brownsville and BRO is planned in the future.

2.2 Airfield and Airspace

This section details the airfield and airspace elements at BRO, including existing conditions of the airside system and of the regional airspace.

2.2.1 Airfield

Airfield facilities include runways, taxiways, apron areas, navigational aids (NAVAID), and airfield lighting and marking.

2.2.1.1 Existing Airport Reference Code

The geometric layouts of airport runways, taxiways, taxilanes, and aprons are based on safety and maneuverability requirements for the design aircraft. According to the FAA, the design aircraft is an airplane, or a family of airplanes, projected to perform at least 500 annual operations (or 250 takeoffs).

The airport design standards for the design aircraft are based on the following parameters:

- The Aircraft Approach Category (AAC) is based on the reference landing speed (Vref), or 1.3 times stall speed at the maximum certificated landing weight.

- The Airplane Design Group (ADG) is based on wingspan and tail height of aircraft. When the design aircraft falls in different groups as a result of tail heights, the higher group is used. FAA AAC and ADG categories are listed in Table 2-2.

The existing Airport Reference Code (ARC) is based on the highest Runway Design Code (RDC), which is determined by the Design Aircraft. The existing ARC is C-IV at BRO.

Table 2-2. FAA Aircraft Approach Category and Airplane Design Group

AAC	Vref/Approach Speed	ADG	Tail Height (feet)	Wingspan (feet)
A	Approach speed less than 91 knots	I	< 20	< 49
B	Approach speed 91 knots or more, but less than 121 knots	II	20 - < 30	49 - < 79
C	Approach speed 121 knots or more, but less than 141 knots	III	30 - < 45	79 - < 118
D	Approach speed 141 knots or more, but less than 166 knots	IV	45 - < 60	118 - < 171
E	Approach speed 166 knots or more	V	60 - < 66	171 - < 214
		VI	66 - < 80	214 - < 262

Notes:

Current AAC and ADG at BRO is highlighted in blue

< = less than

Source: FAA AC 150/5300-13A Airport Design (2012)

2.2.1.2 Runways

The RDC is used to identify the design standards to which a runway should be built. It is based on the AAC and ADG of the design aircraft, as well as on the designated or planned runway visibility minimums expressed by Runway Visual Range (RVR) values, as listed in Table 2-3. The RVR is a horizontal visual range and represents the horizontal distance a pilot can expect to see down the runway.

BRO is equipped with two runways, Runway 13/31 and Runway 18/36. Runway 13/31 has a RDC C-IV and is 7,399 feet long and 150 feet wide. Runway 18/36 also has an RDC C-IV and is 6,000 feet long and 150 feet wide. Both runways are composed of grooved asphalt. The National Flight Data Center (NFDC) reports both runways are in good condition; however, pavement condition indicates the runways are close to their life expectancy and will need to be rehabilitated and maintained in the near term.

Runway 13/31 is the primary runway that supports single-wheel, double-wheel, and double-tandem aircraft operations of 75,000; 170,000; and 240,000 pounds (lbs) respectively. Runway 18/36 is capable of supporting single-wheel, double-wheel, and double-tandem aircraft operations of 75,000; 144,000; and 150,000 lbs, respectively.

Table 2-3. Visibility Minimums

RVR (feet)[a]	Instrument Flight Visibility Category (Statute Mile)
5,000	Not lower than 1 mile
4,000	Lower than 1 mile but, not lower than 3/4 mile
2,400	Lower than 3/4 mile, but not lower than 1/2 mile
1,600	Lower than 1/2 mile, but not lower than 1/4 mile
1,200	Lower than 1/4 mile

Note:

[a] RVR values are not exact equivalents.

Source: FAA AC 150/5300-13A Airport Design (2012)

Both runways 13/31 and 18/36 are C-IV. The main characteristics of the two runways are listed in Table 2-4, while Figure 2-2 depicts the airfield.

Table 2-4. Runways Characteristics

	Runway 13/31	Runway 18/36
RDC	C-IV-2400	C-IV-5000
Runway Length	7,399 feet	6,000 feet
Runway Width	150 feet	150 feet
Pavement Type and Condition	Grooved asphalt in good condition[a]	Grooved asphalt in good condition[a]
Pavement Strength	Single Wheel: 75,000 lbs Double Wheel: 170,000 lbs Double Tandem: 240,000 lbs PCN: ———	Single Wheel: 75,000 lbs Double Wheel: 144,000 lbs Double Tandem: 150,000 lbs PCN: ——-
Runway Markings	Precision (good condition)	Non Precision (good condition)
Runway Centerline to Hold line	250 feet	250 feet

Note:

[a] NFDC reports both runways are in good condition. However, pavement condition and remaining life expectancy show the runways will need to be rehabilitated in the near term.

Source: NFDC, 2016

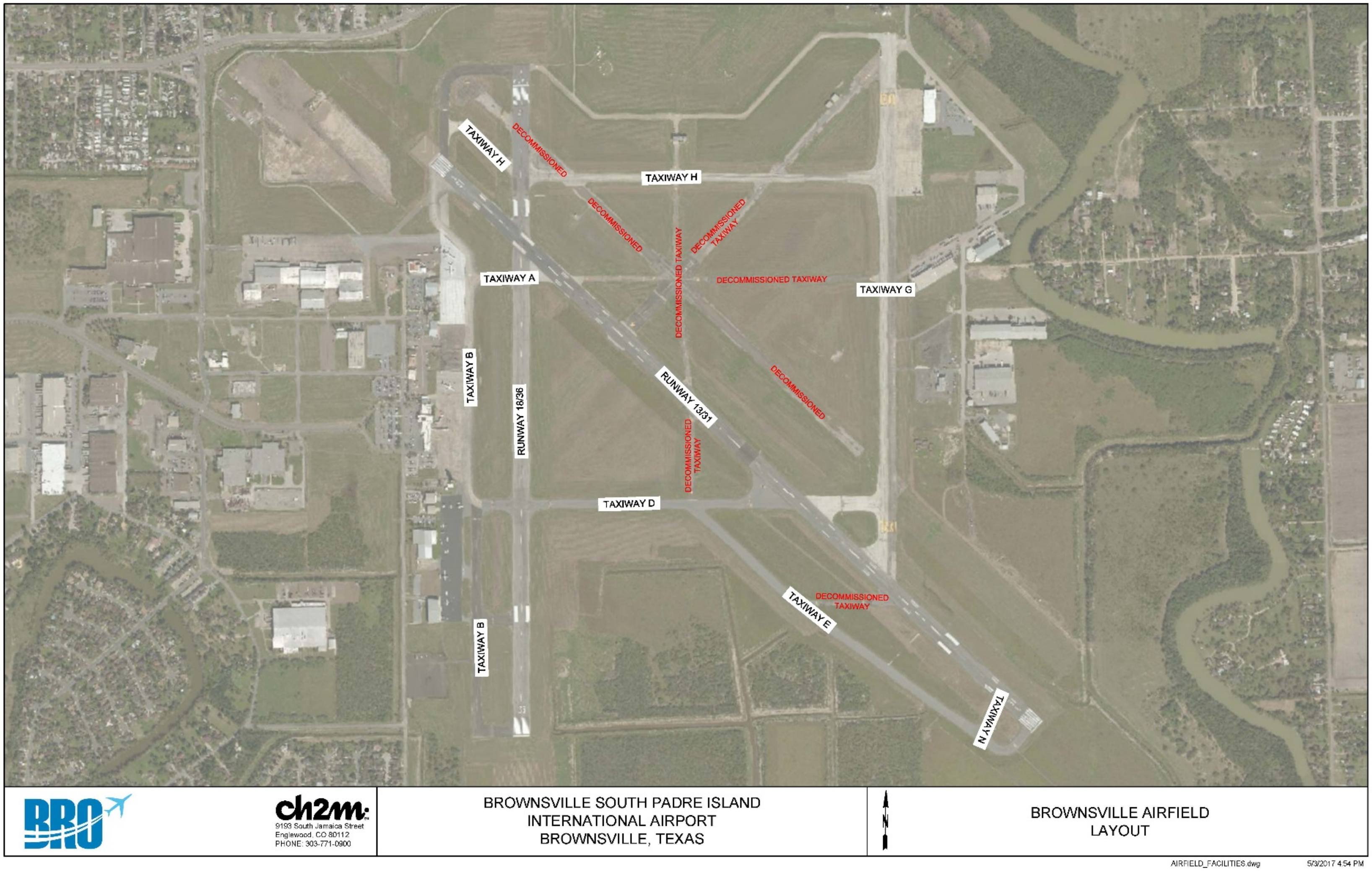


Figure 2-2. Airfield Facilities

2.2.1.3 Runway Wind Coverage

Prevailing wind direction and wind speed usually determine the most favorable runway alignment and configuration at an airport. Strong crosswinds can restrict the use of an airport depending on the capabilities of the aircraft and the skills of the pilot.

FAA AC 150/5300-13A lists the allowable crosswind component based on the RDC, as listed in Table 2-5. The maximum allowable crosswind component is 10.5 knots for small aircraft and up to 20 knots for the larger-aircraft categories. A crosswind runway is recommended when the primary runway orientation is not able to provide at least 95% wind coverage with the allowable crosswind component factored in.

Table 2-5. Crosswind Component per Runway Design Code

RDC	Allowable Crosswind Component
A-I and B-I[a]	10.5 knots
A-II and B-II	13 knots
A-III and B-III C-I through C-III D-I through D-III	16 knots
A-IV and B-IV C-IV through C-VI D-IV through D-VI	20 knots
E-I through E-VI	20 knots

Note:

[a] Includes A-I and B-I small aircraft.

Source: FAA AC 150/5300-13A (2012)

To analyze windrose and existing wind coverage at BRO, data were obtained in FAA format between 2006 and 2016 from the FAA airports geographic information system program. The Windrose File Generator uses data from the Integrated Surface Hourly/Integrated Surface Data inventory from the National Climate Data Center. It then compiles and summarizes the latest 10 years of data in FAA format and produces files for several weather conditions: All Weather, Instrument Flight Rule (IFR), and Visual Flight Rule (VFR).

IFR conditions occur when the cloud ceiling is 500 feet or higher, but below 1,000 feet, and/or the visibility is less than 3 statute miles, but at least 1 statute mile. VFR conditions occur when the cloud ceiling is at least 1,000 feet and the visibility is at least 3 statute miles.

Table 2-6 lists current wind coverage at BRO based on the maximum allowable component and the weather condition (all weather and IFR). As previously mentioned, both runways are C-IV. Combined, both runways provide adequate wind coverage for all aircraft and their maximum-allowable crosswind components.

Table 2-6. Current Wind Coverage at BRO

Wind Speed	Runway 13/31	Runway 18/36	Combined
All Weather			
10.5 knots	94.36%	90.41%	98.88%
13 knots	97.36%	96.54%	99.66%
16 knots	99.35%	99.52%	99.92%
20 knots	99.87%	99.9%	99.96%
IFR			
10.5 knots	96.11%	95.11%	99.04%
13 knots	98.08%	98.0%	99.4%
16 knots	99.22%	99.16%	99.61%
20 knots	99.62%	99.51%	99.72%

Note:

% = percent

Source: FAA Windrose File Generator, 2016

2.2.1.4 Runway Use

Runway use depends on many factors, including runway configuration, weather, and prevailing winds. Table 2-7 lists the estimated percentage of aircraft operations by runway end and type of operation at BRO, based on discussions with airport personnel.

Table 2-7. Runway Use

Runway	Commercial Aircraft	General Aviation
Runway 13	45%	35%
Runway 31	30%	25%
Runway 18	15%	20%
Runway 36	10%	20%

2.2.1.5 Taxiways

Taxiways provide access to airport runways, passenger terminals, maintenance areas, and other areas of the airfield. The geometric layout of the taxiways is based upon the Taxiway Design Group (TDG), a classification of airplanes based on outer-to-outer main gear width and cockpit to main gear length. FAA TDGs are listed in Table 2-8.

Taxiway B runs parallel to Runway 18/36 and provides access to both ends of the runway. Taxiway A and Taxiway F provide additional access to Runway 18/36 only. The portion of Taxiway A northeast of Runway 13/31 has been closed permanently.

In addition, Taxiway D provides access to Runway 18/36 and continues east from the main ramp to provide additional access to Runway 13/31. Figure 2-2 shows the airfield and taxiway configuration.

Taxiway H, Taxiway A, and Taxiway D can all be used directly from the main ramp to access Runway 13/31. Taxiway E runs parallel to Runway 13/31 halfway down Runway 31 on the southwestern side of the runway. Taxiway G can be used to access the Air Freight Terminal from Runway 13/31.

Additionally, Taxiway H can be used to access the Air Freight Terminal from Taxiway B. Figure 2-2 shows the runway and taxiway configuration at BRO. At BRO, taxiways have been designed prior to the introduction of the TDG and new taxiway fillets standards. The TDG of the current and future design aircraft per the Airport Layout Plan (DC-8 and B757-200, respectively) is 4. Additional information on design aircraft will be provided in Chapter 3, Aviation Demand Forecasts.

Table 2-8. Taxiway Design Group

Item	TDG							
	1A	**1B**	**2**	**3**	**4**	**5**	**6**	**7**
Taxiway Width (feet)	25	25	35	50	50	75	75	82
Taxiway Edge Safety Margin (feet)	5	5	8	10	10	15	15	15
Taxiway Shoulder Width (feet)	10	10	15	20	20	30	30	40
Taxiway/Taxilane Centerline to Parallel Taxiway/Taxilane Centerline with 180-degree Turn	Variable, additional design guidelines contained in AC 150/5300-13A							
Taxiway Fillet Dimensions	Variable, additional design guidelines contained in AC 150/5300-13A							

Source: FAA AC 150/5300-13A Airport Design (2012)

2.2.1.6 Pavement Condition

The Pavement Condition Index (PCI) is based on a visual inspection of pavement conditions. The index is a number from 0 to 100 that is used to indicate the general condition of a section of pavement.
A PCI survey assesses pavement conditions and records and analyzes visible signs of deterioration. In addition, distress type, severity, and quantity are taken into consideration. Runway 13/31 and Runway 18/36 are grooved asphalt reported in good condition in the NFDC. However, both runways are expected to need rehabilitation in the short to mid-term. The latest PCI survey was completed in 2019 and Figure 2-3 depicts the draft PCI map.

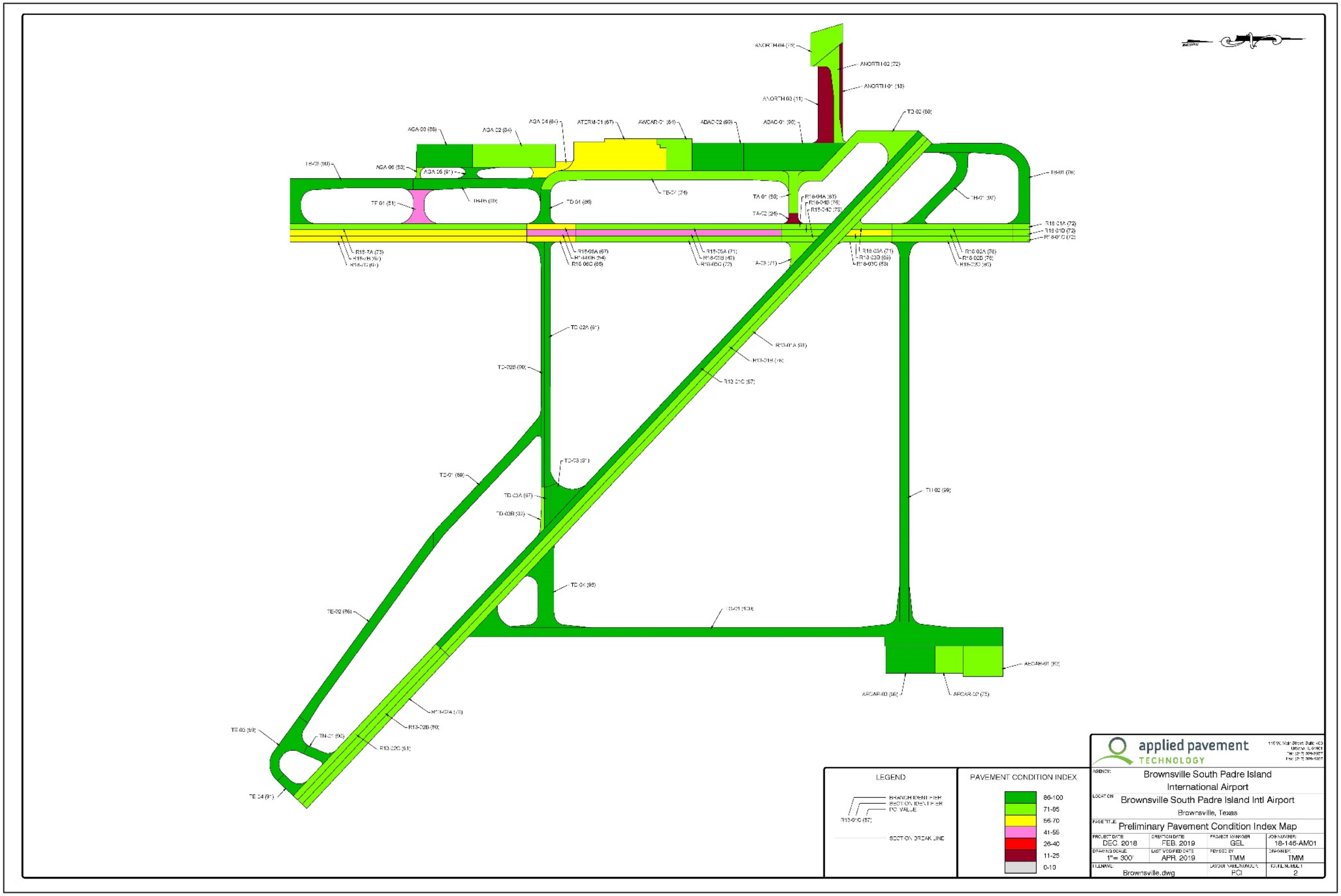


Figure 2-3. Draft PCI Map

2.2.1.7 Deicing Facilities

BRO does not have deicing facilities. The climate in Brownsville is humid subtropical, thus the airport does not need deicing facilities. The average low temperature during the coldest month is 51.6 degrees Fahrenheit in January.

2.2.2 Airspace and Navigational Aids

This section summarizes the airspace and existing NAVAIDs at BRO.

2.2.2.1 Airspace

U.S. airspace can be classified as controlled, uncontrolled, or special use airspace, and consists of seven categories: A, B, C, D, E, G, and special use airspace. Categories A through E are controlled airspace, and Category G is uncontrolled airspace. Special use airspace is restricted airspace for specific use. Each type of airspace is different in shape/size and has different visibility minimums and operating requirements to enter that type of airspace.

BRO is equipped with a contract control tower that is located within Class D controlled airspace that begins at the airport surface and rises up to 2,500 feet above mean sea level. Within this airspace, pilots must have at least 3 miles visibility and must be 1,000 feet above, 500 feet below, and 2,000 feet away horizontally from any clouds when in VFR flight. In addition, each aircraft operating within Class D must have two-way radio capability.

Airspace in BRO vicinity also includes class E airspace with floor at 700 feet that abuts class E airspace with floor at 1,200 feet. Federal airways are near the airport, as well as warning areas. The airport is also near the Mexican border and the Matamoros Terminal Control Area. Figure 2-4 shows the airspace surrounding BRO.

Figure 2-4. BRO Airspace
Source: FAA VFR Chart (2016b)

Code of Federal Regulations (CFR) 14 Part 77 - Safe, Efficient Use, and Preservation of the Navigable Airspace establishes standards in the form of "imaginary" surfaces to protect the airspace surrounding airports from natural or manmade obstructions that could constitute a hazard to aircraft. The size and shape of the surface is dictated by the aircraft approach type (visual, non-precision, or precision), visibility minima set for each runway end, and the portion of the airport they are protecting.

In addition to the imaginary surfaces, Part 77 also mandates the need to notify the FAA of certain proposed construction projects that can be subject to restrictions and airspace obstruction evaluation studies.

For public-use civilian airports, Federal Aviation Regulation (FAR) Part 77 identifies the following "imaginary" airport airspace surfaces:

- Primary
- Approach
- Transitional
- Horizontal
- Conical

Table 2-9 lists the size of the existing Part 77 surfaces at BRO. Figure 2-5 shows a general view of the Part 77 airspace surfaces.

Table 2-9. Part 77

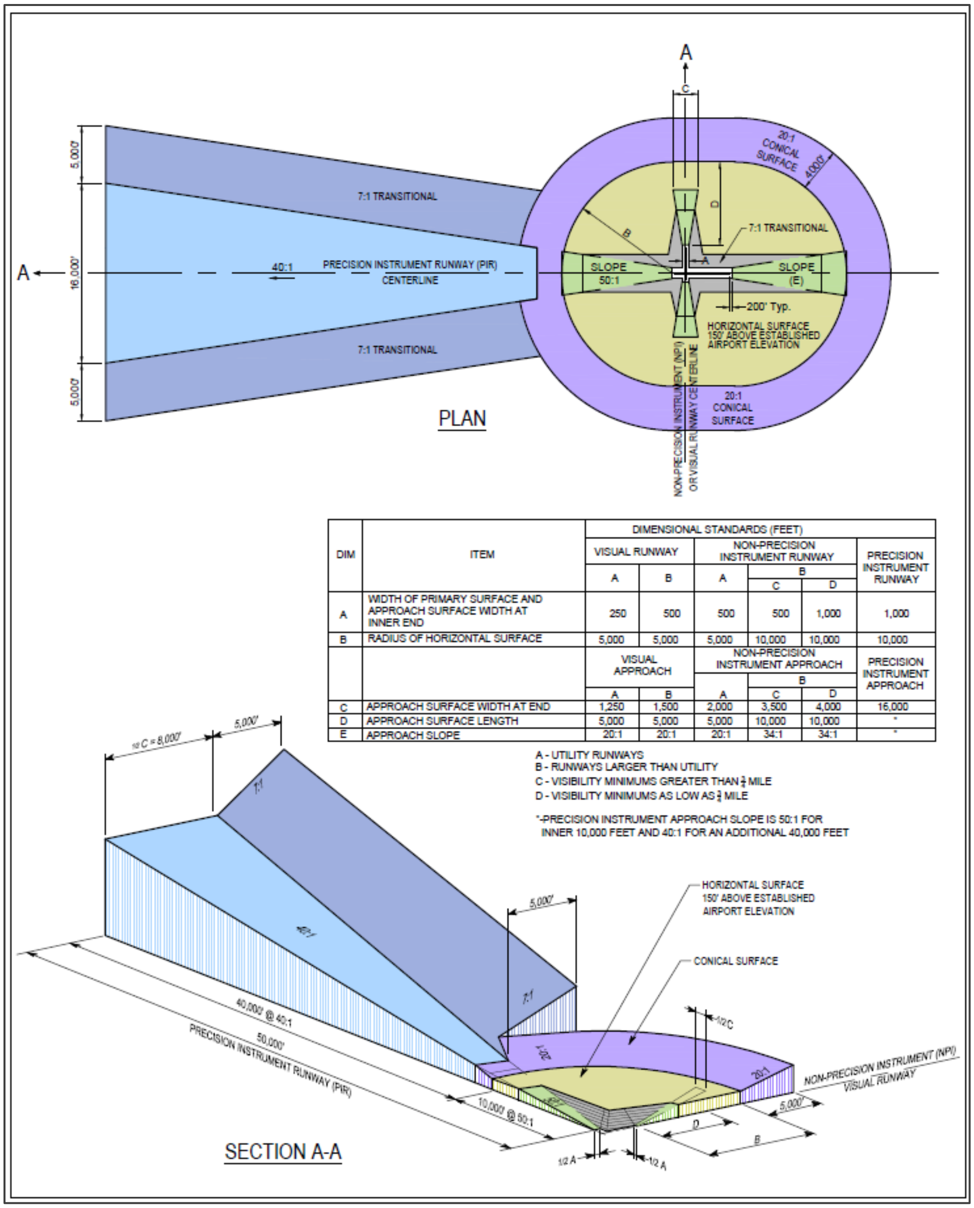
	Runway 13	**Runway 31**	**Runway 18**	**Runway 36**
Runway Type	Precision	Non-Precision (Visibility Minimums > ¾ miles)	Non-Precision (Visibility Minimums > ¾ miles)	Visual[a] (Larger than Utility)
Primary Surface Width (feet)	1,000	1,000	500	500
Approach Surface Inner Width at End (feet)	1,000	500	500	500
Approach Surface Outer Width at End (feet)	16,000	3,500	3,500	1,500
Approach Surface Length (feet)	50,000 (10,000 + 40,000)	10,000	10,000	5,000
Approach Surface Slope	50:1 then 40:1	34:1	34:1	20:1
Radius of Horizontal Surface (feet)	10,000	10,000	10,000	10,000

Notes:

[a] Because the airport is equipped with a very high frequency omnidirectional range (VOR) or TACAN-A (tactical air navigation system) procedure, as well as a circling procedure from Runway 18, Runway 36 is classified as instrument approach under Terminal Instrument Procedures (TERPS) criteria only. FAA Advisory Circular 150/5300-13A, Change 2 to be published, should provide clarification for these runways equipped with circling procedures.

> = greater than

Source: FAR Part 77.25 "Civilian Airport Imaginary Surfaces"



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

A - UTILITY RUNWAYS
B - RUNWAYS LARGER THAN UTILITY
C - VISIBILITY MINIMUMS GREATER THAN ¾ MILE
D - VISIBILITY MINIMUMS AS LOW AS ¾ MILE

*-PRECISION INSTRUMENT APPROACH SLOPE IS 50:1 FOR INNER 10,000 FEET AND 40:1 FOR AN ADDITIONAL 40,000 FEET

Figure 2-5. Part 77 Surface Illustration

Source: FAR Part 77.25 "Civilian Airport Imaginary Surfaces"

The FAA Form 5010-1 Airport Master Record lists the controlling obstruction, which is the obstruction within the boundaries of the approach surface that determines the obstruction clearance slope to the runway end, for each runway. If the obstruction clearance slope is 50:1 or greater, no controlling obstruction is listed on the form. Table 2-10 summarizes controlling obstruction for each runway end.

Table 2-10. Controlling Obstruction

	Obstruction Type	Distance from Runway	Obstruction Height	Slope to Clear
Runway 13	Tree	1,224 feet from runway, 369 feet left of centerline	31 feet	33:1
Runway 31	Tree	751 feet from runway, 611 feet left of centerline	24 feet	22:1
Runway 18	Tree	722 feet from runway, 140 feet left of centerline	37 feet	14:1
Runway 36	Tree	660 feet from runway, 312 feet right of centerline	30 feet	15:1

Source: Aeronautical Information Services, 2016

In 2015, a survey was completed, and the survey data was evaluated against 14 CFR Part 77 criteria. The Airport Layout Plan airspace sheet and Table 2-11 list the obstructions as identified in the 2015 survey.

Table 2-11. BRO 2015 Airspace Obstructions

OBS ID	CH2M Point ID	Name	Ortho Height (feet)	OIS Height (feet)	Penetration Distance (feet)	OIS Type
1	2388	Pine Tree 1	35.6	34.9	0.7	Runway 18 Approach
2B	2666	Boca Chica Boulevard	32.7	32.6	0.1	Runway 18 Approach
3	2386	Pine Tree Row 4	58.1	36.2	21.9	Transitional
4	2385	Pine Tree Row 3	69.4	53.4	16.0	Transitional
5	2383	Deciduous Tree 2	43.0	37.5	5.5	Transitional
6	2370	Power Pole 1	56.1	56.0	0.1	Runway 13 Approach
7	2424	Malsr Building	39.2	35.5	3.7	Runway 13 Approach
8	2415	Stand Pipe	34.1	31.2	2.9	Runway 13 Approach
9	2414	Do Not Enter Sign	21.6	19.7	1.9	Primary
10	2413	Attention Sign 2	21.2	19.7	1.5	Primary
11	2411	Stop Sign	23.3	19.6	3.7	Primary
12	2412	Attention Sign 1	21.4	19.6	1.8	Primary
13	2404	Radio Tower 3	84.2	83.8	0.4	Transitional
14	2402	Radio Tower 1	84.2	83.8	0.4	Transitional
15	1015	Anemometer	31.4	18.1	13.3	Primary
16	2538	Irrigation Gate 2	27.6	18.0	9.6	Transitional
17	2537	Irrigation Gate 1	27.6	19.1	8.5	Transitional
18	2390	Bro Pub Water Tower	186.9	185.6	1.3	Conical
19	2566	ATCT	93.9	68.9	25.0	Transitional
20	2542	Windsock 3	27.1	22.0	5.1	Transitional
21	2555	Palm Tree 5	46.5	46.2	0.3	Transitional
22	2662	Deciduous Tree 7	74.3	59.7	14.6	Transitional

Table 2-11. BRO 2015 Airspace Obstructions

OBS ID	CH2M Point ID	Name	Ortho Height (feet)	OIS Height (feet)	Penetration Distance (feet)	OIS Type
23	2508	Windsock 2	26.8	18.3	8.5	Primary
24	2504	Bush 1	28.2	28.0	0.2	Transitional
25	2505	Bush 2	28.7	25.9	2.8	Transitional
26	2506	Bush 3	29.6	22.2	7.4	Transitional
27	2507	Bush 4	29.7	20.0	9.7	Primary
28	2543	Runway 31 Localizer Building	41.5	20.4	21.1	Primary
29	2544	Berm 1	26.7	20.4	6.3	Primary
30	2545	Berm 2	26.7	23.0	3.7	Transitional
31B	2716	Indiana Avenue	37.1	36.5	0.6	Runway 31 Approach

Notes:

AOC points identified with a “B” after the obstruction number indicate the obstruction penetrates the OIS as a result of the addition of the minimum clearance distances, as specified in 14 CFR 77.17(b).

MALSR = Medium-intensity Approach Lighting System

OIS = obstruction identification services

2.2.2.2 Air Traffic Control Tower

The air traffic control tower (ATCT) is located west of Runway 18/36 just across the main ramp from Taxiway D. The ATCT has a clear line of sight to all four runway ends. However, according to the NFDC, the northwestern corner of Taxiway B (south of the Runway 13 hold line) is not visible from the ATCT.

The BRO ATCT is part of the FAA’s contract tower program, which allows the FAA to contract air traffic control services to select airports. The ATCT at BRO is operated by RVA (Robinson Aviation).

2.2.2.3 Navigational Aids

Runways are generally equipped with NAVAIDs to assist pilots with takeoff and landing procedures. The types of NAVAIDs vary from visual lights to radio frequencies that are interpreted by equipment on the aircraft to allow the pilot to navigate through the clouds. Many of these NAVAIDs are also available for en route operations.

Nearby NAVAIDs at BRO include Very High Frequency (VHF) Omnidirectional Range (VOR) with Distance Measuring Equipment (DME) and a VHF Omnidirectional Range with a Tactical Air Navigation System (VORTAC). Both are radio-based navigational aids that provide horizontal navigational guidance to pilots and aircraft. Table 2-12 lists the nearby NAVAIDs.

Table 2-12. Navigational Aids

NAVAID Type	ID	Name	Frequency	Radial/Bearing	Range (Nm)
VORTAC	BRO	Brownsville	116.30 MHz	239°	2.9
VOR DME	MAM	Matamoros	114.30 MHz	028°	9.7
VOR DME	HRL	Harlingen	109.20 MHz	142°	22.9
VOR DME	REX	Reynosa	112.40 MHz	089°	44.0
LOC	BR	Depoo	393	312°	6.5
LOC	HR	Sebas	338	329°	26.9
LOC	MF	Missi	330	290°	52.1

Notes:

° = degrees

LOC = localizer

MHz = megahertz

Nm = nautical miles

REX = Reynosa

Source: NFDC, 2016

2.2.2.4 Visual Aids

Visual aids are used to provide pilots with alignment, height, distance, and location information both in the air and on the ground. Visual aids typically include various types of airport lighting and pavement markings. Table 2-13 lists the visual aids at BRO.

BRO is equipped with the following visual aids:

- High- and Medium-intensity Runway Lights
- Medium Intensity Taxiway Lights
- Precision Approach Path Indicator (PAPI)
- Visual Approach Slope Indicator (VASI)
- MALSR
- Rotating Beacon
- Lighted Wind Cone with Segmented Circle

Table 2-13. Visual Aids

	Runway 13	Runway 31	Runway 18	Runway 36
Runway Edge Lights	High-intensity Runway Edge Lighting	High-intensity Runway Edge Lighting	Medium-intensity Runway Edge Lighting	Medium-intensity Runway Edge Lighting
Runway Markings	Precision	Precision	Non-precision	Non-precision
Runway End Identifier Lights	No	No	No	No
Visual Approach Aid	-	4-light PAPI	4-light PAPI	4-box VASI
Approach Lights	Medium-intensity Approach Lighting	—	—	—
Other Airfield Equipment				
Taxiway Lights	Medium-intensity Taxiway Lights			
Airport Beacon	Yes (Green and white)			
Windcone and segmented circle	Yes			

Source: NFDC, 2016

2.2.2.5 Instrument Approaches

In addition to visual aids, runways may be equipped with other NAVAIDS to assist pilots with takeoff and landing procedures. When navigating to or from an airport, pilots operate under either VFR, if weather permits. If visibility is restricted or low cloud ceilings exist, pilots use more of their instruments and operate under IFR.

During the decreased visibility while operating under IFR conditions, pilots rely heavily on published instrument flight procedures that are designed to enhance not only en route navigation, but also to allow for safe and efficient landings into an airport. Instrument approach procedures into an airport are based on an airport's operational/fleet-mix needs, weather conditions, and the airport environment (for example, trees and hills).

The FAA uses four instrument approach types, Precision Approach (PA), Approach with Vertical Guidance (APV), Non-precision Approach (NPA), and Visual Approach. Each type of approach has various minimum flight conditions that aircraft cannot exceed.

- PAs typically provide the most precise approach guidance via horizontal and vertical guidance with visibility minima of less than 3/4 statute miles and a height above touchdown of less than 250 feet aboveground level (AGL) miles. Examples of PAs include the Instrument Landing System (ILS) and Localizer Performance Vertical Guidance (LPV) approaches. Many PAs, like the ILS, are still dependent upon ground-based navigational equipment.
- Augmentation of Global Positioning System (GPS) via the Wide Area Augmentation System (WAAS) has resulted in the FAA approach type APV. Removal of errors from the standard GPS signal via WAAS allows for a critical vertical component to be provided to aircraft for very precise approaches using only GPS. While APV provides both a horizontal and vertical component, they are not typically considered PAs by the FAA as a result of height above touchdown above 250 feet AGL and visibility minima as low as 3/4 statute miles, but not less. A subset of APV is the Required Navigation Performance (RNP) approach. RNP approaches use WAAS but requires dual receivers in the aircraft for optimal navigation performance. RNP approaches represent the most advanced GPS-/WAAS-

based procedures in use today. Other examples of APV include Lateral Navigation/Vertical Navigation (LNAV/VNAV) and LPV.

- NPA only provides a horizontal guidance component, with no vertical guidance, resulting in less precise approaches. Examples of NPA include LNAV, Localizer Performance (LP), Non-Directional Radio Beacon (NDB), VOR, and Localizer (LOC).
- Lastly, a visual approach, as the name implies, does not rely on any electronic guidance.

All instrument flight procedures require appropriate pilot training and certified equipment in the aircraft. It should be noted that the FAA still relies on the ground-based ILS' for primary PAs at all of the country's commercial service airports, including BRO. RNP approaches provide much more direct flight routing and are therefore more efficient; however, as a result of the requirement of onboard equipment, pilot training and software for aircrafts to use RNP approaches, implementation of this advanced GPS technology by all airlines will take several more years.

Currently, BRO has ILS/LOC, area navigation (RNAV), and VOR approaches into the airport during instrument meteorological conditions. Table 2-14 lists the characteristics of common instrument approach types, and Table 2-15 lists existing approach procedures at BRO.

Table 2-14. Instrument Approach Characteristics

Approach Type	Horizontal Guidance	Vertical Guidance	Ceiling/Visibility Minimum
Precision	Yes	Yes	< 250 feet AGL < 3/4 statute mile
RNP	Yes	Yes	—
LNAV/VNAV	Yes	Yes	—
LPV	Yes	Yes	—
LNAV	Yes	No	—
LP	Yes	No	—
NDB	Yes	No	—
LOC	Yes	No	—
VOR	Yes	No	—
Visual	No	No	≥ 1,000 feet AGL ≥ 3 statute miles

Note:

≥ = greater than or equal to

Table 2-15. Instrument Approach at BRO

Approach Type	Runway	Visibility Minimum[a]	Ceiling Minimum[a] (feet)
ILS or LOC	Runway 13	½	200
RNAV LPV (GPS)	Runway 13	½	200
RNAV LP (GPS)	Runway 18	1	321
LOC BC	Runway 31	1	460
VOR or TACAN-A (Circling)	-	1	418 (518, 518, 658)

Note:

Depends on AAC – AAC B, C and D in bracket if different from AAC A.

Source: NFDC, 2016

2.3 General Aviation

General aviation (GA) facilities include fixed-base operator (FBO) facilities and GA aircraft storage. An FBO is an airport business that caters to the needs of the GA community, offering aircraft and passenger services. GA storage can include T-hangars, conventional/box hangars, and apron space (tie-down).

There are two FBOs at BRO: Hunt Pan Am and Southmost Aviation. Hunt Pan Am facilities are located along Taxiway B toward the north of the airport terminal, while Southmost Aviation facilities are located along taxiway B towards the south of the airport terminal. The GA hangars at BRO consist of conventional and corporate-type hangars, managed by the two FBOs. No T-hangars are on the airport, and demand for this type of infrastructure does not exist at this time.

At BRO, all the GA hangars and apron tie-downs are located along Taxiway B. The GA apron is divided into two distinct areas based on the FBO location. Hunt Pan Am's apron is located north of the commercial apron, and adjacent to the intersection of Taxiway B and Runway 13/31 and Taxiway A and Runway 18/36. Southmost Aviation's apron is located to the south of the airfield, adjacent to the intersection of Taxiway D and F and Runway 18/36. The primary users of the GA apron are transient aircraft, which includes a mix of corporate and small aircraft. Based aircraft are for the most part based into hangars. Figure 2-6 shows the GA facilities along Taxiway B.

Both FBOs provide the following services for private and corporate aviation, as well as for airline: fueling, catering, lavatory service, rental car services, ground support, tie-down space, and hangar space.

2.3.1 ICE Air Operations

ICE Air Operations, the transportation program of the U.S. Immigration and Customs Enforcement, are conducted from BRO using a combination of Boeing 737s and MD-80s. These operations are conducted from the Hunt Pan Am ramp and use the Hunt Pan Am ground-handling services and facilities. The buses used for the ground-handling portion are staged in an area collocated with parking Lot G north of the airport. The buses access the apron through the fence when aircraft are ready for departure. Analysis is underway to relocate the buses to a different parking area, not collocated with Lot G.

Figure 2-6. General Aviation Facilities

2.4 Passenger Terminal Complex

2.4.1 Passenger Terminal Building

The passenger terminal building at BRO is in fair condition; with a steady increase in operations and enplanements, the aging infrastructures does not meet the needs of the airport. Several studies have been completed in the past to assess the best options to improve the passenger terminal building and passenger experience. The preferred option identified in the Terminal Area Master Plan and Environmental Assessment and Conceptual Design of the Terminal includes a new two-level terminal to be located west of existing terminal, including four contact gates and hold rooms, as well as an expanded terminal apron from the existing apron to the rear face of the new terminal facility. The new passenger terminal complex also includes demolishing the existing terminal facility, and relocating and expanding the landside terminal roadway system and terminal parking area.

The Environmental Assessment led to issuance of a Finding of No Significant Impact, and the new terminal building is in the design phase. Because the existing terminal building will be replaced soon, this section summarizes the characteristics of the future terminal building, which will serve as the baseline for the other chapters of this Airport Master Plan.

Table 2-16 summarizes the existing functional area size, the schematic plan, and requirements to meet the short-term and long-term forecasts per the Terminal Project Definition report. Per the schematic plan, total terminal area is expected to increase from 35,060 square feet to 58,933 square feet to meet the requirements of the short-term forecasts.

Figure 2-7 and Figure 2-8 depict the terminal schematic plans per the Terminal Project Definition report. Figure 2-9 and Figure 2-10 depict the current and future terminal building complex. The future terminal building complex is depicted for reference only. Final design of the terminal building and roadway as well as precise phasing of the relocation will be detailed during the final design phase.

Table 2-16. Summary of BRO Passenger Terminal Functional Requirements

Terminal Component	Existing No./Space	Required No./Space	Short Term Forecast	Long Term Forecast	Schematic Plan
Regional Jet Gates (medium to large)	2	2	3	3	3
Narrowbody Jet Gates			0	1	1
Ticketing/Check-in Area (ft^2)	2,044	2,500	2,640	3,120	3,216
Baggage Screening Area - TSA (ft^2)	200	940	1,740	1,740	1,740
Baggage Make Up Area (ft^2)	2,200	1,400	2,300	4,500	2,635
Security Screening (ft^2)	1,300	875	875	1,750	1,750
Departure Lounge (ft^2)	1,660	2,000	3,200	6,200	5,481
Concourse Corridor Circulation (ft^2)	872	3,400	5,800	13,100	4,500
Domestic Baggage Claim (frontage and area [ft^2])	80 LF 3,985	67 LF 2,345	38 LF 1,330	50 LF 1,750	65 LF 2,300
FIS/CBP Areas					
• Primary Inspection booths (Double Units)	2 units	2 units	2 units	2 units	2 units
• Primary Inspection booth area (ft^2)	120	161	322	322	940
• Primary Queue Area (ft^2)	230	600	750	1,320	1,875

Table 2-16. Summary of BRO Passenger Terminal Functional Requirements

Terminal Component	Existing No./Space	Required No./Space	Short Term Forecast	Long Term Forecast	Schematic Plan
• Circulation	1,900	incl	incl	incl	incl
• Offices, Labs, Quarantine, Mech, etc.	1,650	incl	incl	incl	incl
• Training/Break Room	230	incl	incl	incl	incl
• Toilets	320	incl	incl	incl	incl
• Total FIS/CBP Space (CBP Small Airport)	4,450	8,118	8,118	8,118	8,118
International Baggage Claim (frontage and area [ft^2])			55 LF 1,925	89 LF 3,115	90 LF 2,300
Airport Administration and Operations	4,742	3,300	3,500	4,000	4,000
Public Toilets	1,685	1,800	2,000	2,400	1,850
Commercial Concessions (ft^2) 10% of terminal	3,984	3,500	4,500	6,000	4,550
Subtotal	27,122	30,178	37,928	55,793	42,440
Public Circulation (15%)	6,269	3,018	5,689	8,369	6,366
Subtotal (ft^2)	33,391	33,196	43,617	64,162	48,806
Mechanical/Electrical Systems (15%) (ft^2)	included	4,979	6,543	9,624	7,321
Subtotal (ft^2)	33,391	38,175	50,160	73,786	56,127
Building Envelope/Structure (5%) (ft^2)	1,669	1,909	2,508	3,689	2,806
Total Terminal Area (ft^2)	35,060	40,084	52,668	77,475	58,933

Note:

CBP = U.S. Customs and Border Protection

FIS = Federal Inspection Station

ft^2 = square feet

LF = linear feet

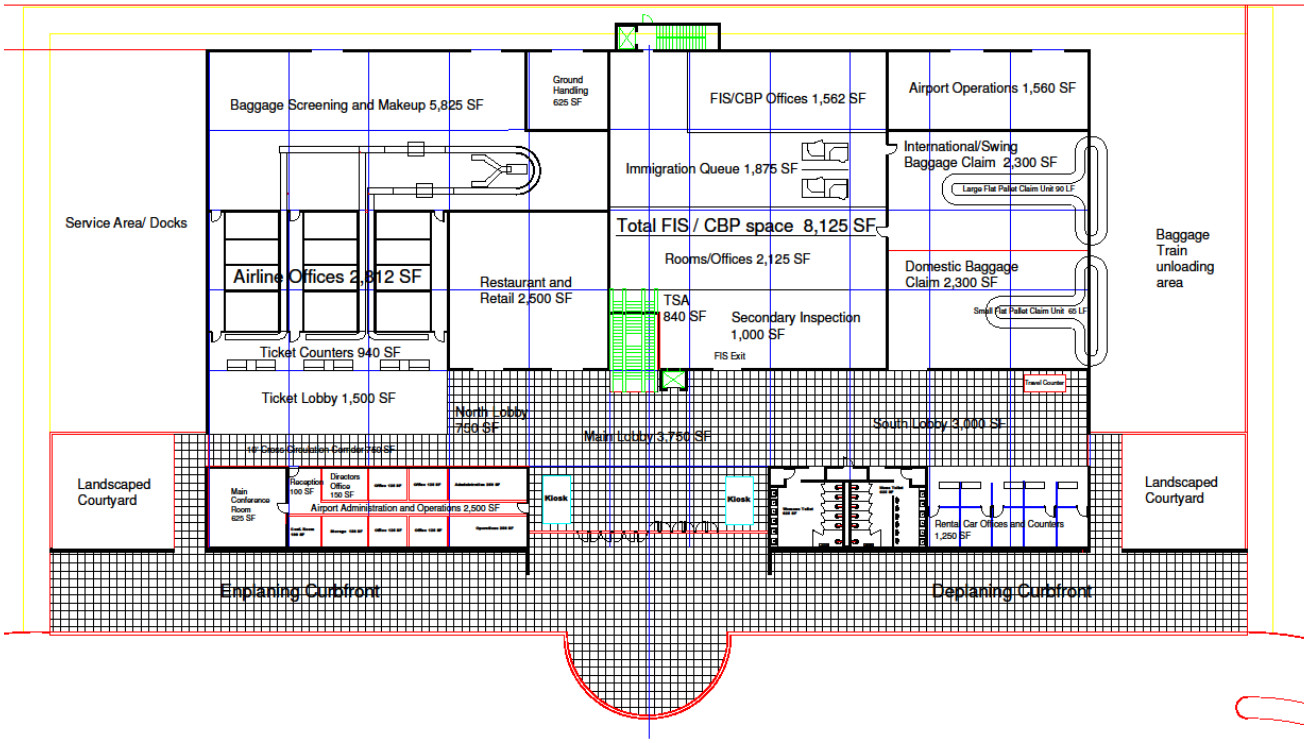


Figure 2-7. Terminal Building Schematic Plan: First Floor

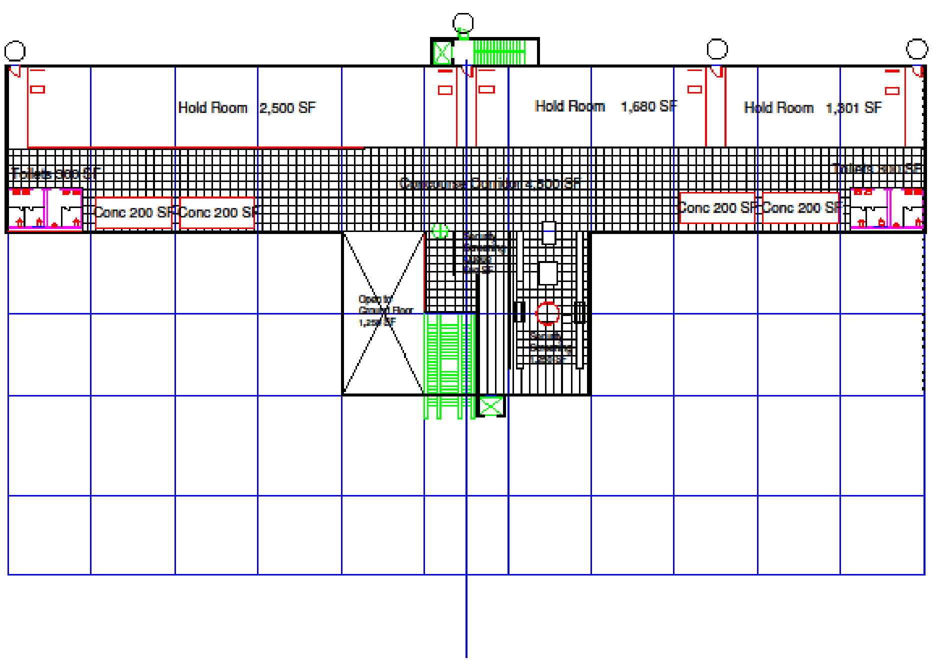


Figure 2-8. Terminal Building Schematic Plan: Second Floor

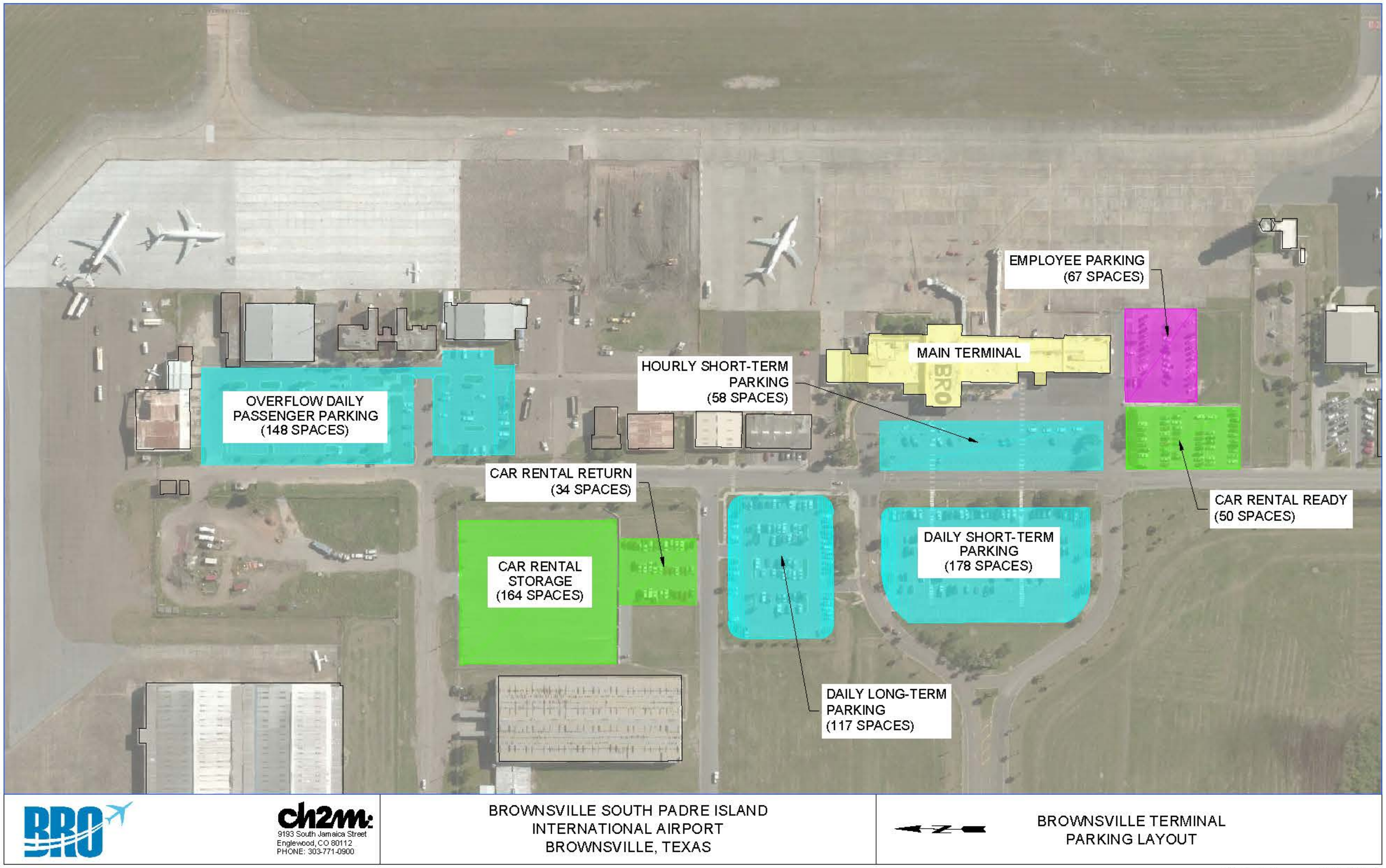


Figure 2-9. Existing Commercial Passenger Terminal Complex

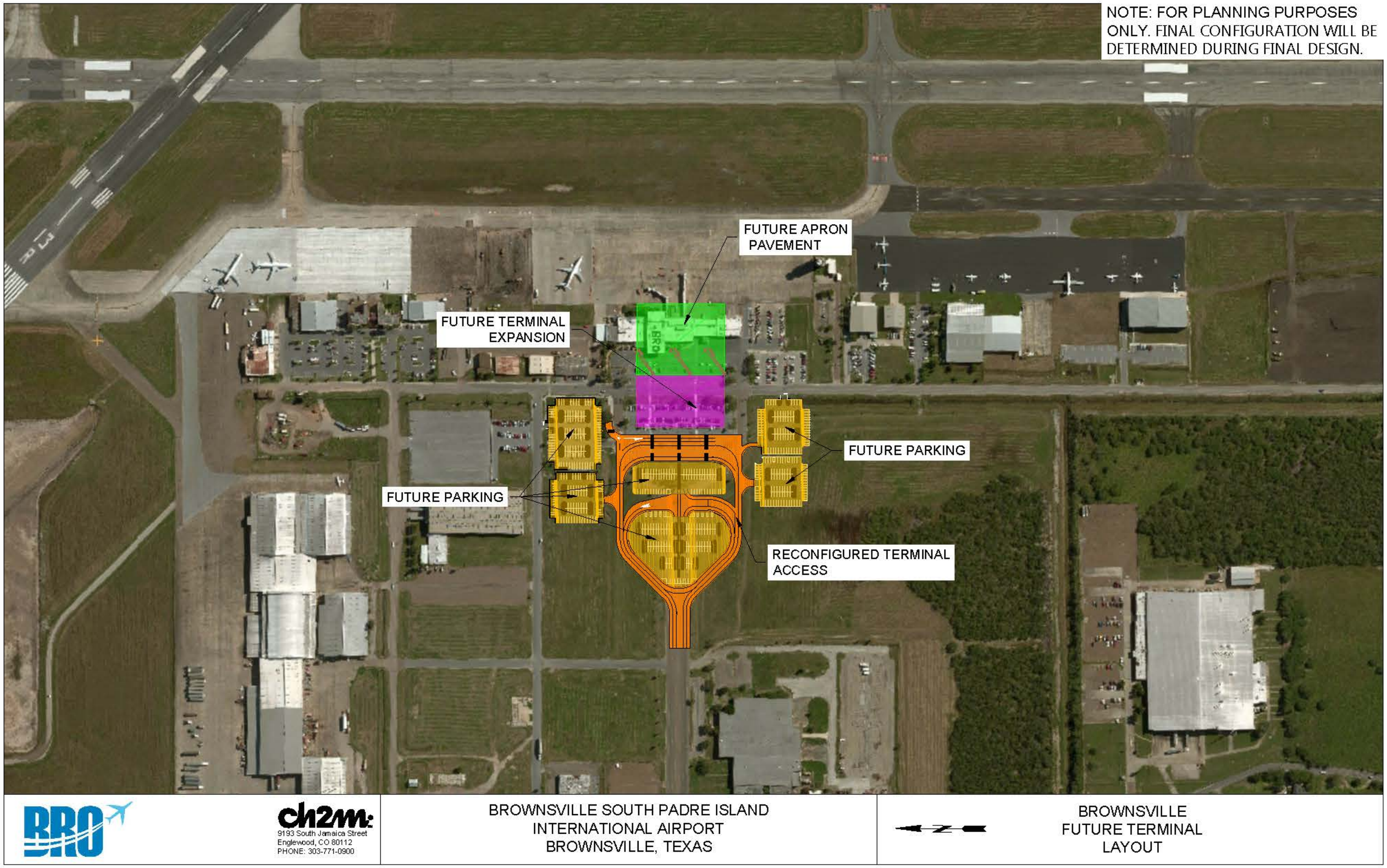


Figure 2-10. Future Commercial Passenger Terminal Complex

2.4.1.1 Ticketing Area

Three ticket counters and three kiosks are needed in the short-term planning period, while the long-range planning period requires four ticket counters and four kiosks in the terminal ticketing area. The schematic program is based on six ticket counters and six kiosks. The check-in/ticketing area includes the airline office space, counter area, active check-in zone, counter queue, kiosk area, and cross circulation. It is assumed the average width of ticket counters is 5 feet. The overall depth of the central ticket counter area is required to be 10 feet and includes the ticket counter, customer service work area, and baggage belt. The ticket counter check-in zone should be 8 feet deep. The ticket lobby queue area should be 20 feet deep. The queue area should include space for six ticket kiosks and 180 square feet of space for queues. Behind the ticketing queue area security screening, cross circulation 10-feet deep should be provided.

All departing passengers, crew, and airport employees go through security screening before accessing the secure area of the passenger terminal. The equipment includes X-rays, magnetometers, and full-body scanners. The expected maximum throughput is 175 per lane in 1 hour, which is about 21 seconds per person. After going through security, passengers enter the ground-level secure hold room area.

2.4.1.2 Hold Rooms

Hold rooms should be open and connected to promote efficient operations and allow flexible use between gates and better use of the available space. The departure lounges should be planned to provide a waiting area for 80% to 90% of the aircraft passenger capacity with room for 80% of the passengers to be seated and 20% to be standing. For planning purposes, seated passengers are allotted 15 square feet per passenger, whereas standing passengers are allotted 10 square feet. The departure lounges include check-in podiums and a boarding/deplaning corridor connecting the gate to the concourse corridor. In addition, the customer service agent podium should have one position for regional jet aircraft and two positions for narrow body jet aircraft (up to 150 seats). Areas will be available for commercial concessions, restrooms, and other services.

2.4.1.3 Concessions

Concessions include food and beverage and retail areas, along with other services accessible to passengers in both the secure and nonsecure areas. The BRO passenger terminal concessions area will include commercial concessions that provide different types of services to the traveling public. Commercial concessions have become an important source of revenue to airports the passenger terminal and thus will have a variety of stores and services available to the traveling public. It is anticipated the concessions space will include at least:

- Ground transportation services including rental car companies, limousines, vans, and buses
- Food and beverage service
- News, gift, and specialty shops
- Banking, ATM
- Concessions storage and loading docks

Concessions should be located in both the landside and airside areas of the passenger terminal building. The commercial concessions and service areas should be located in areas convenient to passengers waiting for their flights. Preliminary estimates of concessions show a ratio of 2,000 square feet per 100 peak-hour passengers; more progressive recommendations are to provide 10% of the terminal in concessions.

2.4.1.4 Baggage Claim

Adequate queuing and circulation in the baggage claim area should be at least 35 square feet per linear foot of claim device. The area in front of the claim units should provide space for the passengers to wait and collect their luggage. The peripheral area normally is used to wait for an opening to the front of the unit, for a passenger waiting for someone else who is getting the luggage, to park the cart, or to circulate through the area. For Level of Service C, the retrieval and peripheral area should be 17 square feet per occupant.

2.4.2 Airport Roads and Ground Access

Efficient ground access is not only vital to ensure smooth and continuous arrival and departure of both passenger and tenant operations, it can have a direct effect on the airport's image and attractiveness. Figure 2-11 depicts the main access roadways and automobile parking to the passenger terminal building in the existing conditions. As part of the terminal building relocation, the roads and automobile parking also will be relocated to account for the new location of the terminal building.

2.4.2.1 Vehicular Access

BRO's main access point is Billy Mitchell Boulevard from Boca Chica Boulevard. The route leads directly to the main parking lot and airport terminal and splits off to either Minnesota Avenue or Amelia Earhart Drive. Minnesota Avenue provides access south to Southernmost Aviation and the Commemorative Air Force Museum while Amelia Earhart Drive serves Hunt Pan Am Aviation. In addition to the main access roads on the western side of the airfield, the eastern side can be accessed via South Vermillion Avenue from Boca Chica Boulevard. Airport access will be modified to accommodate for the new passenger terminal building. Preliminary planning is depicted on Figure 2-8. The airport access and project phasing will be refined during the final design phase.

2.4.2.2 Terminal Curb

The terminal is equipped with a 1,200-linear-foot curb for drop-offs and pick-ups. There are three 400-foot-long lanes. Shuttle, taxi, and limo services also use the terminal curbside. Preliminary analysis of the curb frontage for the new terminal building show a Level of Service C could be achieved with a curb-front range from 153 to 181 feet.

Figure 2-11. Main Public Roadways

2.4.3 Parking Lots

BRO has eight different parking lots as listed in Table 2-17 and depicted on Figure 2-9.

Table 2-17. Existing Parking Areas

Parking Area	Number of Stalls
Short-term Daily Passenger Parking	178
Short-term Hourly Passenger Parking	58
Long-term Daily Passenger Parking	117
Overflow Daily Parking	148
Total Terminal Parking	***501***
Car Rental Return Lot	50
Car Rental Storage Lot	164
Car Rental Ready Lot	34
Total Rental Car Parking	***248***
Employee Parking	62
Employee Curb Parking	5
Total Employee Parking	***67***
TOTAL PARKING	***816***

2.5 Support Facilities

2.5.1 Cargo/Freight Facilities

South Texas Express has provided BRO with cargo and freight services since 1998. They operate from one hangar and apron located in the northeastern corner of the airfield near the intersection of South Vermillion Avenue and Boca Chica Boulevard. South Texas Express traffic levels vary (from 1 to 15 aircraft operations per day) depending on the year and economic projects in Cameron County and vicinity. In 2015, it was a record year with over 15 flights per day moving 17 million pounds of cargo. In 2016, it was projected that 5 to 6 million pounds were moved.

2.5.2 Aircraft Rescue and Firefighting Facilities

2.5.2.1 Aircraft Rescue and Firefighting Index

An airport's Aircraft Rescue and Firefighting (ARFF) Index is regulated under FAR Part 139. It is based on the length of the longest aircraft that performs an average of five scheduled departures per day. Table 2-18 lists FAA ARFF Index requirements. BRO is an Index B airport (NFDC, 2016).

Table 2-18. Aircraft Rescue and Firefighting Index Classifications

Airport Index	Aircraft Length (feet)	Scheduled Departures	Number of Vehicles	Agent + Water
A	> 90	≥ 1	1	500 lbs DC or HALON 1,211 or 450 lbs DC + 100 gallons H_2O
B	90 to 125	≥ 5	2	Index A + 1,500 gallons H_2O
	126 to 158	< 5		
C	126 to 158	≥ 5	3	Index A + 3,000 gallons H_2O
	159 to 199	< 5		
D	159 to 199 > 200	< 5	3	Index A + 4,000 gallons H_2O
		< 5		
E	≥ 200	≥ 5	3	Index A + 6,000 gallons H_2O

Source: FAR Part 139

2.5.2.2 Aircraft Rescue and Firefighting Facilities

The ARFF station is located north of Taxiway H halfway between Runway 18-36 and the cargo area. The facility consists of space to accommodate two vehicle bays used to store and maintain ARFF vehicles and equipment. BRO mentions that adding a third bay and additional water lines would allow for meeting future needs. Four employees are on duty per shift, and the station is manned 24 hours per day, 7 days per week.

The airport is equipped with two ARFF vehicles, a 1999 Int’l 4800 and a 1999 E & I Titan.

2.5.3 Fuel Facilities

Each FBO is equipped with aboveground storage tanks and trucks. Hunt Pan Am is equipped with three active Jet A tanks and one active Avgas tank, as well as four Jet A mobile trucks and two Avgas mobile trucks for an overall capacity of 46,000 gallons. Southmost Aviation has one 18,000-gallon Jet A tank, one 8,000-gallon Avgas tank, one 5,000-gallon Jet A truck, and one 3,000-gallon Avgas truck. Southmost Aviation is considering increasing Jet A capacity with a 12,000-gallon tank.

2.5.4 Airport/Airfield Maintenance

BRO has one building for storage of maintenance equipment. Maintenance activities conducted at the airport include pavement repair, lighting maintenance, fence/gate repair, pavement striping, and mowing.

2.5.5 Utilities

BRO is equipped with all utilities (water, electricity, and communication services). Water services are provided by the Brownsville Public Utilities Board (PUB). Services are available from the El Jardin Water Supply Corporation, jointly certificated with the PUB outside the southern and western perimeter. The PUB also provides electric services.

The airport is relocating electrical infrastructure that conflicts with the airport’s fence. A utility survey will be completed as part of the terminal relocation project.

2.6 Land Use

The FAA requires airport owners and operators (sponsors) to be proactive in ensuring compatible land use around their airport through binding sponsor obligations and grant assurances. The establishment of effective compatible land use around an airport is critical to the long-term viability of an airport as well as to the health, safety, and welfare of both airport users and surrounding neighbors.

As previously mentioned, BRO is in Cameron County, Texas, which is within the city limits of Brownsville and the primary jurisdiction responsible for ensuring compatible land use around the airport. Cameron County unincorporated areas also are located near the airport. Effective compatible land use planning starts at the local comprehensive plan level and includes mechanisms to protect airspace and define compatible land uses around the airport. The following is a summary of city zoning and land use plans that impact the airport.

Imagine Brownsville is the comprehensive land use plan of the City of Brownsville. The transportation element chapter includes several references to BRO. The vision objective for the airport is to establish it as the passenger and premier heavy freight center for south Texas. In addition, the short-term strategies include developing a multimodal logistics/manufacturing hub at the airport/port area. To meet this goal, multiple steps are needed: preserve land use and corridors near the port and airport to improve multimodal freight movement; coordinate with Airport Master Plan for runway needs or airport expansion plans; and extend the airport runway to 12,800 feet to accommodate heavy freight traffic and create dual customs facility.

Chapter 14 of the City of Brownsville code of ordinances is dedicated to aviation, addressing airport operations and the creation of the Airport Advisory Board (Article II) and the Airport Zoning Board. However, it includes limited airspace and zoning regulations dedicated to the airport. Section 14-3 addresses the adoption of federal regulations, which includes Part 77: "*The federal aviation regulations promulgated by the Federal Aviation Administration are hereby referred to, adopted and made a part of this chapter as though fully set forth and incorporated in this chapter. Not less than three copies of such regulations are on file in the office of the city secretary.*"

Sec. 338-34 of Chapter (l) of Chapter 338, Telecommunications, includes height exceptions for airport overlay zones: *"No variance request will be accepted or approved for height exceptions within the* airport *overlay zones. These areas are based on an elevation contour map of the vicinity of the Brownsville, South Padre Island International Airport."*

FINAL REPORT

Aviation Forecasts

Prepared for

Brownsville South Padre Island International Airport

August 2019

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Contents

Figures

Acronyms and Abbreviations

%	percent
BRO	Brownsville South Padre Island International Airport
CSA	combined statistical area
FAA	Federal Aviation Administration
FIS	Federal Inspection Station
GA	general aviation
GRP	gross regional product
HRL	Valley International Airport
ICE	Immigration and Customs Enforcement
IFR	Instrument Flight Rule
lbs	pounds
MAM	General Servando Canales International Airport
MFE	Mc Allen Miller International Airport
MSA	metropolitan statistical area
r^2	correlation factors that are statistical measurements of the relationship among variables included in the analysis
REX	Reynosa
TAF	terminal area forecast
USDOT	U.S. Department of Transportation
W&P	Woods & Poole Economics, Inc.

SECTION 3

Aviation Forecasts

This chapter presents the passenger, air cargo, and aircraft operations for Brownsville South Padre Island International Airport (BRO) for the next 20 years. The study has taken into account historical aviation trends and expected socioeconomic growth of Brownsville metropolitan area to estimate the long-term BRO aviation growth that will help to determine the development and expansion required to accommodate the future demand.

3.1 Introduction

The airport has had commercial scheduled passenger service, all-cargo, air taxi, general aviation (GA), and charters providing service to Immigration and Customs Enforcement (ICE), which deals with undocumented immigrants. The airport had 104,513 enplaned domestic passengers in 2016.
The passenger activity has increased since 2009, except between 2015 and 2016, when traffic slightly dropped after Allegiant Airlines stopped scheduled service to Las Vegas.

The population of Brownsville Harlingen-Raymondville metropolitan areas has increased gradually since 2000. The gross regional product also has grown significantly during the same period, with annual average growth of 3.3%, which is significantly higher than the national growth for the same period at 1.9%.

GA is the main aviation activity at BRO; however, commercial passenger aircraft is the sector that has increased the most in the last few years. The air carriers offering scheduled service are United and American Airlines, using regional aircraft. Between 2011 and 2013, Aerolitoral, a Mexican Airline provided scheduled service to Monterrey. Since 2014, ICE has charter flights carrying undocumented immigrants in the process to be deported.

3.2 Region Supporting the Aviation Activity

BRO is in Brownsville, which is part of the Brownsville Harlingen Metropolitan Statistical Area (MSA) and Cameron County. Two other airports are in Rio Grande that provide commercial service: Harlingen and McAllen. There is an overlap of the commercial service area of the three airports. The commercial service area is determined by flight frequencies, air fares, and time of travel to and from the airports.

Figure 3-1 depicts the three commercial airports, as well two airports on the Mexican side of the U.S.-Mexican border. In addition to BRO, four airports are included in the overall demand catchment area:

- Valley International Airport (HRL) in Harlingen, Texas
- Mc Allen Miller International Airport (MFE) in Mc Allen, Texas
- Reynosa International Airport (REX) in Reynosa, Tamaulipas, Mexico
- General Servando Canales International Airport (MAM) in Matamoros, Tamaulipas, Mexico

3.2.1 Characteristics of the City of Brownsville and the Region

Brownsville is on the southernmost tip of Texas, on the northern bank of the Rio Grande River, which divides the United States and Mexico. The cities of Matamoros and Reynosa, State of Tamaulipas, Mexico, are across the border. According to the 2015 U.S. Census Bureau, the Brownsville-Harlingen MSA has a population of 420,400. The Matamoros-Brownsville MSA has a population of more than 1.1 million, making it the fourth largest metropolitan area along the U.S.-Mexico border. The city of Raymondville is located north of the Brownsville–Harlingen area and is considered part of the consolidated metropolitan area of Brownsville, Harlingen, and Raymondville.

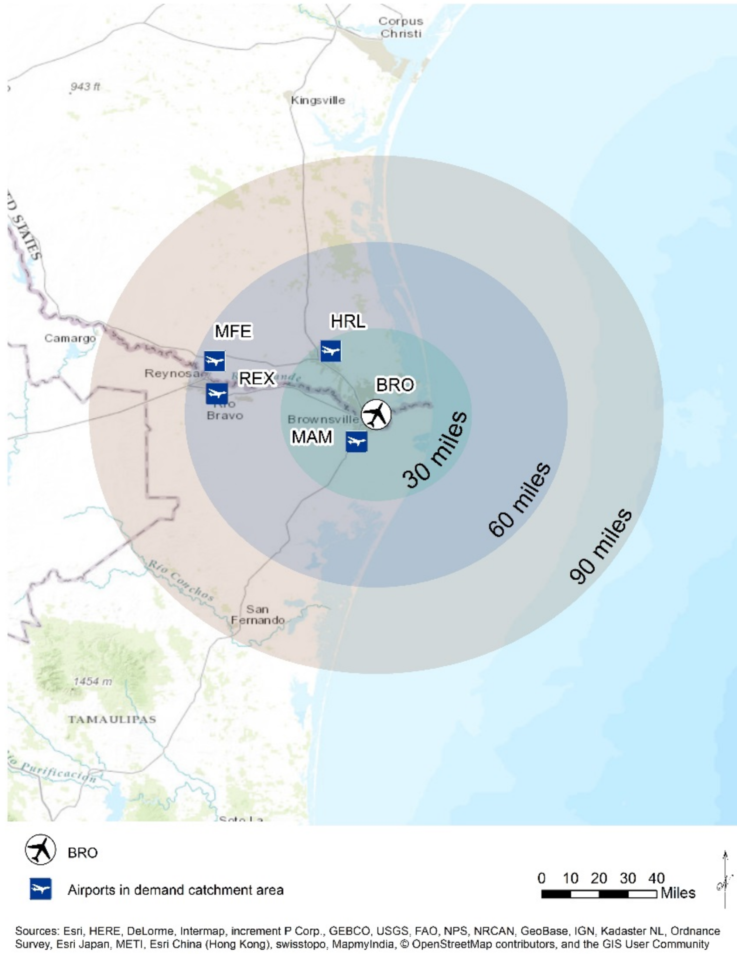

Figure 3-1. Brownsville Harlingen Influence Area

Some of the major regional economic activities take place in the Port of Brownsville. A deep seaport connecting the Mexican roadway network with the Gulf of Intracoastal Waterway of Texas, the port handles products coming from Mexico, other parts of the United States, and the world. Brownsville's economy is strongly tied to the North American Free Trade Agreement because of its proximity to Mexico. Several major Fortune 500 companies and manufacturers have operations in the area.

SpaceX, a space transport company headquartered in Hawthorne, California, is building a private space launch facility in Boca Chica Village, east of Brownsville on the Gulf Coast, which is expected to bring high-tech jobs to the region. After the Federal Aviation Administration (FAA) prepared an Environmental Impact Statement, the agency issued a Record of Decision in July 2014 stating that the proposed SpaceX facility will not generate any significant impacts to the environment. Construction of the facility started in late 2014 and is expected to have its first space launches in 2018. The SpaceX operation could potentially help in generating more aviation activity at the airport.

3.2.2 Socioeconomic Data of Brownsville-Harlingen Metropolitan Statistical Area

To evaluate the socioeconomic characteristics of Brownsville region, the consultant team has used the Woods & Poole Economics, Inc. (W&P) database of the Brownsville-Harlingen-Raymondville combined statistical area (CSA) and the Brownsville-Harlingen MSA (Figure 3-2). W&P is an independent consultant that specializes in preparing long-term socioeconomic and demographic forecasts for MSAs, counties, states, and regions of the United States. W&P gathers historical socioeconomic data of every U.S. MSA, county, state, and region, and projects future growth through 2050 based on the analyses of its team of experts.

Figure 3-2. Brownsville-Harlingen Metropolitan Statistical Area

Tables 3-1 and 3-2 depict historical regional socioeconomic data that could be related to BRO aviation activity and development. It is important to point out that rates of growth for the three variables are greater than the national average.

Table 3-1. Brownsville-Harlingen-Raymondville
Historical Socioeconomic Data

Year	Population in Thousands	Employment in Thousands	Gross Regional Product (GRP) in Millions of U.S. Dollars (2009 $U.S.)
2000	356.199	144.592	6,675.132
2001	362.384	148.437	6,869.764
2002	370.392	153.419	7,467.495
2003	378.910	154.634	7,777.375
2004	387.066	158.264	8,231.452
2005	394.658	160.950	8,312.003
2006	401.632	168.083	8,754.267
2007	407.882	173.453	9,021.409
2008	414.763	177.284	8,961.306
2009	422.165	177.908	9,115.973
2010	429.874	179.160	9,600.743
2011	435.302	185.483	9,717.569
2012	438.155	187.842	9,950.676
2013	440.170	192.119	10,260.309
2014	442.295	195.285	10,546.074
2015	451.001	200.399	10,938.851
Average Annual % Growth	**1.59%**	**2.20%**	**3.35%**

Source: W&P, 2017.

Table 3-2. Brownsville-Harlingen
Historical Socioeconomic Data

Year	Population in Thousands	Employment in Thousands	GRP millions of U.S. Dollars (2009 $ U.S.)
2000	336.123	139.495	6437.55
2001	342.368	142.552	6646.525
2002	350.194	147.943	7244.311
2003	358.492	149.155	7534.614
2004	366.299	152.8	7975.291
2005	373.429	155.189	8038.279

Table 3-2. Brownsville-Harlingen
Historical Socioeconomic Data

Year	Population in Thousands	Employment in Thousands	GRP millions of U.S. Dollars (2009 $ U.S.)
2006	380.169	162.31	8464.813
2007	386.306	167.526	8672.296
2008	393	170.81	8567.267
2009	400.303	171.252	8747.5
2010	407.672	172.333	9185.582
2011	413.188	179.034	9300.783
2012	416.048	181.447	9559.063
2013	418.217	185.747	9855.787
2014	420.392	188.784	10140.405
2015	420.392	193.774	10511.793
Average Annual % Growth	**1.50%**	**2.22%**	**3.32%**

Source: W&P, 2017.

The historical figures of the three socioeconomic variables for the two areas show consistent steady growth between 2000 and 2015. The historical Brownsville-Harlingen figures of these three socioeconomic variables reflect a 25% growth in population, 39% growth in employment, and 63% growth in growth regional product (GRP) over the 15 years from 2000 through 2015. The tables present the average annual growth for the three variables. The only year there was a drop in GRP was 2008, because of the recession.

With a combined population of more than 1.1 million, the Brownsville–Matamoros area is the fourth largest metropolitan area along the U.S.–Mexico border. The area has a major impact on Brownsville and the passenger traffic at BRO.

3.3 Historical Aviation Activity

This section presents historical aviation activity, including commercial passenger, air cargo, aircraft operations, via commercial, general, and military aviation.

3.3.1 Historical Passenger Statistics of Brownsville South Padre Island International Airport

The consultant team has used airport statistics and the Air Carrier Statistic Database, which is gathered by the Office of Airline Information of the Bureau of Transportation Statistics, part of the Research and Innovative Technology Administration of the U.S. Department of Transportation (USDOT); this information is referred to as the "T-100 data." The airlines submit the T-100 data to USDOT regularly; these submittals include segment data; numbers of trips, enplaned and onboard passengers, and seats; and distance. The study also has analyzed the historical statistics provided by BRO. Between 2011 and 2013, Aerolitoral (Aeroméxico Connect) provided service from Monterrey to BRO with Embraer 145.

Tables 3-4, 3-5, 3-6, and 3-7 depict BRO's historical enplaned and deplaned passenger data for domestic and international passengers. These tables provide the average annual growth from 2000 to 2015. The complete T-100 data for 2016 have not been published yet. The main airlines are United and American Airlines, which provide scheduled service from Houston Intercontinental and Dallas-Fort Worth, respectively. The two air carriers have used regional jets, such as Embraer 145 and CRJ 900. Allegiant Airlines provided service for a few months between 2015 and 2016. A few air taxis are serving domestic and international destinations.

For international traffic, the analysis used the range from 2001 to 2015; in 2000, there was no recorded international commercial activity at BRO. Additionally, the airport had scheduled international operations between 2011 and 2013 to Monterrey, Mexico. This service was provided with E-145.

It is important to point out that the commercial passenger analysis has not included ICE flights because they are not commercial operations and not market oriented. ICE used, and still uses, BRO as a hub to transport/transfer undocumented immigrants in the process of being deported. ICE has used chartered aircraft that have provided both international and domestic flights.

Table 3-3. T-100 Historical Enplaned Passenger Data
Brownsville South Padre Island International Airport

	Domestic Enplaned Passengers			International Enplaned Passengers		
Year	**Aircraft Departures**	**Passengers**	**Seats Available**	**Aircraft Departures**	**Passengers**	**Seats Available**
2000	1,742	66,818	88,190			
2001	1,701	69,566	96,941	3	91	150
2002	1,735	67,649	98,982	2	0	100
2003	1,720	59,981	86,212	1	0	0
2004	1,709	66,006	85,203	1	4	37
2005	1,835	76,457	91,876	2	68	100
2006	2,272	90,059	111,725	1	131	138
2007	2,320	91,899	112,779	2	83	100
2008	2,234	82,654	109,657	3	193	244
2009	2,560	80,821	126,364	1	45	50
2010	2,440	84,528	118,610	2	81	100
2011	2,378	83,369	115,732	64	2,365	3,200
2012	2,307	81,672	114,031	150	4,158	7,500
2013	2,440	88,965	119,739	46	816	2,316
2014	2,383	95,752	115,076	5	176	250
2015	2,552	106,648	133,775	5	123	186
Avg. Annual % Growth	**2.58%**	**3.17%**	**2.82%**			

Source: USDOT T-100

Table 3-4. T-100 Historical Deplaned Passenger Data
Brownsville South Padre Island International Airport

	Domestic Deplaned Passengers			International Deplaned Passengers		
Year	**Aircraft Arrivals**	**Passengers**	**Seats Available**	**Aircraft Arrivals**	**Passengers**	**Seats Available**
2000	1,748	66,000	88,490	--	--	--
2001	1,701	68,437	96,924	2	111	200
2002	1,742	67,141	99,320	3	128	150
2003	1,720	59,206	86,140	1	20	50
2004	1,707	64,252	85,116	5	123	250
2005	1,833	74,601	91,776	5	123	324
2006	2,277	88,434	111,975	--	--	--
2007	2,320	89,432	112,779	8	615	698
2008	2,233	80,578	109,607	1	7	162
2009	2,550	79,482	125,928	7	238	350
2010	2,435	82,200	118,425	2	145	202
2011	2,368	81,256	115,322	68	2,587	3,400
2012	2,302	79,321	113,454	152	4,284	7,664
2013	2,441	84,881	119,278	51	936	2,640
2014	2,384	90,591	115,050	3	48	124
2015	2,546	102,474	133,810	3	68	170
Avg. Annual % Growth	**2.54%**	**2.98%**	**2.80%**			

Source: USDOT T-100 Data.
-- = No recorded International commercial traffic

As expected, there is consistency between the T-100 enplaned and deplaned passenger data at BRO, in number of passengers, seats per commercial aircraft operations, and load factors. BRO is mainly an origin and destination airport, with a small percentage of connecting passengers. Table 3-5 reflects a combination of T-100 enplaned and deplaned passengers for the 2000 to 2015 period.

Table 3-5. T-100 Historical Commercial Passenger Data
Brownsville South Padre Island International Airport

	Domestic Passengers			International Passengers		
Year	**Aircraft Operations**	**Passengers**	**Seats Available**	**Aircraft Operations**	**Passengers**	**Seats Available**
2000	3,490	132,818	176,680	0	0	0
2001	3,402	138,003	193,865	5	202	350
2002	3,477	134,790	198,302	5	128	250
2003	3,440	119,187	172,352	2	20	50
2004	3,416	130,258	170,319	6	127	287
2005	3,668	151,058	183,652	7	191	424
2006	4,549	178,493	223,700	1	131	138
2007	4,640	181,331	225,558	10	698	798
2008	4,467	163,232	219,264	4	200	406
2009	5,110	160,303	252,292	8	283	400
2010	4,875	166,728	237,035	4	226	302
2011	4,746	164,625	231,054	132	4,952	6,600
2012	4,609	160,993	227,485	302	8,442	15,164
2013	4,881	173,846	239,017	97	1,752	4,956
2014	4,767	186,343	230,126	8	224	374
2015	5,098	209,122	267,585	8	191	356
Avg. Annual % Growth	**2.56%**	**3.07%**	**2.81%**			

Source: USDOT T-100 Data.

Figures 3-3 and 3-4 present the historical passenger activity of BRO, in terms of domestic and total commercial passengers. BRO did not have scheduled international passenger flights, except for between July 2011 and June 2013. Brownsville has a 24-hour Federal Inspection Station (FIS) facility, and based on the statistics provided by the airport, several international air taxis, charters, and GA flights are going through BRO. There are more international arrivals than departures to foreign destinations. Table 3-6 provides the number of international passengers using the FIS facility. Most of the passengers are not using air carrier airlines; this is the reason for the significant difference of international passengers shown between Tables 3-6 and 3-7.

Table 3-6. International Passengers using BRO
FIS Facility

Year	Inbound Passengers	Outbound Passengers
2011	2,391	2,354
2012	24,730	4,847
2013	20,441	1,607
2014	20,560	839
2015	16,555	539
2016	15,959	485

Source: BRO statistics, 2017.

The historical commercial air passenger traffic fluctuated between 2000 and 2015. However, the trend for the regional socioeconomic data have been consistently upward throughout the historical period.

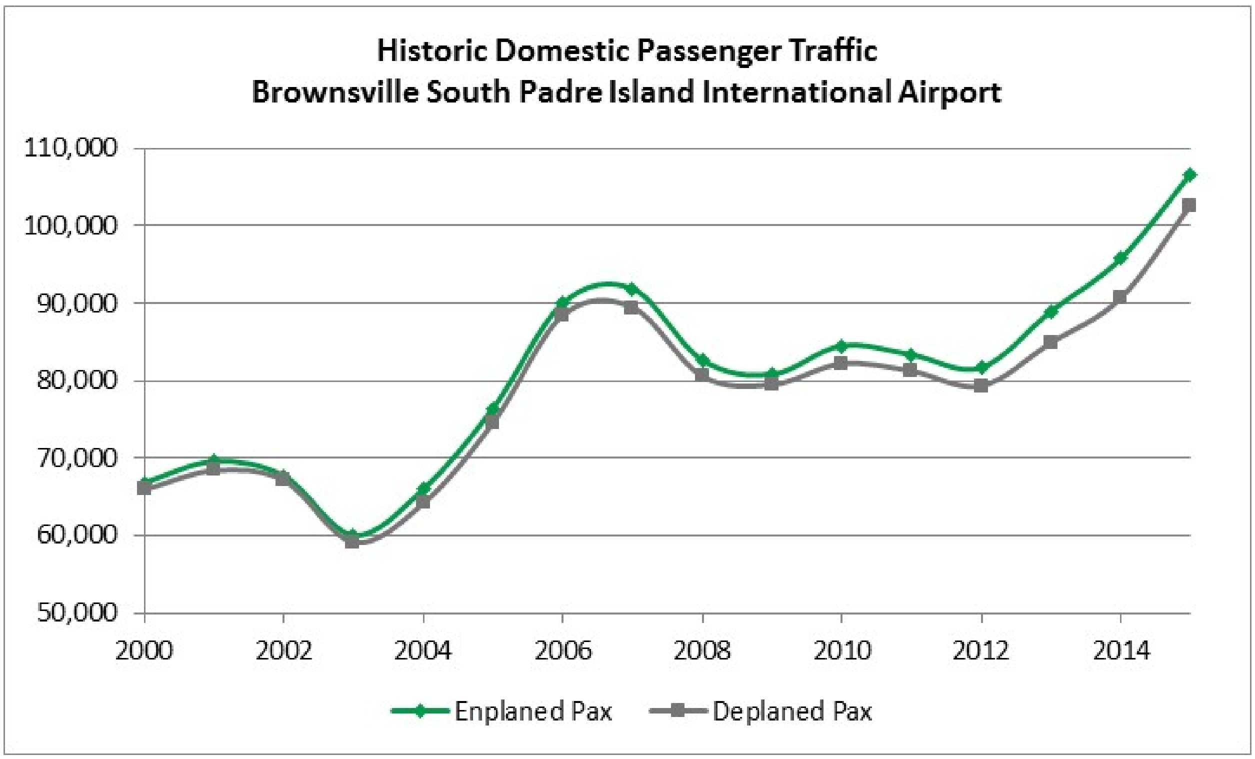

Figure 3-3. Historical Domestic Passenger Traffic 2000-2015
Source: USDOT T-100 Data.

Figure 3-4. Historical Domestic and International Passenger Traffic 2000-2015

Source: USDOT T-100 Data

Table 3-7 depicts the statistics provided by BRO for 2000 through 2016.

Table 3-7. Historical Commercial Passenger Data
Brownsville South Padre Island International Airport

Year	Enplaned Passengers	Deplaned Passengers	Total Passengers
2000	67,869	66,481	134,350
2001	71,398	68,468	139,866
2002	70,246	70,735	140,981
2003	65,719	65,131	130,850
2004	67,623	66,060	133,683
2005	77,244	75,128	152,372
2006	91,450	90,077	181,527
2007	93,852	91,444	185,296
2008	85,521	81,722	167,243
2009	83,410	79,366	162,776
2010	87,705	82,165	169,870
2011	86,646	81,887	168,533
2012	84,923	79,039	163,962
2013	91,776	84,111	175,887

Table 3-7. Historical Commercial Passenger Data
Brownsville South Padre Island International Airport

Year	Enplaned Passengers	Deplaned Passengers	Total Passengers
2014	96,076	90,186	186,262
2015	108,473	101,592	210,065
2016	104,513	96,238	200,751
Avg. Annual % Growth	**2.74%**	**2.34%**	**2.54%**

Source: BRO, 2017.

3.3.2 Cargo

The airport has had some cargo activity, including some all-cargo aircraft, flying domestic and internationally. Because Brownsville is near the Mexican border, many maquiladora products go through the area; some of these products are transported by airplane. According to the airport staff, aircraft carry a wide variety of products, which can change from year to year. Table 3-8 provides the incoming and outgoing cargo going through the airport from 2005 to 2016, including domestic and international flights. From 2005 to 2012, the statistics combine land and air cargo. The BRO statistics started to differentiate the two activities in 2013. Starting in 2013, the figures correspond to air cargo estimates.

Table 3-8. Air Cargo at BRO

Year	Inbound Cargo (pounds [lbs])	Outbound Cargo (lbs)
2005	2,166,456	2,999,803
2006	1,866,563	2,446,872
2007	2,062,209	2,171,873
2008	1,923,133	1,888,533
2009	691,130	903,318
2010	2,034,108	2,093,960
2011	1,248,797	1,044,734
2012	870,722	2,350,900
2013	353,834	689,812
2014	1,410,026	1,813,817
2015	591,910	11,079,279
2016	351,937	1,954,536

Source: BRO Statistics, 2017.
lbs = pounds

A significant spike in outbound cargo occurred in 2015. According to airport staff, this increase was due to a specific project that took place that year. After completion of the project, the cargo activity went back to levels of the same order of magnitude of previous years.

3.3.3 Aircraft Operations

An aircraft operation is defined as either a takeoff or landing. Table 3-9 presents the historical aircraft operations at the airport. The analysis used the airport statistics and T-100 to estimate the different types of aircraft operations. For instance, the commercial operations have been divided into several categories:

- Domestic passengers (scheduled and non-scheduled).
- International passengers (scheduled and non-scheduled). From 2011 to 2013, Aerolitoral (Aeroméxico Connect) provided scheduled service between Monterrey and Brownsville. Otherwise, charters/air taxis have provided non-scheduled service through the evaluated period.
- Air cargo (domestic and international). Air cargo involves mainly non-scheduled flights, but some limited cargo is carried by the scheduled passenger flights.
- ICE domestic and international flights carrying undocumented immigrants in the process to be deported. These flights started at BRO in 2013.
- Air taxi (domestic and international). Many international flights coming from Mexico, and other Latin American and Caribbean locations, use BRO as the port of entry because the airport has a 24-hour FIS facility. Passengers then continue to their destination.
- The military uses BRO to do some training. As a matter of fact, there are more local military operations than itinerant ones. Most of the military aircraft are from Kingsville Naval Air Station (120 miles) and Corpus Christi Naval Air Station (160 miles) that come to do touch-and-go operations at BRO. The two naval stations are located north of the airport.

Table 3-9. Historical Aircraft Operations
Brownsville International Airport

	Commercial Operations								
Year	Domestic Passengers	International Passengers	Air Cargo	ICE Flights	Air Taxi	Total Commercial	General Aviation	Military Aviation	Grand Total
2005	3,668	7	NA	-	1,064	4,739	20,238	11,027	36,004
2006	4,549	1	49	-	919	5,518	23,996	16,543	46,057
2007	4,640	10	202	-	723	5,575	22,564	14,966	43,105
2008	4,467	4	133	-	379	4,983	17,909	8,950	31,842
2009	5,110	13	158	-	362	5,643	15,611	5,694	26,948
2010	4,875	11	412	-	897	6,195	16,395	12,321	34,911
2011	4,746	138	696	-	79	5,659	20,848	14,905	41,412
2012	4,609	307	431	-	362	5,709	22,452	11,519	39,680
2013	4,881	97	277	211	2,854	8,320	17,506	11,112	36,938
2014	4,767	9	331	1,807	3,481	10,395	15,263	9,220	34,878
2015	5,098	10	295	888	3,968	10,259	13,882	8,143	32,284

Source: BRO statistics, 2017; USDOT T-100 Data.

GA and military include local and itinerant operations. The aircraft operations at BRO have fluctuated, as shown on Figure 3-5.

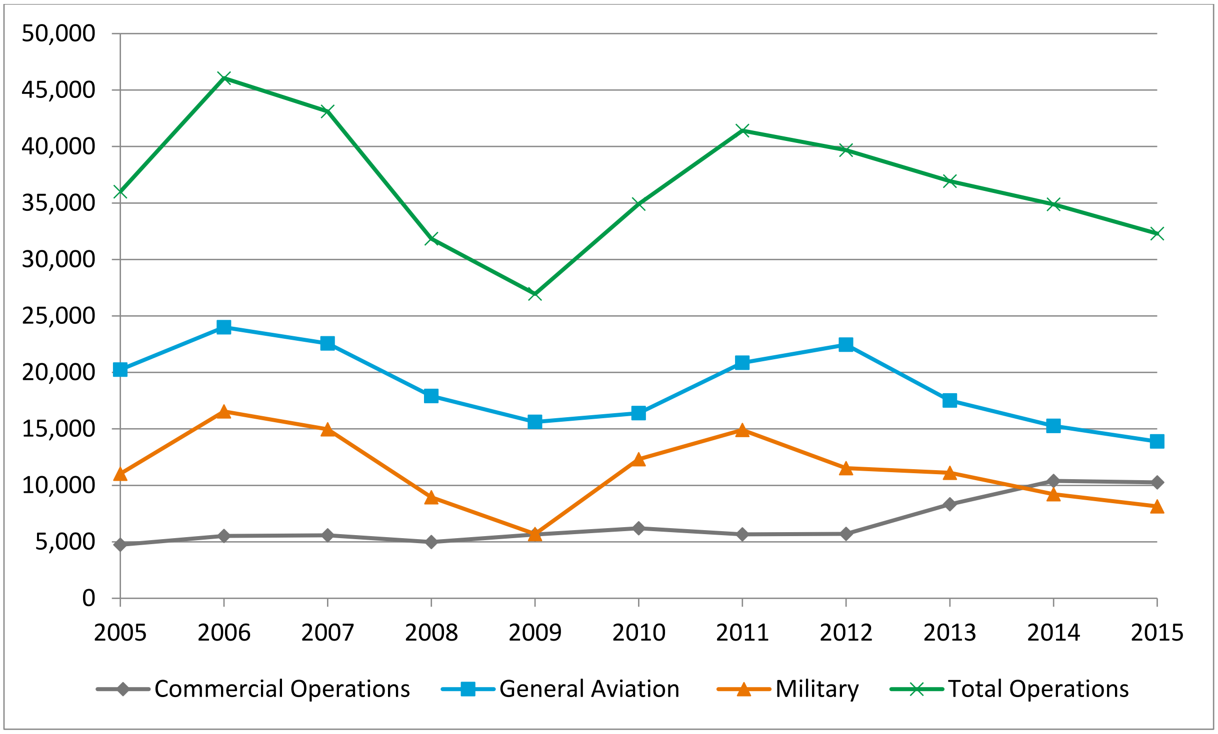

Figure 3-5. Historical Aircraft Operations
Source: BRO statistics, 2017

General Aviation Activity

The main aviation activity at BRO is GA. The airport has two fixed-base operators: Hunt Pan Am and Southmost Aviation. There are other major tenants, such as Airport Enterprise, Little Farm, and Mirage Aviation, which have based aircraft at the airport. Although Hunt Pan Am and Southmost Aviation own aircraft for rent, which is used for flight training with local students by local certified flight instructors, the airport does not have a flight school, so most (approximately 80% of the total) of the GA operations are itinerant. Conversely, McAllen-Miller International Airport and Valley International Airport do have flight schools.

Table 3-10 presents the number of based aircraft at BRO since 2011, and the ratio of operations per based aircraft. The most predominant aircraft are single-engine, followed by multi-engine. The ratio of operations per based aircraft has gradually decreased throughout the evaluated period.

From BRO statistics, the study has estimated 80% of the GA operations are itinerant and 20% local. The two fixed-base operators do not provide flight training, while McAllen and Harlingen have pilot schools.

Table 3-10. Numbers of Based Aircraft Provided by the Airport

	2011	2012	2013	2014	2015	2016
Single-engine	40	38	37	48	44	43
Multi-engine	6	5	8	4	4	5
Turbo Prop	0	0	1	5	2	2
Jets	3	3	3	2	1	3
Helicopter	1	0	0	1	1	1
Total	50	46	49	60	52	54
Aircraft Operations	20,848	22,452	17,506	15,263	13,882	13,216
Ratio Operations per based Aircraft	417.0	488.1	357.3	254.4	267.0	244.7

Source: Brownsville South Padre Island International Airport

ICE Flights

ICE has used BRO since 2013 as a transfer point for undocumented immigrants to be deported out of the country. ICE employs several charter airlines to transport the immigrants, and the airlines provide service to international and domestic destinations. According to USDOT T-100 data, most of the international flights from BRO go to Central American and Caribbean destinations. Table 3-11 presents the number of flights from 2013 to 20015.

Table 3-11. ICE Flights Going through BRO, 2013-2015

	Domestic		International		
Year	Inbound	Outbound	Inbound	Outbound	Total
2013	90	61	14	46	211
2014	746	473	151	437	1807
2015	354	218	91	225	888

Source: US DOT T-100 Data.

3.4 Major Issues Affecting Future Aviation Demand

There are three major factors that could impact the aviation activity at BRO: the national economy, local socioeconomic conditions, and airline industry. This chapter previously described the historical local socioeconomic conditions, particularly the steady growth in population, employment, and gross regional product, since 2000.

The national economy could have a significant impact on the aviation demand. Usually, aviation demand is more robust when the economy is doing well. In the past few years, the economy has recovered from the 2007-2008 recession, which has helped BRO commercial aviation activity.

Any economy has cyclical periods of growth and contraction, and decision makers strive to extend the periods of development and reduce the times of reduction. The 2017 FAA Aerospace Forecasts expects an average annual growth of the U.S. gross domestic product of 2.1% for the next 20 years.

The U.S. commercial airline industry has experienced some significant changes in the last few years due to various airline mergers, reducing the number of alternatives for air travelers. Fuel prices have stabilized and gradually decreased, helping significantly with the profits of U.S. carriers. With the improvement of the economy, business and leisure travel has increased, and the airlines have slowly increased seat capacity to accommodate the greater demand.

According to the 2017 FAA Aerospace Forecasts, the domestic passenger activity is expected to grow annually by 1.7% for the next 20 years. For the overall airline system (domestic and international), the FAA expects an average annual growth of 1.9%. The FAA report also states the regional market has decreased as the regional/commuters compete for even fewer contracts with the remaining air carriers. Additionally, the FAA expects the replacement of 50-seat aircraft with a more fuel-efficient 70-seat aircraft. Legacy air carriers are replacing less-efficient aircraft with more economical and newer aircraft models because of the competition of the low-cost carriers.

According to Boeing's market outlook (2016), passenger traffic within North America is expected to grow 2.6% in the next 20 years, and more than 8,300 new airplanes will be needed, with the single-aisle aircraft having the largest growth. Boeing estimates that 5,400 new airplanes will be replacing aircraft that will be retired in the foreseeable future.

Embraer foresees additional 70- to 90-seat aircraft in North America, replacing 50-seat aircraft (Embraer, 2016). The aircraft manufacturer mentions in its 2016 current market outlook that North American airlines have ordered nearly 600 76-seat jets. In its market forecast 2015-2034, Bombardier Commercial Aircraft also anticipates a growth in the North American market.

The potential impact of these market outlooks for BRO is the gradual replacement of Embraer 135 and 145 for larger regional jets. American Airlines has already replaced one daily flight with CRJ 900, with 76 seats.

3.5 Aviation Forecasts

The main goal of these aviation forecasts is to provide flexible aviation projections that could be adjusted if future aeronautical demand is different from what has been projected. It is important to point out that aviation forecasts define levels of demand that could take place either before or after what has been expected to take place. It is essential that airport management pay close attention to the future airport activity to make adjustments, if needed, in a timely manner to properly accommodate the aviation demand.

3.5.1 Passenger Aviation Forecasts

This section presents the expected commercial passenger aviation forecasts at BRO throughout the 2015 to 2035 period, including passengers and aircraft operations. The study estimates the annual and peak hour figures for short (5 years), medium (10 years), and long (20 years) timeframes.

The commercial aviation forecasts at BRO are based on historical aviation trends at the airport and relevant socioeconomic variables that could impact the aviation activity in the region. The consultant team used W&P as the main source for the historical and projected socioeconomic variables of Brownsville Harlingen-Raymondville CSA and Brownsville Harlingen MSA. The aviation forecast estimates could differ in timing, depending upon the continuing growth of the local economy.

The analysis has taken into account the local, state, national, and global economic conditions that could impact the development of the commercial aviation industry in Brownsville area. The issues that have been considered include:

- The forecasts must consider the long-term trends of the socioeconomic variables, and every economy is subject to cycles.
- The aviation forecasts are unconstrained and have not considered any physical restrictions that could affect BRO growth.

- The aviation projections must be relatively conservative, taking into consideration the potential occurrence of unexpected events that could impact the BRO activity. Examples could be the establishment of a new major employer in the Brownsville area or some major economic/political decisions that could impact the airport activity.

The aviation activity could be affected by a combination of factors that are difficult to foresee, particularly if they are external to the aviation industry. Therefore, it is critical that the proposed aviation forecasts are flexible to adjust to the demand changes of the airport activity.

The commercial passenger demand has normally good correlations with some socioeconomic variables, such as GRP, population, and employment. These variables have been considered in the preparation of the passenger forecasts. As mentioned, the historical and projected socioeconomic data have been obtained from the W&P database.

The following models were considered to forecast future passenger and aircraft operations:

- Regression analyses using different sets of socioeconomic variables, including population, employment, and GRP, with BRO commercial passenger aviation, to determine if there is a good correlation with the aviation activity
- Linear and logarithmic trend lines with individual socioeconomic variables

Regression analysis is a statistical process for estimating the relationships among variables. It includes many techniques for modeling and analyzing several variables, when the focus is on the relationship between a dependent variable and one or more independent variables. More specifically, regression analysis helps to show how the typical value of the dependent variable (or criterion variable) changes when any one of the independent variables is varied, while the other independent variables are held fixed. Regression analysis is used for prediction and forecasting; it is a widely acceptable means of forecasting future aviation activity.

The accuracy and reliability of the new model, or regression analysis, is determined by the correlation factors (r^2), which are statistical measurements of the relationship among variables included in the analysis. The correlation values range from 0.00 to 1.00. The closer the r^2 is to 1.00, the better the regression among independent and dependent variables. For the domestic passenger forecasts, the analysis has considered regressions with r^2 greater than 0.75.

The study considered two sets of socioeconomic data, one for the Brownsville-Harlingen-Raymondville CSA and one for the Brownsville-Harlingen MSA, to determine if there was a strong correlation between the socioeconomic variables and the domestic passenger activity. No such evaluation was prepared for the international passenger traffic because of its inconsistency.

Tables 3-12, 3-13, 3-14, and 3-15 depict passenger regression formulas and their respective correlation factors for the Brownsville-Harlingen-Raymondville CSA and the Brownsville-Harlingen MSA, using T-100 data figures and BRO statistics.

The study has obtained better correlation factors using the BRO data than the USDOT T-100 statistics. Hence, the analysis uses the BRO data to forecast the BRO domestic passenger activity. For the airport data, the correlations that exist between the historical BRO passenger activity and the socioeconomic data of the Brownsville-Harlingen-Raymondville CSA and Brownsville-Harlingen MSA are similar (r^2=0.81). Therefore, the analysis has used a combination of two evaluated areas to project the future passenger activity at the airport, using population employment and GRP as independent variables.

Table 3-12. Domestic Passenger Regressions Using US T-100 Data, Considering Socioeconomic Data of the Brownsville-Harlingen-Raymondville CSA

Variables	Regression	Correlation Factor
Population Employment GRP	Pax = -645.59 * Pop + 1161.1 * Jobs + 7.981 * GRP + 73374.6	0.78
Population GRP	Pax = -323.96 * Pop + 16.09 * GRP + 70109.4	0.73
Employment GRP	Pax = 585.243 * Jobs + 0.41296 * GRP – 23724	0.73
GRP	Pax = 8.363 * GRP + 6473.74	0.72
GRP	Pax = 70988.509 *ln(GRP) – 563,945.52	0.697
Population	Pax = 334.43 * Pop + 55744.89	0.67
Population	Pax = 134,129.173 *ln(Pop) – 725221.364	0.666
Employment	Pax = 614.935* Jobs – 25,170.215	0.735
Employment	Pax = 104,717.999 *ln (Jobs) – 457,924.113	0.73

Table 3-13. Domestic Passenger Regressions Using US T-100 Data, Considering Socioeconomic Data of Brownsville-Harlingen MSA

Variables	Regression	Correlation Factor
Population Employment GRP	Pax = -604.35 * Pop + 1242.63 * Jobs + 6.305 * GRP + 54113.82	0.78
Population GRP	Pax = -226.43 * Pop + 14.43 * GRP + 44985.77	0.73
Employment GRP	Pax = 612.49 * Jobs + 0.2766 * GRP – 23396.1	0.74
GRP	Pax = 8.86 * GRP + 5000.255	0.717
GRP	Pax = 72402.053 *ln (GRP) – 574,054.316	0.694
Population	Pax = 343.042 * Pop – 51752.74	0.638
Population	Pax = 130,151.414 *ln (Pop) – 694,141.168	0.635
Employment	Pax = 631.699 * Jobs – 24,223.219	0.736
Employment	Pax = 103,828.859 *ln (Jobs) – 449,615.453	0.73

Table 3-14. Domestic Passenger Regressions Using BRO Statistics, Considering Socioeconomic Data of the Brownsville-Harlingen-Raymondville CSA

Variables	Regression	Correlation Factor
Population Employment GRP	Pax = -537.34 * Pop + 1074.13 * Jobs + 6.58 * GRP – 58917.15	0.81
Population GRP	Pax = -239.81 * Pop + 14.08 * GRP + 55896.53	0.77
Employment GRP	Pax = 594.83 * Jobs + 0.284 * GRP – 21900.05	0.78
GRP	Pax = 8.364 * GRP + 8791.64	0.76
GRP	Pax = 71,174.531 *ln(GRP) – 563,310.242	0.741
Population	Pax = 336.503 * Pop – 54,267.598	0.718
Population	Pax = 135,043.056 *ln (Pop) – 728,388.358	0.713
Employment	Pax = 615.214* Jobs – 22,893.441	0.778
Employment	Pax = 104,895.236 *ln (Jobs) – 456,511.107	0.775

Table 3-15. Domestic Passenger Regressions Using BRO Statistics, Considering Socioeconomic Data of Brownsville-Harlingen MSA

Variables	Regression	Correlation Factor
Population Employment GRP	Pax = -496.16 * Pop + 1142.81 * Jobs + 5.039 * GRP + 41,998.41	0.81
Population GRP	Pax = -148.59 * Pop + 12.510 * GRP + 33603. 6	0.76
Employment GRP	Pax = 625.48 * Jobs + 0.0901 * GRP – 21635.5	0.78
GRP	Pax = 8.856 * GRP + 7,363.14	0.76
GRP	Pax = 72,559.206 *ln (GRP) – 573,150.911	0.738
Population	Pax = 345.623 * Pop – 50,425.203	0.685
Population	Pax = 131,203.084 *ln (Pop) – 698,078.18	0.683
Employment	Pax = 631.738 * Jobs – 21,904.877	0.779
Employment	Pax = 103,967.891 *ln (Jobs) – 448,000.898	0.776

As stated, the study used the W&P socioeconomic forecasts to project the passenger base case scenario. Table 3-16 presents the projections of the socioeconomic variables of the two areas. Since the correlation factors for the two regressions are not strong, the consultant team has chosen an average of the two in estimating the future passenger growth at BRO, as shown in Table 3-17.

Table 3-16. Forecasts of 2015-2045 Socioeconomic Variables
Brownsville South Padre Island International Airport Region

	Brownsville Harlingen Raymondville			Brownsville Harlingen MSA		
	Population (thousands)	**Jobs (thousands)**	**GRP ($U.S. million)**	**Population (thousands)**	**Jobs (thousands)**	**GRP ($U.S. million)**
2015	451.001	200.399	10,938.851	428.911	193.774	10511.793
2016	460.226	205.552	11323.412	437.931	198.805	10883.007
2017	469.642	210.741	11716.227	447.141	203.872	11262.182
2018	479.249	215.983	12118.641	456.539	208.987	11650.634
2019	489.049	221.317	12532.704	466.129	214.196	12050.358
2020	499.041	226.756	12959.167	475.91	219.505	12462.089
2025	551.953	255.592	15294.945	527.745	247.668	14718.03
2030	609.588	287.053	17998.783	584.294	278.415	17331.027
2035	670.763	320.966	21108.927	644.434	311.579	20338.148
Average Annual % Growth	**2.00%**	**2.38%**	**3.34%**	**2.06%**	**2.40%**	**3.36%**

Source: Woods & Poole Socioeconomic Forecasts, 2017.

Table 3-17. Domestic Enplaned Passenger Forecasts 2015–2035
Brownsville South Padre Island International Airport

	Enplaned Passenger Forecasts Using Socioeconomic Data		
Year	**Brownsville Harlingen Raymondville CSA**	**Brownsville Harlingen MSA**	**Average of the Two Enplaned Passenger Forecasts**
2015	108,473	108,473	108,473
2016	106,944	106,755	106,849
2017	110,043	109,886	109,965
2018	113,161	113,026	113,093
2019	116,350	116,235	116,293
2020	119,630	119,525	119,577
2025	137,547	137,360	137,453
2030	158,168	157,608	157,888
2035	182,195	180,823	181,509
Avg. Annual % Growth	**2.63%**	**2.59%**	**2.61%**

Three forecasts scenarios were prepared (low, base case, and high). Table 3-18 compares the base case scenario with the 2018 FAA terminal area forecast (TAF).

Table 3-18. Comparison BRO Base Case Domestic Projections and 2018 TAF Enplanement Forecasts

Year	2018 TAFs *	Base Case Forecasts	Difference between BRO and 2018 TAF
2015	-	108,473	-
2016	-	106,850	-
2017	121,793	109,965	-9.7%
2018	134,796	113,094	-16.1%
2019	138,827	116,293	-16.2%
2020	142,551	119,578	-16.1%
2025	160,374	137,454	-14.3%
2030	179,869	157,888	-12.2%
2035	200,592	181,509	-9.5%

* The 2018 FAA TAF includes both domestic and international passengers, while the base case scenario describes in this table only includes the domestic passengers. A comparison of the base case total enplanements and 2018 TAF is provided in Table 3-33. Both scenarios provide forecasts of the same order of magnitude.
Sources: FAA, 2018

Table 3-19 presents the low-case and high-case scenarios for domestic passenger enplanements. The analysis takes into consideration that BRO competes with two other airports in the Rio Grande Valley region. The average growth for the base-case forecast scenario is 2.61%. The low-case scenario considers that future BRO passenger growth will be similar to the FAA projections for the overall domestic market. In the high-case scenario, BRO domestic passenger activity will have a similar growth to GRP of the region (3.65%), plus the introduction of a low-cost carrier service around 2018, with service three times per week, and a new regional service similar to the one provided by United and American Airlines, with two flights per day. The evaluation has assumed average growth of 1.8% and 4.6% for low-case and high-case scenarios, respectively.

Table 3-19. Low-, Base-, and High-Case Scenarios – Domestic Enplaned Passenger Forecasts 2015–2035
Brownsville South Padre Island International Airport

Year	Low-Case	Base-Case	High-Case
2015	108,473	108,473	108,473
2016	107,714	106,849	104,500
2017	109,868	109,965	108,158
2018	112,065	113,093	130,444
2019	114,306	116,293	135,010
2020	116,592	119,577	165,085
2025	126,845	137,453	192,776
2030	138,679	157,888	224,840
2035	152,364	181,509	261,919
Average Annual Growth	**1.80 %**	**2.61%**	**4.59%**

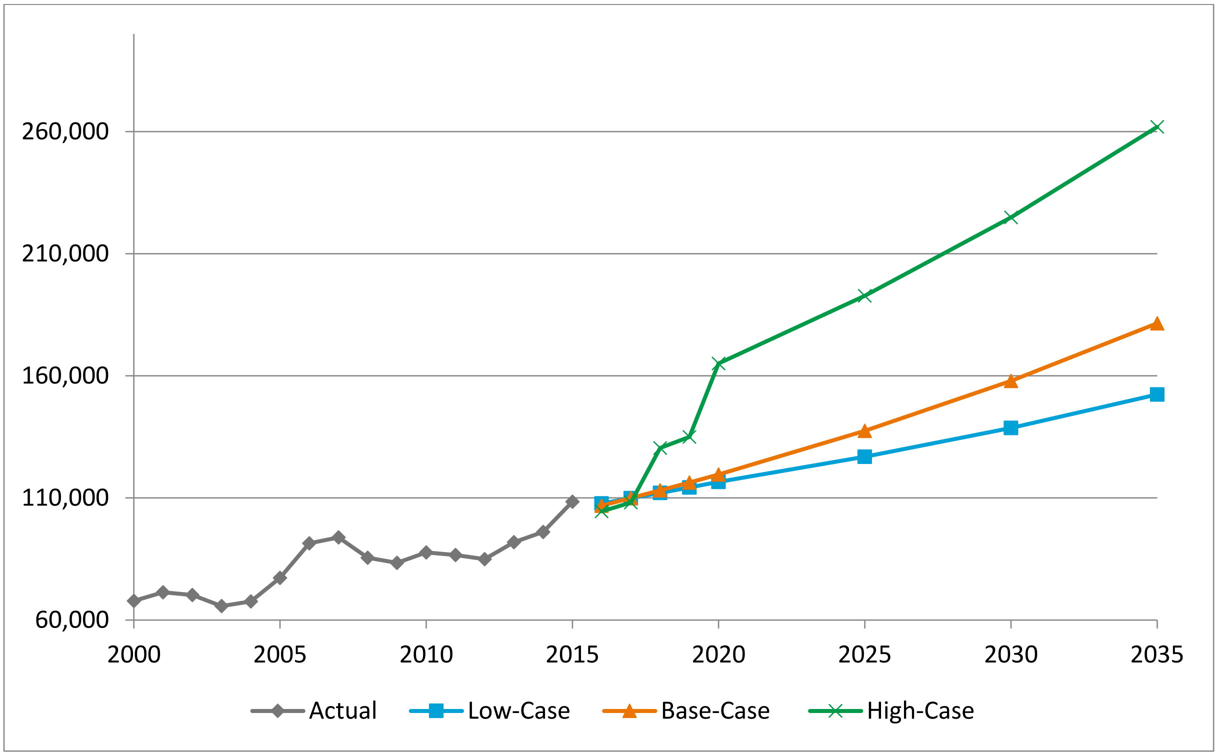

Figure 3-6. Historical and Projected Domestic Enplaned Passengers
Source: USDOT T-100 Data, BRO Statistics (2017)

3.5.2 International Passenger Forecasts

The airport has had sporadic International commercial air activity. Between July 2011 and June 2013, Aeroméxico Connect provided scheduled service between Monterrey and BRO with Embraer 145. While the average load factor in 2012 was about 55%, it dropped to 36%[1] in the first 6 months of 2013, before the airline discontinued service. Since Aeroméxico did not provide daily service, it could have had a negative impact on potential business travelers going to the region.

Ailevon Pacific Aviation Consulting has been providing air service development consultant services to BRO and has analyzed potential flight service from different Mexican cities. The City of Matamoros is across the border from Brownsville, and Reynosa is across the border from McAllen. According to Ailevon's analysis, there are five nonstop destinations from Reynosa (REX), including Cancun. The airlines serving REX are Aeroméxico, VivaAerobus, Aeromar, and Interjet. Aeroméxico is the only airline serving Matamoros.

According to research done by Ailevon, the two airports have increased their demand in the last 5 years, especially at REX, with a growth of 185%, which is an average of 23% per year. Matamoros has had an average increase of 11%.

The only airport in Rio Grande Valley providing scheduled international service is McAllen, with Aeromar which provides six flights per week with an ATR-42.

From a market research done for a Mexican airline, it has been determined that a considerable percentage of people flying to REX cross the border into Rio Grande Valley. According to property tax records, Mexican citizens own a significant share of properties on South Padre Island and do business in

[1] USDOT T-100 Data.

the area, so they travel regularly there. The Ailevon analysis has evaluated scenarios of passengers flying directly to one of the airports in Rio Grande Valley to save time crossing the border.

Brownsville is in a strategic location to attract some of the Mexican travelers going to visit the Rio Grande Valley because of its closeness to South Padre Island and businesses in the area. In addition, the airport has an FIS facility that operates 24 hours per day and 7 days per week. Monterrey and Brownsville are only 166 miles apart, but some travelers prefer flying, in part, because of security issues in Mexico. Furthermore, there could be travelers flying from other parts of Mexico, including Mexico City, who go to the area for business or personal reasons.

Since the consultant team has considered a bottom-up approach to estimate the international passenger forecasts at BRO, the analysis has checked the current aircraft fleet of the main Mexican airlines. Aeromar has a fleet of ATR-42 (48 seats) and ATR-72 (68 seats). Aeroméxico has four types of regional jets, Embraer ERJ-145 (50 seats), ERJ-170 (76 seats), ERJ-175 (76 seats) and Embraer ERJ-190 (99 seats), and Boeing B-737-800 (160 seats), which could be used for the BRO market. Interjet flies Airbus A-320 (150 seats), A-321 (192 seats), and Sukhoi Superjet (93 seats). VivaAerobus has a fleet of A-320 jets with 180 seats. Volaris, another low-cost carrier, has A-319, A 320, and A-321.

Based on research done by Ailevon for BRO–Mexican opportunities, much of the demand is truly concealed by traffic flying into Mexican airports and then crossing into the United States to places like Brownsville and South Padre Island. Traditional data sources, such as the USDOT OD1B dataset, Marketing Intelligence Data Transfer bookings, or Airline Reporting Corporation/Billing and Settlement Plan ticketing information can, in some cases, provide the location of a passenger's origin. For a market like BRO, it is especially challenging when preparing international passenger forecasts because BRO's reported demand only tells part of the story. BRO depends on feedback from airline industry sources, who have quantified potential demand such as daily service to markets in Mexico.

Because of the characteristics of the BRO market, the consultant team initially foresees regional aircraft, with the gradual increase of airplane size and frequency throughout the planning period. It is important to point out that the commercial airlines will choose the aircraft type that they consider better fits their routes and networks. It is believed that scheduled international service will start in near future (2018) of the planning period, with three times per week service using regional aircraft, and increasing flight frequencies and aircraft sizes will occur, in the medium- and long-term period. Table 3-20 presents the international passenger forecast.

Table 3-20. International Passenger Forecasts 2015-2035
Brownsville South Padre Island International Airport

Year	Weekly Frequency – Departures	Average Aircraft Size Seat	Load Factor	Weekly Enplanements	Annual Enplanements
2018	3	50	75%	113	5,900
2020	5	50	85%	213	11,100
2025	7	76	80%	426	22,200
2035	7	95	85%	566	29,400

3.5.3 Air Cargo Activity

Several factors could affect the cargo activity. Factors to be considered include:

- Conditions of the local, state, and national economy

- Transportation network available in the area, including highways, railroads, ports, and other competing airports
- Types of industries that could require air service

As stated, maquiladora supplies and products go through the area, and some of them are shipped by airplane. There have been all-cargo flights coming from various destinations in the United States, Mexico, and Canada. The cargo activity has been inconsistent throughout the evaluated period, and a wide variety of goods is shipped.

The consultant team has considered that BRO cargo statistics from 2005 to 2012 combined air and land cargo. From 2013 to 2016, the data differentiate air cargo and land cargo, and the analysis has used the last 4 years to project the future demand. For inbound freight, the "base year" is the average of the last 4 years. In the case of outbound cargo, a large spike of freight in 2015 resulted from a specific project that impacted the typical activity going through the airport. Hence, the study used the two middle years (2014 and 2016) as a baseline. The anticipated rate of growth will be similar to the GRP of the Brownsville-Harlingen Raymondville region (3.5%). The forecast estimates for inbound and outbound cargo are depicted in Table 3-21.

Table 3-21. Forecasted Air Cargo 2015-2035
Brownsville South Padre Island International Airport

Year	Outbound (lbs.)	Inbound (lbs.)
Baseline	2,000,000	676,927
2017	2,070,000	700,620
2018	2,142,450	725,140
2019	2,217,440	750,520
2020	2,295,050	776,790
2025	2,725,800	922,580
2030	3,237,400	1,095,740
2035	3,845,020	1,301,400

3.5.4 Commercial Passenger Aircraft Operations

As stated, most of the commercial passenger activity at BRO has been domestic, with some intermittent international passenger operations. The main domestic destinations have been Houston Intercontinental with Continental, and now United, and Dallas-Fort Worth with American Airlines. Aeroméxico Connect had scheduled service from and to Monterrey with two or three times per week between July 2011 and June 2013.

Most of the commercial BRO flights are with regional aircraft, with the most predominant being the Embraer ERJ-145 (50 seats). Table 3-22 depicts the changes of the passenger aircraft fleet throughout the analyzed period (2000–2015), and the most predominant airplanes are those with 50 seats. In 2016, American introduced a daily flight with a CRJ-900 (76 seats).

The commercial aircraft fleet mix has become more homogeneous throughout the evaluated period. Table 3-23 depicts the distribution by aircraft type in different years of the evaluated period. Tables 3-24 and 3-25 present the average aircraft size and load factors for the domestic, international, and overall commercial passenger aircraft operations at BRO for the period ending 2015. The analysis has not included ICE and air taxi flights in the commercial passenger activity.

Table 3-22. Changes of the Domestic Passenger Aircraft Fleet Mix Throughout the Evaluated Period 2000–2015
Brownsville South Padre Island International Airport

	Seats per Aircraft	2000	2004	2008	2012	2015
Embraer 145	50.00	50.86%	98.95%	56.12%	92.70%	77.13%
Embraer 135	37.00		1.05%	7.75%	5.35%	6.68%
Embraer 140	44.00				1.91%	0.20%
Embraer 120	30.00	0.17%				
Canadair RJ-200ER	50.00			36.08%		10.14%
CRJ-700	70.00					3.42%
ATR-42	46.00	45.81%				
MD80	141.00/ 166.00*	0.29%				2.40%
B-737-300	124.13	1.78%				
B-737-500	108.0	1.03%			0.04%	
B-737-800	155.00	0.06%		0.04%		

Source: USDOT T-100 Data
Note:
* 141 seats for 2000 and 166 seats for 2015

Table 3-23. Number of Seats per Departure and Load Factors – Historical Enplaned Passenger Data
Brownsville South Padre Island International Airport

	Domestic Passengers		International Passengers		Total Passengers	
Year	Avg. Aircraft Size	Load Factor	Avg. Aircraft Size	Load Factor	Avg. Aircraft Size	Load Factor
2000	50.63	75.77%			50.63	75.77%
2001	57.00	71.78%	50.00	60.67%	56.99	71.76%
2002	57.06	68.41%	50.00	0.00%	57.05	68.34%
2003	50.15	69.57%			50.12	69.57%
2004	49.86	77.50%	37.00	10.81%	49.86	77.47%
2005	50.07	83.23%	50.00	68.00%	50.07	83.22%
2006	49.14	80.59%	138.00	94.93%	49.17	80.61%
2007	48.61	81.48%	50.00	83.00%	48.61	81.49%
2008	49.04	75.37%	81.33	79.10%	49.09	75.38%
2009	49.40	64.00%	50.00	90.00%	49.40	64.01%
2010	48.73	71.31%	50.00	81.00%	48.73	71.32%
2011	48.72	72.15%	50.00	73.91%	48.75	72.19%

Table 3-23. Number of Seats per Departure and Load Factors – Historical Enplaned Passenger Data
Brownsville South Padre Island International Airport

	Domestic Passengers		International Passengers		Total Passengers	
Year	**Avg. Aircraft Size**	**Load Factor**	**Avg. Aircraft Size**	**Load Factor**	**Avg. Aircraft Size**	**Load Factor**
2012	49.22	71.73%	50.00	55.44%	49.27	70.72%
2013	49.07	74.30%	50.35	35.23%	49.10	73.56%
2014	48.29	83.21%	50.00	70.40%	48.29	83.18%
2015	52.42	79.72%	37.20	66.13%	52.39	79.70%

Source: USDOT T-100 Data

Table 3-24. Number of Seats per Arrival and Load Factors – Historic Deplaned Passenger Data
Brownsville South Padre Island International Airport

	Domestic Passengers		International Passengers		Total Passengers	
Year	**Avg. Aircraft Size**	**Load Factor**	**Avg. Aircraft Size**	**Load Factor**	**Avg. Aircraft Size**	**Load Factor**
2000	50.62	74.58%			50.62	74.58%
2001	56.93	70.64%	100.00	55.50%	56.98	70.61%
2002	57.03	67.57%	50.00	85.33%	57.01	67.60%
2003	50.08	68.75%			50.08	68.73%
2004	49.86	75.57%	50.00	49.20%	49.86	75.49%
2005	50.03	81.44%	64.80	37.96%	50.07	81.29%
2006	49.18	78.98%			49.18	78.98%
2007	48.48	79.24%	87.25	88.11%	48.61	79.30%
2008	49.03	73.62%	162.00	4.32%	49.09	73.52%
2009	49.40	63.15%	50.00	68.00%	49.40	63.16%
2010	48.68	69.41%	101.00	71.78%	48.73	69.41%
2011	48.71	70.47%	50.00	76.09%	48.75	70.63%
2012	49.18	69.93%	50.42	55.90%	49.26	69.04%
2013	49.05	70.89%	51.76	35.45%	49.10	70.13%
2014	48.26	78.74%	41.33	38.71%	48.25	78.70%
2015	52.56	79.70%	56.67	40.00%	52.56	76.48%

Source: USDOT T-100 Data

The average aircraft size has remained consistent at around 50 seats per flight through the historical period for domestic and total commercial operations. There was an increase in 2015 because of the addition of Allegiant flights to Las Vegas for a few months. For domestic operations, the average load factor has ranged from 63% to 83%, with an average of 75% throughout the evaluated period. For international flights, load factors have not been consistent because, for most of the evaluated period, flights were charter and air taxi service, except the period between July 2011 and June 2013, when Aeroméxico Connect provided regular flights.

Currently, the 50-seat aircraft is the most predominant at BRO, but aviation experts expect the airlines will gradually replace their 50-seat regional aircraft with more fuel efficient 70- to 76-seat aircraft. The most recent FAA Aerospace Forecast and Embraer's current market outlook both have stated they anticipate a transition to larger regional aircraft. For instance, the major U.S. airlines and their associated regional/commuter airlines have ordered Embraer ERJ 175 and Canadair. These replacements will take time to be transitioned into the fleet. Some of the airlines have delayed the retirement of 50-seat aircraft because of increased demand and lower fuel costs.

To estimate future passenger aircraft operations, the analysis considered the expected aircraft size and load factors. For the domestic market, the consultant team has considered a gradual transition to larger regional aircraft. It is better to have more operational frequency than having larger aircraft with fewer flights since more alternatives to travel provide more flexibility to travelers. The analysis projected a slight growth in the load factor throughout the planning period. Table 3-25 presents the number of annual domestic passenger aircraft operations.

Table 3-25. Domestic Passenger Aircraft Operation Forecasts
Brownsville South Padre Island International Airport

Year	Base Case Enplaned Passengers	Average Seats per Departing Aircraft	Load Factor	Annual Aircraft Departures	Total Domestic Operations
2015	108,473	54.00	77.00%	2,609	5,218
2016	106,850	54.50	77.25%	2,538	5,076
2017	109,965	55.00	77.50%	2,580	5,160
2018	113,094	55.50	77.75%	2,621	5,242
2019	116,293	56.00	78.00%	2,662	5,324
2020	119,578	56.50	78.25%	2,705	5,410
2025	137,454	58.00	79.00%	3,000	6,000
2030	157,888	60.00	79.50%	3,310	6,620
2035	181,509	62.00	80.00%	3,659	7,318

3.5.5 General Aviation Activity

The main aviation activity at the airport is GA, with gradual decrease of air operations since 2012. The consultant team asked airport staff about the expected expansion plans of the major GA operators at the airport to estimate future growth of the activity. Most of the aircraft are single engine; this was considered when preparing the GA forecast.

It is important to understand the trends of U.S. GA to prepare the expected activity growth at airports. The national GA has experienced declines of activity since the 1980s, in part because of the high operating costs for the owners. In general, the number of based aircraft at airports has declined at many airports. Table 3-26 presents the changes of the US active fleet in various FAA Aerospace Forecasts to see the variations of the expected growth in the industry.

Table 3-26. U.S. GA Fleet Forecasts

	FAA Aerospace Forecasts		
Year	2005-2016	2013-2032	2017-2037
2004	184,315		
2005	184,930		
2010	190,995		
2011	192,235	185,970	
2012	193,425	185,610	
2016	197,450	185,555	173,950
2017		185,845	173,190
2018		186,210	172,515
2020		187,340	171,360
2025		192,930	168,980
2030		201,805	167,285

Source: FAA Aerospace Forecasts (2005-2016), (2013-2032), (2017-2037).
Note:
Excludes experimental, sport aircraft, and other.

As shown in the table, the U.S. GA fleet has decreased gradually, to the point that the actual fleet in 2004 was greater than the one in 2016 and, in 2013, the FAA forecasts less GA aircraft than there were in 2004. Table 3-27 presents the expected projections by aircraft type. The piston fleet (single- and multi-engine) is expected to decrease gradually throughout the planning period.

Table 3-27. Expected U.S. GA Fleet by Aircraft Type

Year	Single-engine	Multi-engine	Turbo-prop	Turbo-jet	Rotor	Total
2015	127,887	13,254	9,712	13,440	10,506	174,799
2016	126,820	13,200	9,460	13,770	10,700	173,950
2017	125,760	13,155	9,285	14,100	10,890	173,190
2018	124,730	13,115	9,180	14,415	11,075	172,515
2019	123,705	13,080	9,110	14,760	11,255	171,910
2020	122,685	13,045	9,080	15,115	11,435	171,360
2025	117,410	12,820	9,420	16,965	12,365	168,980
2030	112,010	12,505	10,420	18,975	13,375	167,285
2035	107,205	12,125	11,835	21,105	14,545	166,815
Av Annual Growth	**-0.88%**	**-0.44%**	**0.99%**	**2.28%**	**1.64%**	**-0.23%**

Source: FAA Aerospace Forecasts 2017-2037

To forecast the future GA at BRO, the consultant team has taken into consideration the discussions with airport staff about the plans of the main GA operators and the FAA TAF (2016). Based on the conversations, some of the GA operators have plans to expand their operation, so the analysis has followed a similar trend to TAFs. The number of based aircraft provided by BRO is a little lower than TAF, but the expected growth will be similar.

The historical number of aircraft operations per based aircraft has decreased gradually, and the study has assumed the trend will continue downwards, but at slower rate, similar to TAF projections. Table 3-28 presents base-case scenario for based aircraft and GA aircraft operations.

Table 3-28. Projected Based Aircraft at BRO – Base-case Scenario

Year	Single-engine	Multi-engine	Jet	Helicopter	Total	Aircraft Operations
2015	44	6	1	1	52	13,880
2016	43	7	3	1	54	13,230
2017	44	7	3	1	55	11,720
2018	45	8	3	1	57	12,030
2019	45	8	3	1	57	12,140
2020	46	9	3	1	59	12,450
2025	49	9	3	1	62	12,900
2035	57	9	3	1	70	13,510

Low- and High-Case Scenarios

The analysis also has considered a low- and high-case scenario for GA. The analysis has assumed the low-case scenario will have less based aircraft, specifically single-engine aircraft, and the ratio of aircraft operations per based aircraft will be lower. For the high-case scenario, there will be a larger fleet with more turboprops and turbojets and more operations per based aircraft.

Table 3-29. Projected Based Aircraft and Number of Operations – Low-case Scenario

	Single-engine	Multi-engine	Jet	Helicopter	Total	Aircraft Operations
2015	44	6	1	1	52	13,880
2016	43	7	3	1	54	13,230
2017	44	7	3	1	55	11,170
2018	44	7	3	1	55	11,060
2019	44	7	3	1	55	11,170
2020	45	7	3	1	56	11,290
2025	46	7	3	1	57	11,210
2035	50	7	3	1	61	11,160

Table 3-30. Projected Based Aircraft and Number of Operations – High-case Scenario

	Single engine	Multi-engine	Jet	Helicopter	Total	Aircraft Operations
2015	44	6	1	1	52	13,880
2016	43	7	3	1	54	13,230
2017	44	7	3	1	55	12,540
2018	45	8	3	1	57	12,880
2019	46	8	3	1	58	13,220
2020	47	9	4	2	62	15,830
2025	52	11	5	3	71	16,990
2035	62	14	7	4	87	18,100

Figure 3-7 depicts the historical and projected GA activity at the airport.

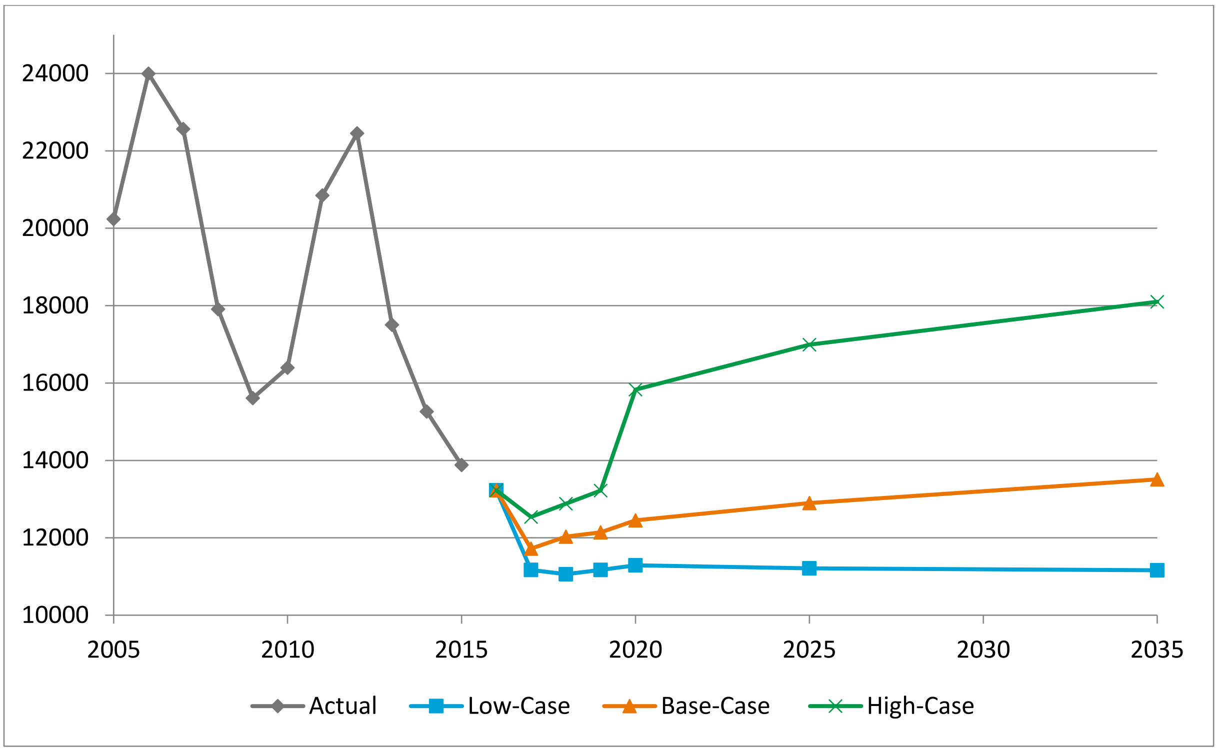

Figure 3-7. Historical and Projected GA Operations

Comparison to TAFs

Table 3-31 presents the comparison of base-case estimates with TAF estimates. These are within the accepted range defined by FAA.

Table 3-31. Comparison of BRO and TAFs

	BRO Forecasts		TAFs		% Difference	
	Based Aircraft	Aircraft Operations	Based Aircraft	Aircraft Operations	Based Aircraft	Operations
2015	52	13,880	60	13,892		
2016	54	13,230	60	13,140		
2017	55	11,720	60	12,074	-8.3%	-2.9%
2018	57	12,030	61	11,528	-6.6%	4.4%
2019	57	12,140	61	11,625	-6.6%	4.4%
2020	59	12,450	62	11,723	-4.8%	6.2%
2025	62	12,900	65	12,225	-4.6%	5.5%
2035	70	13,510	75	13,290	-6.7%	1.7%

Source: TAF Estimates

3.5.6 Air Taxis

The airport has a significant number of air taxi operations. Some of them are international and others domestic. As mentioned, several international flights stop at BRO to do their immigration and customs, since the airport has an FIS opened 24 hours a day, 7 days per week. Afterward, the flights continue to their final destination. It is important to point out some of the people going through FIS are on private flights (GA). Table 3-32 presents the number of passengers using the FIS facilities, and the estimates do not include people transported by ICE flights. It seems many flights that stop at BRO coming in to the United States return to their country from other airports; hence, it is the reason for the considerable disparity of incoming and outgoing passengers.

Table 3-32. International Passengers Using FIS
Brownsville South Padre Island International Airport

Year	Inbound	Outbound
2011	2,391	2,354
2012	24,730	4,847
2013	20,441	1,607
2014	20,560	839
2015	16,555	539
2016	15,959	485

Source: BRO statistics, 2017.

In any case, the study has estimated the number of air taxi will remain constant, around 4,000 annual operations. The 2017-2037 FAA Aerospace Forecast report foresees a decline of air taxi activity, compensated by an increase in air carrier service.

3.5.7 ICE Flights

As mentioned, the airport has several ICE flights transporting undocumented immigrants. Even though the activity is bound by government policy, it is important to reserve areas for aircraft parking and facilities to deal with the process of deportation. According to USDOT T-100 statistics, the busiest year was 2014 with 1,800 operations, which is the equivalent of six flights per day or three aircraft (in and out). In 2015, there were 888 operations. The study foresees a range of 8 to 12 operations per day, which represents four to six daily aircraft. The aircraft normally used by ICE are B-737 and MD-80.

3.5.8 Military Flights

It is typical in airport planning to maintain the level of military activity of the base year (2015) constant through the planning period. Therefore, the study estimates 8,200 annual military operations. The study foresees there will be more local military (training) than itinerant ones.

3.5.9 Summary of Annual Aviation Forecasts

Table 3-33 presents the summary of the preferred BRO base-case scenario aviation forecast.

Table 3-33. Summary of Aviation Forecasts
Brownsville South Padre Island International Airport

	2015	2020	2025	2035
Annual Enplanements		130,678	159,654	210,909
Domestic	108,568	119,578	137,454	181,509
International	95	11,100	22,200	29,400
2018 FAA TAF	-	142,551	160,374	200,591
Difference between BRO and 2018 TAF	-	-8.32	-0.44	5.14
Cargo (pounds)				
Outbound	2,000,000	2,295,050	2,725,800	3,845,020
Inbound	676,927	776,790	922,580	1,301,400
Aircraft Operations	32,380	32,504	33,642	35,778
Commercial Domestic	4,972	5,126	5,814	7,340
Commercial International	520	728	728	728
General Aviation	13,800	12,450	12,900	13,510
Air Taxi	4,000	4,000	4,000	4,000
ICE Flights	888	2,000	2,000	2,000
Military	8,200	8,200	8,200	8,200

The TAF estimates are of the same order of magnitude as the BRO enplanements forecasts.

3.5.10 Comparison of Projected Aircraft Operations with TAF

Table 3-34 compares the projected aircraft operations of forecast report with the TAF numbers.

Table 3-34. Comparison of Aircraft Operations Forecast and 2018 TAF Estimates
Brownsville South Padre Island International Airport

Year	BRO Forecasts	2018 TAF Estimates	Difference Between the Two
2015	32,380	33,174	
2020	32,504	32,921	-1.3%
2025	33,642	34,812	-3.4%
2035	35,778	38,131	-6.2%

Source: TAF estimates

The 2018 TAF estimates are of the same order of magnitude as the BRO forecasts. The consultant team has taken into account the viewpoint of several aviation experts who expect the transition from 50-seat aircraft to 70-seat ones; this is how the commercial aircraft operations were estimated.

3.6 Planning Parameters

To estimate the sizing and dimensioning of airport and passenger terminal facilities, the analysis must determine the periods with greater activity, particularly the design hour, specifically passenger and aircraft operations. So the facilities are planned and developed properly, the design hour should be representative of busy periods, but not the absolute peak periods, because then the facilities would be underutilized most of the time.

The design-day, design-hour estimates help to calculate the sizing of the airport and passenger terminal facilities. This section explains how the peak hours were estimated, including the calculations of peak month and the average day of the peak month.

3.6.1 Peak Month

The study estimated the peak month percentage of the year activity, considering historical trends and accepted standards in the aviation industry. To evaluate the patterns, the consultant team used the USDOT T-100 monthly statistics pattern from 2000 to 2015 and BRO statistics from 2005 to 2016. The analysis focused on the historical domestic passenger and aircraft operation data since international activity has not been consistent throughout the period. The peak months of departures and passengers do not necessarily coincide. Table 3-35 depicts the ratio of domestic passenger peak month for the year.

Table 3-35. Peak Month Percentages of the Year – Historical Domestic Commercial Passenger Statistics
Brownsville South Padre Island International Airport

	From BRO		To BRO	
Year	Trips	Onboard	Trips	Onboard
2000	8.67%	9.84%	8.64%	9.95%
2001	8.88%	11.21%	8.89%	10.80%
2002	8.76%	11.15%	8.74%	11.35%
2003	9.01%	9.79%	8.96%	9.75%
2004	8.54%	9.43%	8.34%	9.26%
2005	8.45%	9.23%	8.48%	9.17%
2006	9.11%	9.52%	9.09%	9.37%

Table 3-35. Peak Month Percentages of the Year – Historical Domestic Commercial Passenger Statistics
Brownsville South Padre Island International Airport

	From BRO		To BRO	
Year	**Trips**	**Onboard**	**Trips**	**Onboard**
2007	9.22%	9.97%	9.17%	9.97%
2008	9.44%	11.03%	9.45%	10.75%
2009	10.32%	10.86%	10.39%	10.86%
2010	8.42%	9.70%	8.43%	9.79%
2011	8.65%	9.70%	8.75%	9.62%
2012	8.91%	10.50%	8.92%	10.50%
2013	9.75%	10.85%	9.79%	10.45%
2014	9.06%	10.22%	9.02%	9.30%
2015	9.56%	10.52%	9.58%	10.81%
Average of Peak Month	**9.09%**	**10.23%**	**9.09%**	**10.11%**

Source: USDOT T-100 Data.

Table 3-36 presents a comparison of the number of seats per aircraft operation and load factors between historical annual statistics and peak month figures. The greater difference exists between annual and peak month load factors. They will be taken into account when preparing the peak month estimates.

Table 3-36. Peak Month Averages versus Annual Averages – Historical Domestic Commercial Passenger Statistics
Brownsville South Padre Island International Airport

	From BRO				To BRO			
	Average Aircraft/Size		**Load Factor**		**Average Aircraft/Size**		**Load Factor**	
Year	**Annual**	**Peak Month**	**Annual**	**Peak Month**	**Annual**	**Peak Month**	**Annual**	**Peak Month**
2000	50.63	58.00	75.77%	82.69%	50.62	52.69	74.58%	82.50%
2001	56.99	62.53	71.76%	82.62%	56.93	62.15	70.64%	78.66%
2002	57.05	61.53	68.34%	80.69%	57.03	61.53	67.57%	81.33%
2003	50.12	50.93	69.57%	74.41%	50.08	50.47	68.75%	74.23%
2004	49.86	50.00	77.47%	85.44%	49.86	49.91	75.57%	83.76%
2005	50.07	52.10	83.22%	91.20%	50.03	49.92	81.44%	88.24%
2006	49.17	50.19	80.61%	86.26%	49.18	48.49	78.98%	82.52%
2007	48.61	49.95	81.49%	89.85%	48.48	49.20	79.24%	84.92%
2008	49.09	50.57	75.38%	86.86%	49.03	49.73	73.62%	82.56%
2009	49.40	50.00	64.01%	73.23%	49.40	48.85	63.15%	66.78%

Table 3-36. Peak Month Averages versus Annual Averages – Historical Domestic Commercial Passenger Statistics
Brownsville South Padre Island International Airport

	From BRO				To BRO			
	Average Aircraft/Size		Load Factor		Average Aircraft/Size		Load Factor	
Year	Annual	Peak Month	Annual	Peak Month	Annual	Peak Month	Annual	Peak Month
2010	48.73	50.17	71.32%	82.72%	48.68	48.29	69.41%	81.12%
2011	48.75	49.52	72.19%	79.93%	48.71	48.29	70.47%	78.23%
2012	49.27	49.97	70.72%	81.58%	49.18	49.97	69.93%	81.05%
2013	49.07	49.84	74.30%	81.36%	49.05	49.84	70.89%	74.43%
2014	48.29	53.42	83.21%	84.81%	48.26	52.51	78.74%	74.61%
2015	52.42	53.59	79.72%	85.79%	52.56	53.59	76.58%	84.72%
Average	**50.25**	**51.40**	**74.98%**	**82.45%**	**50.23**	**51.25**	**73.01%**	**79.60%**

Source: USDOT T-100

Table 3-37 shows the percentage of aircraft operations in the peak month of the year for GA and total annual operations.

Table 3-37. Historical Annual and Peak Month of GA Activity
Brownsville South Padre Island International Airport

Year	Peak Month	Annual Op	% Peak Month
2005	2,293	20,238	11.33
2006	2,740	23,996	11.42
2007	2,407	22,564	10.67
2008	1,759	17,909	9.82
2009	1,690	15,611	10.83
2010	1,760	16,395	10.73
2011	2,862	20,848	13.73
2012	2,837	22,452	12.64
2013	2,017	17,506	11.52
2014	1,846	15,263	12.09
2015	1,574	13,882	11.34
2016	1,609	13,216	12.17
Average of the peak month			**11.55**

Source: BRO Statistics, 2017.

Table 3-38 shows the percentage of total aircraft operations in the peak month of the year and total annual operations.

Table 3-38. Historical Annual and Peak Month of Total Aircraft Operations
Brownsville South Padre Island International Airport

Year	Peak Month	Annual Operations	% Peak Month
2005	3,557	36,004	9.88
2006	4,784	46,057	10.39
2007	4,577	43,105	10.62
2008	3,334	31,842	10.47
2009	2,696	26,948	10.00
2010	3,984	34,911	11.41
2011	4,635	41,412	11.19
2012	4,489	39,680	11.31
2013	3,961	36,938	10.72
2014	3,852	34,878	11.04
2015	3,323	32,284	10.29
2016	3,536	32,823	10.77
Average of peak month			**10.70**

Source: BRO statistics, 2017.

Normally, when the level of aviation demand increases, the peak month percentage of the year will gradually diminish since the aviation traffic will be distributed more evenly through the year.

For the base year of commercial passenger operations, the study has used ratios of 10.35% and 9.15% of the annual domestic passengers, and aircraft operations from the T-100 data for the peak month. For the commercial international activity, the peak month estimates for the base year are 10.20% for passenger and 9.30% for aircraft operations.

The peak months for different categories (passenger, commercial passenger operations, GA, etc.) do not necessarily take place in the same month. Hence, the different activities are not added together directly.

For instance, to estimate the total peak month passengers and aircraft operations, the analysis used the peak month percentage to the year pattern provided by the USDOT T-100 data with the BRO forecast data. Tables 3-39 and 3-40 depict peak month passenger and commercial air operation forecasts. To estimate the total peak month activity, the analysis has taken into account the monthly ratios from the T-100 and has adjusted these data with the traffic growth.

Table 3-39. Peak Month Passenger Forecasts
Brownsville South Padre Island International Airport

Year	Domestic Passengers	International Passengers	Total Passengers
2015	22,350	-	22,350
2020	24,400	3,000	27,400
2025	27,910	5,330	33,240
2035	36,580	6,470	43,050

Table 3-40. Peak Month—Commercial Aircraft Operation Forecasts
Brownsville South Padre Island International Airport

Year	Domestic Operations	International Operations	Commercial Air Operations
2015	496		496
2020	512	44	556
2025	566	62	628
2035	681	62	743

For the other aircraft operations, the ratios of peak month of the year are based on historical activity at the airport. The monthly statistics provided by the airport helped to estimate the ratios of different aircraft operations. The peak months of various aircraft operations do not necessarily coincide, so the total aircraft estimate is different from the sum of different categories. Table 3-41 depicts projected peak operations for each type of operations.

Table 3-41. Projected Peak Month Estimates of Aircraft Operations
Brownsville South Padre Island International Airport

	2015	2020	2025	2035
Aircraft Operations	3,465	3,382	3,511	3,763
Commercial Domestic	496	512	566	681
Commercial International	-	44	62	62
General Aviation	1,555	1,494	1,548	1,621
Air Taxi	440	440	440	440
ICE Flights	102	161	198	252
Military	1,005	1,005	1,005	1,005

3.6.2 Average Weekday of the Peak Month

Tables 3-42 and 3-43 show the calculations for the average weekday of the peak month. There are usually some variations in traffic, depending on the days of the week; this is true particularly between weekdays and weekends. At BRO, the weekend days have a little less traffic than the weekdays. Thus, for this analysis, the month has been divided by 29.6 days; this is conservative for the facility requirements analysis as it increases the average day of the peak month.

Table 3-42. Average Weekday of Peak Month Passengers and Aircraft Operations.
Brownsville South Padre Island International Airport

	2015	2020	2025	2035
Passengers	755	827	949	1,243
Domestic	755	824	943	1,236
International	0	3	6	7

Table 3-42. Average Weekday of Peak Month Passengers and Aircraft Operations.
Brownsville South Padre Island International Airport

	2015	2020	2025	2035
Aircraft Operations	117	114	119	127
Commercial Domestic	17	17	19	23
Commercial International	0	1	2	2
General Aviation	53	50	52	55
Air Taxi	15	15	15	15
ICE Flights	3	5	7	9
Military	34	34	34	34

3.6.3 Peak Hour

To estimate the passenger and commercial aircraft peak hour, the study has used the flight published by United and American Airlines in their respective websites. These are the two air carriers providing scheduled domestic service to BRO; United has four daily flights and American has three. United uses Embraer ERJ 145 for all its flights, and American Airlines has two flights with ERJ-145 and one with Bombardier CRJ 900. The two airlines have aircraft remaining overnight, with two flights around 11 a.m. local time that coincide at the airport, so the analysis has taken into consideration the two scenarios when estimating the peak hour.

The study has assumed the passenger aircraft load factor at peak hour is around 90% to 95%.
The analysis has estimated the peak hour percentage of the average weekday of the peak month, based on the current trends. The peak-hour ratio to the average weekday is expected to decrease gradually with future aviation growth.

For the other aircraft operations, the consultant team has used the hourly records of BRO air traffic control tower for all of July 2016. July has been the busiest month of total aircraft operations for the last 6 years. Figure 3-8 depicts the typical hourly operation patterns in July 2016. The peak months of some individual aircraft operations (military and local GA) do not take place July. As shown in the graph, the peak hours for various aircraft operations are at different times of the day.

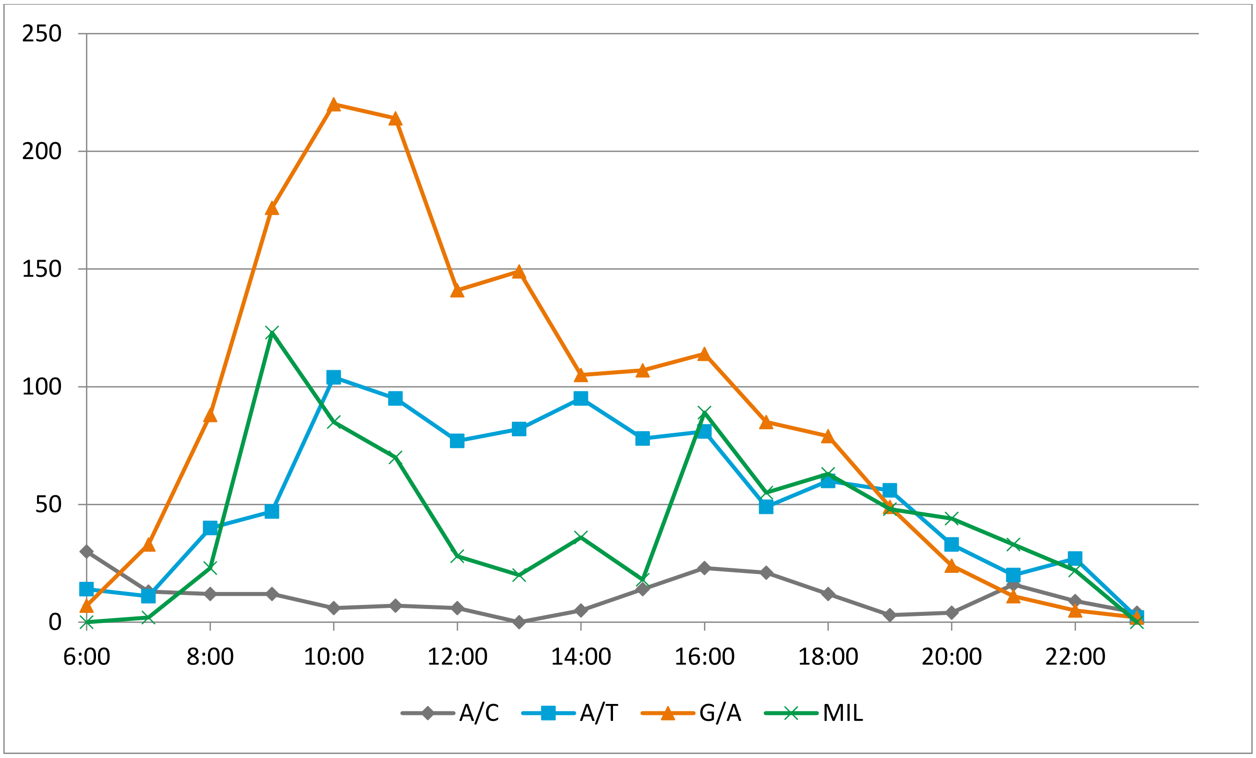

Figure 3-8. Hourly Distribution of Aircraft Operations
Source: BRO Air Traffic Control Tower Statistics, 2017

Table 3-43 presents the anticipated peak hours of commercial passenger and different categories of aircraft operations.

Table 3-43. Forecasted Peak Hour Estimates
Brownsville South Padre Island International Airport

	2015	2020	2025	2035
Passengers	198	232	281	371
Domestic	198	213	238	308
International	-	97	172	209
Aircraft Operations	15	14	15	16
Commercial Domestic	4	4	5	5
Commercial International	2	2	2	2
General Aviation	7	7	7	7
Air Taxi	2	2	2	2
ICE Flights	2	2	2	2
Military	4	4	4	4

The study also reviewed the passenger peak hour in one direction, and Table 3-44 depicts typical passenger peak hour forecasts. Based on the current air carrier schedule, there is an even break between incoming and outgoing passengers since the aircraft remain at the airport for about 30 to

40 minutes. For planning purposes, the evaluation has assumed 65% of the passenger traffic in the heavy direction in the first few years of the planning period, with a gradual reduction in the percentage toward the end of the evaluated period. Even though none of the flights coincide at the airport now, there is an overlap for departing passengers, considering that some passengers arrive 2 hours before flight departure. The ratio will gradually decline with the increase of aviation demand.

Table 3-44. Typical Passenger Peak Hour Forecasts – One Direction
Brownsville South Padre Island International Airport

Year	Domestic Passengers	International Passengers	Total Passengers
2015	129	-	129
2020	138	63	151
2025	149	108	176
2035	185	125	223

3.7 Annual Instrument Approaches

The analysis has estimated the number of aircraft flying at BRO that operate under instrument flight rules (IFR). An instrument flight operation is defined as an arrival or departure of an aircraft following the guidelines of an IFR flight plan or when air traffic control provides IFR the separations between flying aircraft.

Based on 2016 statistics provided by BRO air traffic control tower, 51% of the total operations are IFR. The same ratio is carried through the master plan period, and IFR approaches will half of the total IFR operations. Table 3-45 depicts annual instrument approach forecasts.

Table 3-45. Annual Instrument Approaches

Year	Base Case operations	Total IFR Operations	Total IFR Approaches
2015	32,380	16,514	8,257
2020	32,504	16,577	8,289
2025	33,642	17,157	8,579
2035	35,778	18,247	9,123

Source: BRO statistics, 2017.

3.8 Summary of the Aviation Forecasts

Tables 3-46 and 3-47 summarize BRO annual and peak hour forecasts for the period 2015 to 2035.

Table 3-46. Summary of Commercial Passenger Forecasts
Brownsville South Padre Island International Airport

	2015	2020	2025	2035
Annual Enplanements		130,678	159,654	210,909
Domestic	108,568	119,578	137,454	181,509
International	95	11,100	22,200	29,400
Total Enplanements Difference with 2018 TAF	-	-8.32	-0.44	5.14
Peak Month	22,350	24,497	28,082	36,789
Domestic	22,350	24,400	27,910	36,580
International	0	97	172	209
Peak Hour	198	232	281	371
Domestic	198	213	238	308
International	-	97	172	209

Table 3-47. Summary of Forecasts of Aircraft Operations
Brownsville South Padre Island International Airport

	2015	2020	2025	2035
Annual Operations	32,380	32,504	33,642	35,778
Commercial Domestic	4,972	5,126	5,814	7,340
Commercial International	520	728	728	728
General Aviation	13,800	12,450	12,900	13,510
Air Taxi	4,000	4,000	4,000	4,000
ICE Flights	888	2,000	2,000	2,000
Military	8,200	8,200	8,200	8,200
Total Operations Forecast Difference with 2018 TAF	**-**	**-1.3**	**-3.4**	**-6.2**
Peak Month				
Aircraft Operations	3,465	3,382	3,511	3,763
Commercial Domestic	496	512	566	681
Commercial International	0	44	62	62
General Aviation	1,555	1,494	1,548	1,621
Air Taxi	440	440	440	440
ICE Flights	102	161	198	252

Table 3-47. Summary of Forecasts of Aircraft Operations
Brownsville South Padre Island International Airport

	2015	2020	2025	2035
Military	1,005	1,005	1,005	1,005
Peak Hour				
Aircraft Operations	15	14	15	16
Commercial Domestic	4	4	5	5
Commercial International	2	2	2	2
General Aviation	7	7	7	7
Air Taxi	2	2	2	2
ICE Flights	2	2	2	2
Military	4	4	4	4
Based Aircraft*	-	62	65	75

* FAA TAF was selected for based aircraft forecasts

FINAL REPORT

Facility Requirements

Prepared for

Brownsville South Padre Island International Airport

August 2019

ch2m

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Acronyms and Abbreviations

°C	degrees Celsius
°F	degrees Fahrenheit
AC	Advisory Circular
ADPM	average day of the peak month
ARC	Airport Reference Code
ARFF	aircraft rescue and fire fighting
ASV	annual service volume
ATCT	air traffic control tower
BRO	Brownsville South Padre Island International Airport
CBP	U.S. Customs and Border Protection
CFR	Code of Federal Regulations
Ec	expected average number of casualties
FAA	Federal Aviation Administration
FBO	fixed-base operator
FIS	Federal Inspection Service
FOD	foreign object debris
FTZ	Foreign Trade Zone
GA	general aviation
GSE	ground service equipment
ICE	Immigration and Customs Enforcement
IFR	Instrument Flight Rules
ILS	instrument landing system
ISA	International Standard Atmosphere
lbs	pounds
MTOW	maximum gross takeoff weight
NAS	National Airspace ystem
NAVAID	navigational aid
NFDC	National Flight Data Center
OFZ	Obstacle-Free Zone
PAL	planning activity level
PBN	performance-based navigation
PCI	Pavement Condition Index
QTA	quick turnaround

RNAV	area navigation
RNP	required navigational performance
ROFA	Runway Object-Free Area
ROFZ	Runway Object-Free Zone
RPZ	Runway Protection Zone
RSA	Runway Safety Area
RVA	Robinson Aviation
TDG	Taxiway Design Group
TFMSC	traffic flow management system counts
VFR	Visual Flight Rule
VORTAC	very high frequency omnidirectional range with a tactical air navigation system

Facility Requirements

The Aviation Demand Forecasts chapter presented forecasts of passenger and aircraft activity for the planning period. This chapter assesses the requirements and plan for future airport facilities.
The objective of this chapter is to determine future facility requirements that will be necessary for passenger facilities, landside, airside, and general aviation (GA) facilities to meet demand during the planning period.

4.1 Planning Activity Levels

Operational activity levels are used to assess whether existing facilities have the capacity to meet forecast demand. Appropriate planning activity levels (PALs) were defined for the Brownsville South Padre Island International Airport (BRO), based on the aviation demand forecasts chapter activity levels, as shown in Table 4-1. While the key planning years for PALs 1, 2, and 3 would ideally be at 5-year, 10-year, and 20-year horizons, respectively, it is possible that BRO attains the activity levels before entering the key planning years; therefore, no specific year was associated with any PAL.

Peak-hour factors for the average day of the peak month (ADPM) were defined for use in planning various elements of the airport. These calculations are shown in Table 4-1 for air carrier.

Table 4-1. Peak-Hour Forecast Enplanements and Operations

	PAL 1	PAL 2	PAL 3
Peak Month/Hour Operations – Air Carrier			
Annual Operations (Arrivals and Departures)	5,854	6,542	8,068
Peak-Month Operations (9% of Total)	556	628	743
Peak-Hour Operations	6	7	7
Peak Month/Hour Passengers – Air Carrier			
Annual Passengers (Enplaned and Deplaned)	261,356	319,308	421,818
Peak-Month Passengers (9% of Total)	24,497	28,082	36,789
Peak-Hour Passengers	232	281	371

4.1.1 Critical Aircraft

Airport infrastructure design standards are impacted by the type of aircraft expected to use the facilities. Airport infrastructure is generally designed to accommodate the critical aircraft—the most demanding aircraft or group of aircraft—that will use the facilities on a regular basis. The Federal Aviation Administration (FAA) defines regular basis as at least 500 or more annual operations at the airport.

The FAA publishes the Traffic Flow Management System Counts (TFMSC) that contains data derived from the Air Traffic Airspace Lab’s Traffic Flow Management System. The TFMSC contains a number of fields and assumptions to provide richer information; however, it does not represent the official traffic counts for the National Airspace System (NAS). Although the TFMSC does not represent exact annual operations at the airport, it provides an indication of the type of aircraft using the airport.

Based on the review of TFMSC data and fleet mix analysis, the existing critical aircraft are the Boeing B737-400 and the MD-80 series. The Boeing B737-400 has an airport reference code (ARC) of C-III and a Taxiway Design Group (TDG) 3; the MD-80 series, which includes the MD-82, MD-83, and MD-88 at BRO, have an ARC of C-III and a TDG 4.

4.2 Airfield

This section assesses airfield facilities including airfield capacity, FAA design standards, and runway length requirements.

Forecasts of annual aircraft operations, based aircraft, and the aircraft fleet mix characteristics serve as the basis for airfield facility planning. Table 4-2 summarizes the total operations forecast for the three PALs at BRO. The forecast shows an increase from 32,380 total annual operations in 2015 to 35,778 total annual operations at the end of PAL 3.

Table 4-2. Summary Forecast

	PAL 1	PAL 2	PAL3
Operations			
Total Commercial Operations	5,854	6,542	8,068
General Aviation	12,450	12,900	13,510
Air Taxi	4,000	4,000	4,000
Immigration and Customs Enforcement (ICE)	2,000	2,000	2,000
Military	8,200	8,200	8,200
Total Operations	***32,504***	***33,642***	***35,778***

4.2.1 Airfield Capacity

This section describes the methodologies and assumptions used, as well as the results obtained, in the Airfield Demand Capacity Assessment, in support of the Master Plan Update for BRO. In this assessment, high-level analytical models were used to estimate the airfield capacity of the existing airfield for the base-year conditions and future forecasts of demand and aircraft fleet mix. The analytical models used in the analysis and the assumptions used in those models are summarized in this section. A brief assessment of the impact of NextGen on airfield capacity is also provided.

Assessment Methodology and Assumptions

The FAA describes the methodology for determining airfield capacity in Advisory Circular (AC) 150/5060-5 – *Airport Capacity and Delay*. Capacity is defined as “a measure of the maximum number of aircraft operations which can be accommodated on the airport or airport component.” Airfield capacity can be expressed by the maximum aircraft per year or per hour; when it is expressed per year, it is referred to as the annual service volume (ASV). ASV is not a hard upper limit on aircraft operations; rather, it is intended to be interpreted as the number of annual aircraft operations above which additional increases in demand would result in disproportionate increases in average aircraft delays. ASV is also the basis for a high-level methodology for estimating average annual aircraft delay using the ratio of annual demand to ASV, which is described in the AC.

Airfield capacity is determined by airfield geometry, physical facilities, environmental conditions, airspace, navigational aids, standard flight procedures, and aircraft mix. The following parameters all have an important impact on capacity:

- Number and physical layout of the runways
- Orientation and relative location of the runways
- Number, location, and physical layout of the taxiways
- Aircraft fleet mix using the airport
- Percentage of touch-and-go operations
- Weather conditions—wind speed and direction, cloud ceiling, and visibility
- Instrument Flight Rules (IFR) conditions
- Operational restrictions (such as noise abatement procedures)

BRO Airfield Capacity

The FAA AC 150/5060-5 – *Airport Capacity and Delay*, was used to estimate capacity at BRO. The airport runway configuration at BRO is depicted on Figure 4-1 and is best estimated by Configuration 9, the intersecting runways configuration. Per the FAA AC 150/5060-5, two intersecting runways, properly sized and oriented with optimal taxiways configuration, are typically capable of supporting approximately 200,000 to 265,000 operations annually, depending on the fleet mix using the airport, as depicted on Figure 4-2. The mix index represents the percentage of operations conducted by aircraft classified in four categories based on maximum certificated takeoff weight, number of engines, and wake turbulence classification. Based on the current and projected fleet at BRO, the mix index is assumed to be 40% in 2017 and up to 45% in 2035.

As depicted on Figure 4-2 and based on the existing and future fleet mix at BRO, the projected ASV throughout the planning period is 200,000. Future capacity levels for the airport have been calculated based on the forecasted annual operations and the ASV for the airport. These levels are depicted in Table 4-3. Based on the forecasts, BRO will not exceed the airport's ASV during the planning period.

FAA guidelines suggest that facility improvements should be considered to increase capacity when annual operations reach 60% of the ASV. With Runways 13/31 and 18/36, BRO is not expected to have any capacity issues over the planning period.

The FAA AC 150/5060-5 assumes that runways are equipped with full length parallel taxiways with multiple entrance/exit taxiways and no taxiway problem, as well as an air traffic control tower (ATCT) facility. It is recognized BRO does not conform to all of these assumptions. Although both runways have multiple entrance and exits, they do not have a dedicated full length parallel taxiway, which results in a loss of capacity compared to the theoretical capacity provided in the AC. Even if the ASV were reduced by 20% to 160,000, the projected operations would represent 22.4% of the estimated ASV at PAL 3, below the FAA guidelines threshold of 60% suggested to consider facility improvements to increase capacity.

In addition to the ASV, the runway capacity was also estimated hourly. Table 4-3 also summarizes the peak-hour commercial operations and hourly capacity. The hourly capacity is 57 operations in IFR conditions and 77 operations in visual flight rule (VFR) conditions. Commercial operations during the peak hour were six in 2015 and up to seven at PAL 3, below the hourly capacity. Other types of operations, such as GA operations, can and do occur during the peak hour; however, the hourly capacity is sufficient based upon the airport activity levels.

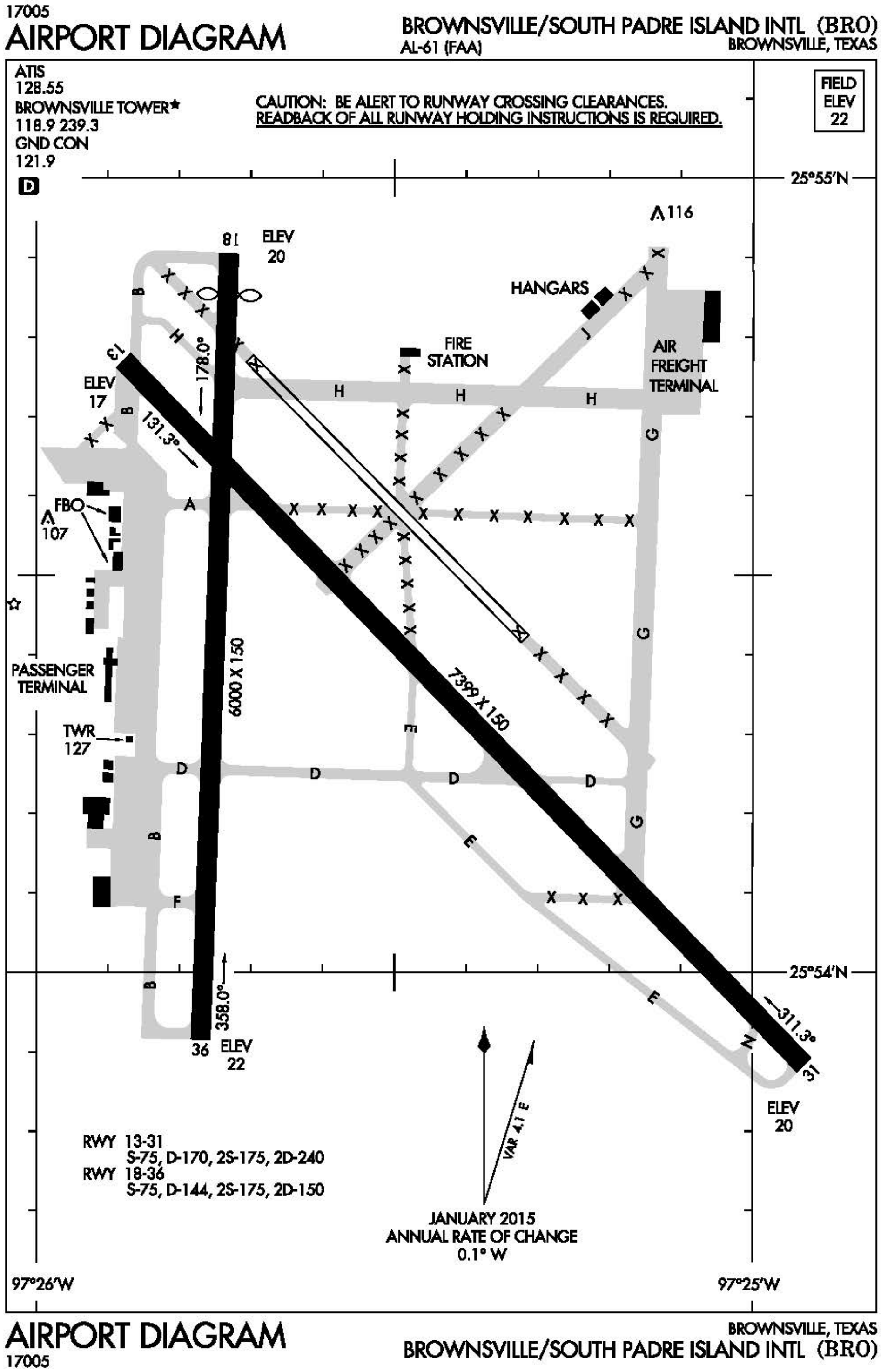

Figure 4-1. BRO Airfield Diagram

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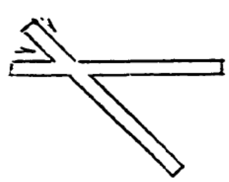

Mix Index	Hourly VFR	Hourly IFR	ASV
0to 20	98	59	230,000
21 to **50**	77	**57**	200,000
51 to 80	77	56	**215,000**
81 to 120	76	59	**225,000**
121 to 180	72	60	265,000

Figure 4-2. AC 150/5060-5 Airfield Configuration

Table 4-3. Capacity Summary

		2015	PAL 1	PAL 2	PAL3
ASV		200,000	200,000	200,000	200,000
Total Operations		32,380 (16.1%)	32,504 (16.3%)	33,642 (16.8%)	35,778 (17.9%)
Peak-Hour Commercial Operations		6	6	7	7
Hourly Capacity	IFR	57	57	57	57
	VFR	77	77	77	77

Note:
VFR = Visual Flight Rule

As previously mentioned, FAA planning standards indicate that when 60% of the ASV (120,000 operations) is reached, the airport should start planning ways to increase capacity and when 80% of the ASV (160,000 operations) is reached, construction of facilities to increase capacity should be initiated. The analysis of airfield capacity for BRO clearly identifies that the airport's existing runway system will not experience a capacity deficiency over the course of the planning period, given current forecasts of future activity levels.

NextGen Capacity Enhancements

NextGen is the umbrella term used in the industry to describe the ongoing, wide-ranging transformation of the NAS. The transformation is focused on changing the legacy radar-based ATCT system and the legacy ground-based navigation system to satellite-based systems.

With performance-based navigation (PBN), such as area navigation (RNAV) and required navigational performance (RNP), aircraft will be capable of flying more direct and narrowly defined routes, even during inclement weather conditions, allowing the possibility for the airport to be operated with reduced average aircraft separations, thereby increasing airfield capacity.

As technology in aircraft moves forward, ground-based navigation will continue to be replaced. The FAA is implementing NextGen approaches across the nation and should be assessed on a case-by-case basis.

4.2.2 Airfield Safety Criteria Dimensioning

The approach visibility minimums, along with the ARC for airfield planning, directly affect the size of various safety areas, including Runway Safety Area (RSA), Runway Object-Free Area (ROFA), Runway Obstacle-Free Zone (ROFZ), and Runway Protection Zone (RPZ) that are associated with each runway. This section addresses the safety-related standards that are specifically identified by the FAA when considering airfield planning. The following defined areas enhance the safety of operations on and near the airfield:

- RSA is a defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershot, overshoot, or excursion from the runway. The RSA needs to be cleared and graded with no potentially hazardous ruts, humps, depressions, or other surface variations; drained by grading or storm sewers to prevent water accumulation; capable, under dry conditions, of supporting the occasional passage of aircraft without causing structural damage to the aircraft; and free of objects, except for those that need to be located in the safety area because of their function.
- ROFA is centered on the runway centerline and should remain free of all objects unless that object is required for navigation or aircraft ground maneuvering. Non-essential objects for air navigation or

aircraft ground maneuvering purposes are not to be placed in the ROFA, including parked airplanes and objects used for agricultural operations.

- ROFZ is a three-dimensional volume of airspace that supports the transition of ground to airborne operations (or vice versa). The Obstacle-Free Zone (OFZ) clearing standards prohibit taxiing, parked airplanes, and other objects (except frangible navigational aids [NAVAIDs] or fixed-function objects) from penetrating this zone. The ROFZ, and, when applicable, the precision OFZ, the inner-approach OFZ, and the inner-transitional OFZ, comprise the OFZ.
- RPZ is a two-dimensional trapezoidal-shaped area beginning 200 feet from the usable pavement end of a runway. The primary function of this area is to preserve and enhance the protection of people and property on the ground. The size or dimension of the RPZ is dictated by guidelines set forth in FAA AC 150/5300-13A, Change 1. Airports are required to maintain control of each runway's RPZ. This control can be exercised through either fee-simple ownership or the purchase of an RPZ easement. Such control includes keeping the area clear of incompatible objects and activities. Runways 13, 31, 18, and 36 RPZs' ownership is a mix of fee-simple ownership and avigation easement. Runway 13 and 18 RPZs include public roads and residential uses.

Table 4-4 and Table 4-5 summarize the FAA design standards and existing conditions for Runways 13/31 and 18/36.

Table 4-4. Existing Runway 13/31 Design Standards Matrix – RDC C-IV-2400

Item	FAA Design Standards		Existing Condition	
	Runway 13	**Runway 31**	**Runway 13**	**Runway 31**
Visibility Minimums	1/2 mile	1 mile	1/2 mile	1 mile
Runway Design				
Runway Length	Based on Design Aircraft		7,399 feet	7,399 feet
Runway Width	150 feet	150 feet	150 feet	150 feet
Shoulder Width	25 feet	25 feet	25 feet	25 feet
Blast Pad Width	200 feet	200 feet	200 feet	200 feet
Blast Pad Length	200 feet	200 feet	200 feet	200 feet
Crosswind Component	20 knots	20 knots	20 knots	20 knots
Runway Protection				
RSA Length beyond Departure End	1,000 feet	1,000 feet	1,000 feet	1000 feet
RSA Length prior to Threshold	600 feet	600 feet	600 feet	600 feet
RSA Width	500 feet	500 feet	500 feet	500 feet
ROFA Length Beyond Runway End	1,000 feet	1,000 feet	1,000 feet	1,000 feet
ROFA Length Prior to Threshold	600 feet	600 feet	600 feet	600 feet
ROFA Width	800 feet	800 feet	800 feet	800 feet
ROFZ Length beyond Runway End	200 feet	200 feet	200 feet	200 feet
ROFZ Width	400 feet	400 feet	400 feet	400 feet
Approach RPZ Length	2,500 feet	1,700 feet	2,500 feet[a]	1,700 feet
Approach RPZ Inner Width	1,000 feet	500 feet	1,000 feet[a]	500 feet

Table 4-4. Existing Runway 13/31 Design Standards Matrix – RDC C-IV-2400

Item	FAA Design Standards		Existing Condition	
	Runway 13	**Runway 31**	**Runway 13**	**Runway 31**
Approach RPZ Outer Width	1,750 feet	1,010 feet	1,750 feet[a]	1,010 feet
Approach RPZ Area	78.914 acres	29.465 acres	78.914 acres	29.465 acres
Departure RPZ Length	1,700 feet	1,700 feet	1,700 feet	1,700 feet
Departure RPZ Inner Width	500 feet	500 feet	500 feet	500 feet
Departure RPZ Outer Width	1,010 feet	1,010 feet	1,010 feet	1,010 feet
Departure RPZ Area	29.465 acres	29.465 acres	29.465 acres	29.465 acres
Runway Centerline Separation to				
Parallel Runway Centerline	N/A	N/A	N/A	N/A
Holding Position	250 feet	250 feet	250 feet	250 feet
Parallel Taxiway/Taxilane Centerline	400 feet	400 feet	400	400
Aircraft Parking Area	500 feet	500+ feet	500+ feet	500+ feet

Source: FAA, 2012.
[a] Runways 13 Runway Protection Zone is not entirely clear.

Table 4-5. Existing Runway 18/36 Design Standards Matrix – RDC C-IV-5000

Item	FAA Design Standards		Existing Condition	
	Runway 18	**Runway 36**	**Runway 18**	**Runway 36**
Visibility Minimums	1 mile	Visual	1 mile	Visual
Runway Design				
Runway Length	Based on Design Aircraft		6,000 feet	6,000 feet
Runway Width	150 feet	150 feet	150 feet	150 feet
Shoulder Width	25 feet	25 feet	25 feet	25 feet
Blast Pad Width	200 feet	200 feet	None	None
Blast Pad Length	200 feet	200 feet	None	None
Crosswind Component	20 knots	20 knots	20 knots	20 knots
Runway Protection				
RSA Length beyond Departure End	1,000 feet	1,000 feet	1,000 feet	1,000 feet[a]
RSA Length prior to Threshold	600 feet	600 feet	600 feet	600 feet
RSA Width	500 feet	500 feet	500 feet	500 feet
ROFA Length Beyond Runway End	1,000 feet	1,000 feet	1,000 feet	1,000 feet[a]

Table 4-5. Existing Runway 18/36 Design Standards Matrix – RDC C-IV-5000

Item	FAA Design Standards		Existing Condition	
	Runway 18	**Runway 36**	**Runway 18**	**Runway 36**
ROFA Length Prior to Threshold	600 feet	600 feet	600 feet	600 feet
ROFA Width	800 feet	800 feet	800 feet	800 feet
ROFZ Length beyond Runway End	200 feet	200 feet	200 feet	200 feet
ROFZ Width	400 feet	400 feet	400 feet	400 feet
Approach RPZ Length	2,500 feet	1,700 feet	1,000 feet[b]	1,000 feet[b]
Approach RPZ Inner Width	1,000 feet	500 feet	500 feet[b]	500 feet[b]
Approach RPZ Outer Width	1,750 feet	1,010 feet	700 feet[b]	700 feet[b]
Approach RPZ Area	78.914 acres	29.465 acres	13.770 acres[b]	13.770 acres[b]
Departure RPZ Length	1,700 feet	1,700 feet	1,700 feet[b]	1,700 feet[b]
Departure RPZ Inner Width	500 feet	500 feet	500 feet[b]	500 feet[b]
Departure RPZ Outer Width	1,010 feet	1,010 feet	1,010 feet[b]	1,010 feet[b]
Departure RPZ Area	29.465 acres	29.465 acres	29.465 acres[b]	13.770 acres[b]
Runway Centerline Separation to				
Parallel Runway Centerline	N/A	N/A	N/A	N/A
Holding Position	250 feet	250 feet	250 feet	250 feet
Parallel Taxiway/Taxilane Centerline	400 feet	400 feet	400 feet	400 feet
Aircraft Parking Area	500 feet	500 feet	500 feet	500 feet

Source: FAA, 2012.

[a] Declared Distances are enforced for Runway 36 to meet ROFA and RSA requirements.
[b] Runways 18 and 36 Runway Protection Zones are not entirely clear and Runway 18 RPZ includes Boca Chica Boulevard.

4.2.3 Declared Distances

Declared distances are enforced for Runway 18/36. Runway 18 landing distance available is reduced to 5,810 feet, and Runway 18 threshold has been displaced. Runway 36 takeoff run available, takeoff distance available, accelerate stop distance available, and landing distance available are all reduced to 5,532 feet. Runway 18 threshold has been displaced to mitigate obstructions in the approach path. Declared distance on Runway 36 are necessary to meet ROFA and RSA requirements beyond the runway end.

4.2.4 Airfield Pavement

Runway 13/31 and Runway 18/36 are both grooved asphalt reported in good condition in the National Flight Data Center (NFDC); however, both runways are expected to need rehabilitation in the short term. The latest pavement condition index survey was completed in 2008.

Table 2-9 in Chapter 2, *Inventory* estimated the current Pavement Condition Index (PCI) based on the 2008 PCI and a 2.5-point-per-year yearly decrease.

Runway 18/36 has several sections in fair and poor condition and will need to be rehabilitated in the short term. Runway 13/31 will also require rehabilitation in the short- to mid-term. Both runways are nearing the end of their useful life and will need to be rehabilitated in the future. In addition, most of the aprons, as well as portions of Taxiways D, E, H, J, and N, are estimated to be in fair or poor condition.

It is recommended the airport conduct a PCI survey to obtain accurate pavement condition and PCI rating. In addition, pavement maintenance is recommended on the taxiways, aprons, and runways.

4.2.5 Airfield Configuration

Taxiway Layout

Figure 4-1 depicts the taxiway layout. Both runways have multiple entrance and exits; however, they do not have a dedicated full length parallel taxiway. In addition, the taxiway layout includes several nonstandard conditions as described in the following sections. A preferred solution that can be implemented at the appropriate time is included in Chapter 5, *Alternative Analysis*, to evaluate taxiway layout.

High Energy Intersections

AC 150/5300-13A, Section 401.b.5.d discusses the need to avoid “high energy” runway-taxiway intersections. The “high energy” portion of a runway is the middle third, where a pilot can least maneuver to avoid a collision. High energy runway-taxiway intersections are intersections that occur in the high-energy portion of a runway.

Taxiway D intersects both Runway 13/31 and Runway 18/36 within the middle third of the runways, as depicted on Figure 4-2. A preferred solution that can be implemented at the appropriate time is included in Chapter 5, *Alternative Analysis*, to evaluate locations, capacity, and need.

Right Angle Intersections

AC 150/5300-13A, Section 401.b.5.e discusses the use of right angle intersections as a method of increasing visibility both between taxiways and between taxiways and runways. Section 401.b.5.e states that “Acute angle runway exits provide for greater efficiency in runway usage, but should not be used as runway entrance or crossing points.”

Several taxiways do not intersect the runways at a right angle as depicted on Figure 4-2. This includes Taxiway N near the Runway 31 threshold, Taxiway E and Taxiway G near the middle of Runway 13/31, Taxiway H west of the Runway 18 threshold, and Taxiway B at the Runway 13 threshold. These configurations are examined further in Chapter 5, *Alternative Analysis*, and a preferred solution that can be implemented at the appropriate time is included.

Direct Access to Runway from an Apron

AC 150/5300-13A, Section 401.b.5.g incorporates runway incursion mitigation guidance originally presented in FAA Engineering Brief 75 regarding taxiways that provide direct access to runways from parking aprons. The guidance states, “Do not design taxiways to lead directly from an apron to a runway without requiring a turn.” The GA apron is located along Taxiway B, and several taxiways provide direct access to Runway 18/36, including Taxiways A, D, and F, as depicted on Figure 4-3.

This configuration is examined further in Chapter 5, *Alternative Analysis*, and a preferred solution that can be implemented at the appropriate time is included.

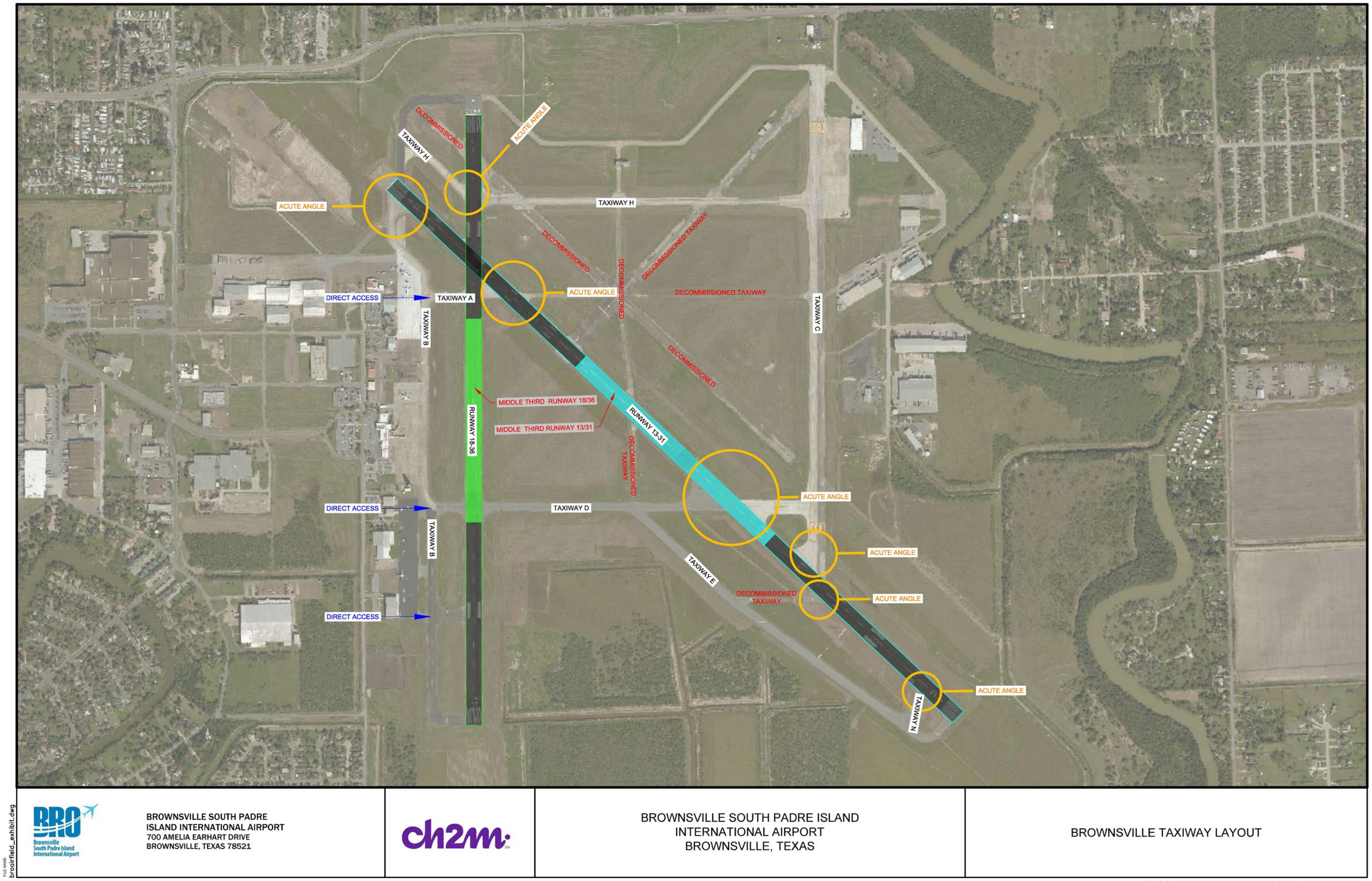

Figure 4-3. Taxiway Layout

4.2.6 Assessment of Takeoff Runway Length Requirement

Runway length requirements are based on the most demanding aircraft that conducts at least 500 annual itinerant operations at an airport. FAA AC 150/5300-13A, AC 150/5325-4B, and aircraft manufacturers' airplane planning manuals provide guidance on determining the runway length requirements.

At BRO, runway length requirements were derived using aircraft manufacturers published airplane planning manuals and pilot's operating handbooks, and calculations were based on the aircraft maximum gross takeoff weight (MTOW) for dry pavement conditions.

The airport elevation is 22.4 feet; however, for planning purposes only, the elevation was approximated by sea level in the calculations for runway length. In addition, the mean daily maximum temperature is listed at 94.4 degrees Fahrenheit (°F) by the National Oceanic and Atmospheric Administration; most of the airplane planning manuals do not include takeoff distance charts for this temperature. For most aircraft, runway lengths were calculated at International Standard Atmosphere (ISA) + 15 degrees Celsius (°C), or 30°C at sea level, which corresponds to 86°F. When available for a couple of aircraft, runway length was calculated at ISA + 25°C, or 40°C at sea level, which corresponds to 104°F at sea level.

Runway length requirements are individually determined by each airline prior to departure, factoring in wet or dry pavement, altitude at the airport, takeoff weight, and aircraft performance characteristics. Airlines' slightly different software may affect calculations. Additionally, results vary depending on different aircraft versions, configurations, and internal specifications.

Individual aircraft experience a particular increase in runway length, depending on their responses to hotter and less dense air. This increase is calculated by each pilot and not available by aircraft type for airport planning purposes. Theoretical hot day runway length calculations for BRO may, therefore, underestimate actual aircraft runway length requirements by up to several hundred feet (depending on the individual aircraft) during the summer months.

For Boeing and Airbus aircraft, the airplane planning manuals include charts for a wide range of aircraft model with various engine configurations, weight variants and MTOW options. For planning purposes, the worst-case scenario was chosen for the runway length calculation using the heaviest weight variant and the engine configuration that provided that longest takeoff for the given weight variant.
For instance, if possible weight variants were 100,000 pounds (lbs) and 150,000 lbs, the 150,000 lbs was chosen as the MTOW for that aircraft. Some aircraft models have several weight variants, as well as various engine configurations, that would allow the aircraft to depart in a shorter distance than what is used for planning purposes. The configuration that requires the most runway to depart was chosen, as it provides the most flexible option and allows planning for a wide variety of aircraft models, weight variants, and engine configuration at BRO.

BRO is used by a variety of aircraft from small turboprop aircraft to narrow-body jet aircraft, as well as cargo aircraft. Runway length requirements were computed for a variety of aircraft to account for this diversity. Summary and conclusions are provided in Section 4.2.4.1.

Table 4-6 summarizes runway length requirements for the variety of aircraft anticipated to use BRO, and Figure 4-4 graphically depicts runway length requirements for commercial aircraft.

Table 4-6. BRO Runway Length Requirements

Aircraft	Engine Type	MGTOW (lbs.)	Takeoff Runway Length (feet)
A319-100	CFM56 Series Engines	168 653	7,100
A320-200	CFM56 Series Engines	174,165	8,000
A321-200	IAE V2500 Series Engines	206,132	9,400
AN-124-200	General Electric CF6-80C2	893,000	9,900[a]
B737-400	CFM56-3B-2 Engines	150,000	8,900
B737-500	CFM56-3B-1 Engines	133,500	8,500
B737-800	CFM56-7B24/-7B26/-7B27	174,200	10,100[b]
B737-900	CFM56-7B24/-7B26	174,200	12,000[b]
B757-200	PW2037 Engines	255,000	9,700
DC-8-73F	CFM56-2-C1 Engines	355,000	10,600
EMB 145	AE 3007 A1E Engines	53,131	7,100
EMB 170	CF 34-8E5 Engines	82,012	7,000
EMB 175	CF 34-8E5A1 Engines	89,000	8,100
EMB 190	CF34-10E5 & -10E6 Engines	114,199	8,900
MD-82	JT8D-217 Engines	149,500	8,200
MD-83	JT8D-219 Engines	160,000	8,800
MD-88	JT8D-217A Engines	149,500	7,900

[a] Airport Planning Manuals were not available for the AN 124-200. Takeoff runway length is based on minimum runway length listed on Antonov website: http://www.antonov.com/aircraft/transport-aircraft/an-124-100-ruslan/an-124-100-performance

[b] Calculated for ISA + 25 °C

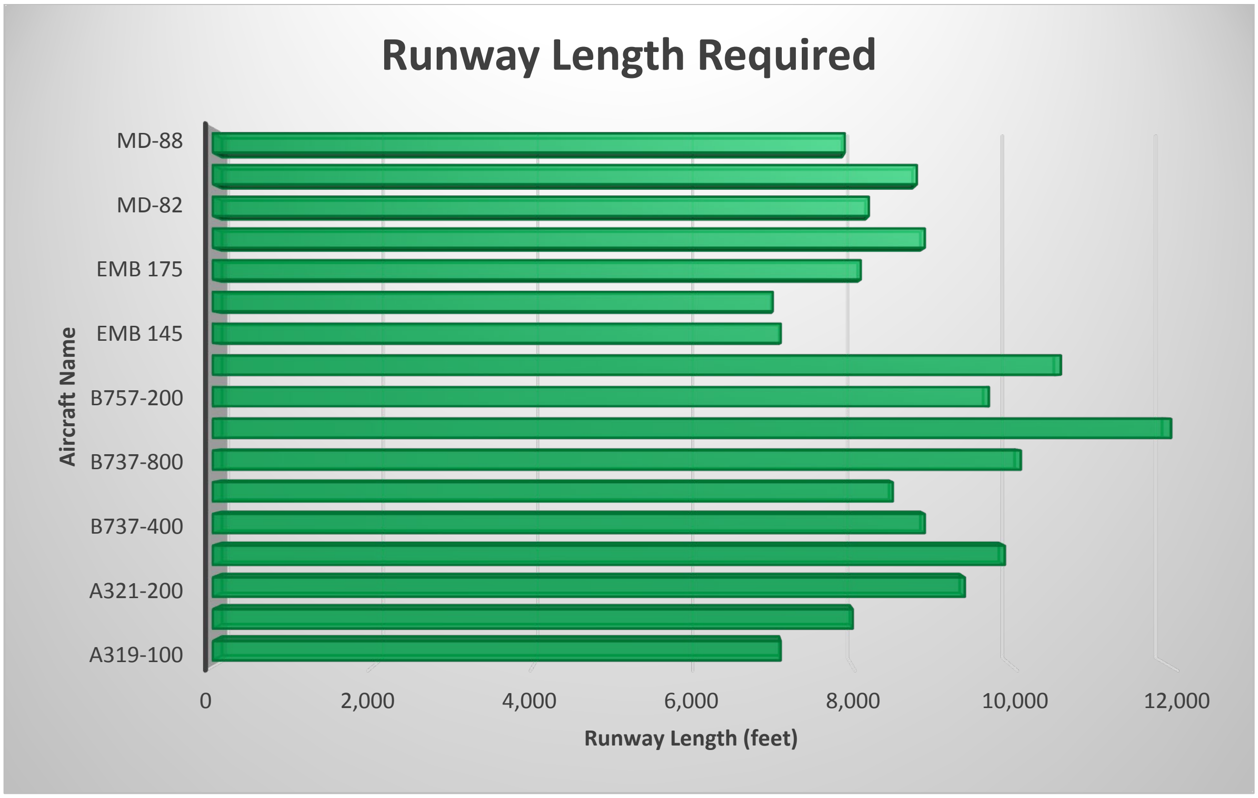

Figure 4-4. BRO Runway Length Requirements

Runway length requirements were also computed for GA aircraft and jet aircraft using the airport. Runway lengths were computed at MTOW using a temperature of 95°F. Table 4-7 summarizes runway length requirements for GA aircraft and jet aircraft using the airport.

Table 4-7 General Aviation Aircraft Runway Length Requirements

Aircraft Type	Runway Length Requirements (feet)
Small Propeller Driver Airplanes Having 10 or more passenger seats	4,300
Small Propeller-Driven Airplanes with Fewer than 10 Passenger Seats (100% Fleet)	3,700
Small Propeller-Driven Airplanes with Fewer than 10 Passenger Seats (95% Fleet)	3,200
Pilatus PC-12	3,200
BE-200	4,000
Cessna CJ-4 Flaps 15	3,700
Cessna X Flaps 15	5,910

Summary and Conclusion

As mentioned, BRO is used by a variety of aircraft from small GA aircraft, to larger commercial jets. Airlines operations currently are conducted using regional jets. As traffic grows, it is anticipated these could be replaced by small narrow-body aircraft such as the A319/320 and B737 series. In addition, Immigration and Customs Enforcement (ICE) flights are conducted at BRO using a combination of Boeing 737s and MD-80s. ICE flights operate several times a week and do meet the substantial use threshold. Cargo operations are conducted using a variety of aircraft, including Boeing 737 and MD-80s. Future cargo operations may include larger aircraft, such as the DC-8-73F or even the AN-124-200. Although not the critical aircraft at this time, runway length requirements for these aircraft have been included for reference.

BRO's primary runway, Runway 13/31, is an RDC C-IV runway and is 7,399 feet long. Based on this analysis, most of the commercial aircraft analyzed are limited in payload to operate from BRO during the summer months. In addition, the secondary runway, Runway 18/36, is 6,000-feet in length, with reduced takeoff run available and takeoff distance available of only 5,532 feet for Runway 36. All the commercial aircraft analyzed as well as some of the larger business jets such as the Cessna Citation X would have to reduce their payload to use Runway 18/36 in the summer.

Runway 13/31 needs to be rehabilitated in the short- to mid-term; to rehabilitate Runway 13/31 pavement, the runway would have to be closed during construction, and all traffic would have to be moved to Runway 18/36. Because of the high temperatures at Brownsville, none of the narrow-body jet aircraft using the airport can take off at MTOW during the summer days in 7,000 feet and much less in 5,532 feet. This includes the ICE flights, which meet the substantial use threshold. As such, pavement maintenance on Runway 13/31 would have an important impact on the traffic at BRO and the revenues of the airport and the fixed-base operator (FBO).

Per Section 4.1.1, the critical aircraft at BRO are the Boeing B737-400 and the MD-80 series used for ICE flights. Per the aircraft planning manuals and assumptions previously summarized, these aircraft require a runway length of 8,900 feet, and 8,800 feet for the MD 83 at BRO. As previously mentioned, runway lengths were calculated at ISA + 15°C, or 30°C at sea level, which corresponds to 86°F instead of the mean daily maximum temperature of 94.4°F at BRO. As such, these values underestimate the runway length required in the summer months. For the most recent versions of the B737 series (B737-800 and 900), charts were available for ISA + 25°C, or 40°C at sea level, which corresponds to 104°F at sea level. Runway lengths required for the B737-800 and B737-900 are 10,100 feet and 12,000 feet, respectively.

Based on the data available in the airport planning manuals, and because of the high temperature in the summer at BRO, it is recommended that options be evaluated to provide a 10,000 feet runway in Phase 1. Ultimately, a 12,000-foot runway is recommended in the long term. For planning purposes, the subsequent analysis will assume a 10,000-foot runway in the short- to medium term, and a 12,000-foot runway as the ultimate configuration, if demand, and especially cargo traffic, warrants the length. Alternatives to evaluate options to rehabilitate the runways and provide for a 10,000-foot and 12,000-foot runway are developed in Chapter 5, *Alternative Analysis*.

4.2.7 Runway Designation

According to the National Geophysical Data Center, the magnetic declination is changing by 0.12° W per year at BRO, so a change of 2.4° W at the end of the planning period. The current declination is 3.74° E (October 2017). In 20 years, the new declination will be 1.34° E.

The true orientation of Runway 13/31 is 315.39° E, the current magnetic orientation is 311.65° E, and the magnetic orientation will be 314.05° at the end of PAL 3. Runway 13/31 is appropriately numbered and does not need to be renumbered during this planning period, unless the magnetic declination varies differently than planned.

The true orientation of Runway 18/36 is 357.85° E, the current magnetic orientation is 354.11° E, and the magnetic orientation will be 356.51° at the end of PAL 3. Based on the true orientation of Runway 18/36 and the current magnetic declination, this runway should be numbered 17/35; however, it is anticipated that this runway will shift to Runway 18/36 in 2025, based on the current magnetic declination rate of change.

4.2.8 NAVAIDs and Instrument Approach Procedures

BRO is equipped with five instrument approach procedures, including three using ground-based NAVAIDs. NAVAIDs in the immediate vicinity of BRO includes a very high frequency omnidirectional range with a tactical air navigation system (VORTAC) named Brownsville (Identifier: BRO) and a Locator named Depoo (Identifier: BR). The Locator procedure to Runway 31 uses both the VORTAC and Locator, and the Vor/Tacan procedure A uses the VORTAC. In addition, the instrument sanding system (ILS) procedure to Runway 13 also uses the VORTAC and Locator, as well as a ground-based localizer and glidepath.

NAVAIDs are appropriate at this time at the airport; however, as ground-based NAVAIDs and procedures are decommissioned and replaced by global positioning system-based procedures, it is recommended that the airport keep track of FAA policies related to ground-based NAVAIDs so the equipment and procedures are appropriate at the airport.

4.3 Passenger Terminal Facilities

4.3.1 Passenger Terminal Apron

The existing passenger terminal apron is approximately 160,000 square feet and includes two contact gates, as well as two aircraft stands. Aircraft parked at the gate are obstructions to the Part 77 transitional surface. The passenger terminal building relocation project includes relocating and expanding the passenger terminal apron. Both the terminal building and the apron will be shifted westward.

The forecasts of aviation demand projects six aircraft during the peak hour in the short term and up to seven aircraft in the long term. The relocated terminal building will include space for four contact gates, as well as apron space, and it will shift the apron so that parked aircraft are not obstructions anymore. In addition, the future terminal building could be expanded to accommodate a larger number of contact gates in the future, when demand warrants.

4.3.2 Passenger Terminal Building

Passenger facility space requirements are determined by applying planning factors to future passenger activity levels. Terminal requirements are determined using origination and destination passenger activity while concourse requirements are driven by the total number of passenger enplanements. ADPM factors are used to size facilities and determine requirements for future activity levels.

A new passenger terminal building is in the design phase at BRO, and passenger terminal building facility requirements have been addressed as part of the Terminal Area Master Plan Study as well as part of the terminal building design. The concept report included a terminal size of approximately 60,000 square feet, while preliminary design as of October 2017 has expanded the building size to almost 90,000 square foot, primarily due to the areas required by U.S. Customs and Border Protection (CBP) for Federal Inspection Service (FIS) activities. Table 4-8 lists the space allocation based on space requirements and allocation as of October 2017. Figures 4-5 to 4-7 depict floor plans as of October 2017 and preliminary rendering of the terminal building.

Table 4-8. Passenger Terminal Concept Design Report Sizing

Passenger Terminal Concept	Passenger Terminal Concept Design Report Sizing (square feet)
Ticketing/Check-in	***8,672***
Ticketing/Check-in	5650
Airline Office/Support	1,981
Public Toilets	1041
Baggage Screening and Makeup	***6,236***
Baggage Screening	3,536
Baggage Makeup	1,153
Ground Handling	1547
Security/TSA	***5,943***
Security Checkpoint	5,070
TSA Office, Training, and Breakroom	770
Outbound Search (FIS)	103
Concourse	***17,477***
Hold Rooms	7,218
Circulation	5,700
Concessions (Retail, Food/Beverage, etc.)	3,281
Restrooms	1,278
FIS/CBP	***12,733***
Sterile Corridor System	1,292
Primary processing Area	1,808
GA Waiting	464
CBP Command and Control Center	225
Secondary Processing Area – Exit Control Queuing Area	362
Triage Podium	186
Secondary Screening	2383
Cashiers Office and Currency Training Storage	131
CBP AG Lab and Disposal	227
Detainee Baggage Storage	50
Interview Room	121
Search Room	108
Secure Hold Rooms (2)	234
Restrooms	515

Table 4-8. Passenger Terminal Concept Design Report Sizing

Passenger Terminal Concept	**Passenger Terminal Concept Design Report Sizing (square feet)**
Canine and Animal Processing	530
Supervisors Office	528
Reception and Offices	516
Weapons Storage and Cleaning Rooms	185
Communications Equipment Room (Telephone and Radio)	65
Lan/Telco Room	216
Wiring Closet -Intermediate Distribution Frame	65
General Storage / File Room	144
Temporary Seized Property Room	92
Misc. and Storage	1414
Staff Toilets / Lockers / Break Room	580
US Pass / Nexus Enrollment Center	212
Lactation Support Room (Staff)	80
Baggage Claim	***7,702***
Airport Administration	***2,403***
Airport Operations and Maintenance	***1,415***
Support	**22,422**
Concessions (Ground Transport, Retail, Food/Beverage)	3,046
Restrooms	1,200
Storage	886
General Circulation	9,892
Utility	7,398
Total Programmed	***85,003***
Open Covered Space	
Canopy	12,429
Curbside	7,405
Outbound Baggage Room	8,965
Plaza	1,541
Total Including Open Covered Space	***115,343***

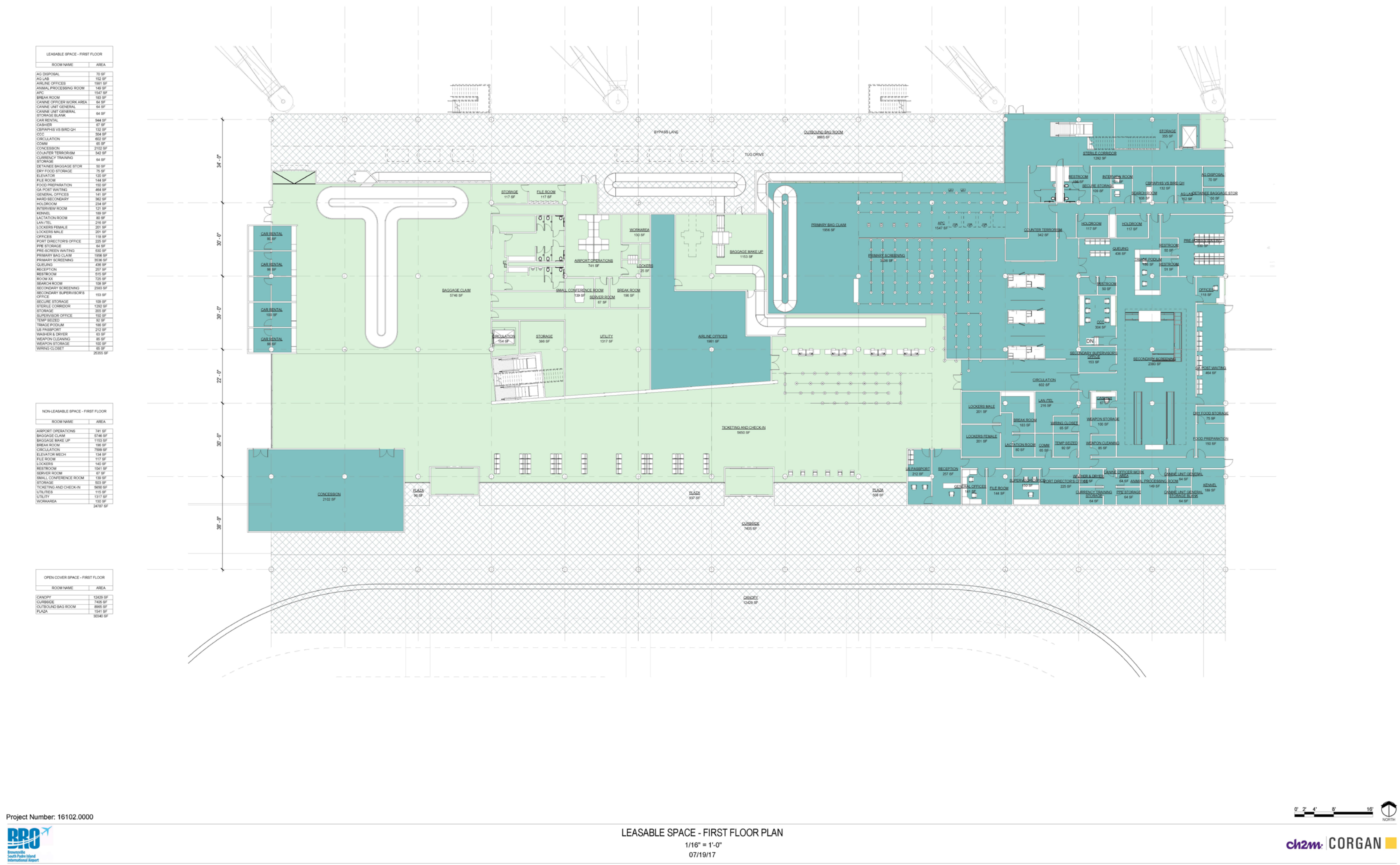

Figure 4-5. Terminal Building Floor Plan (First Floor)

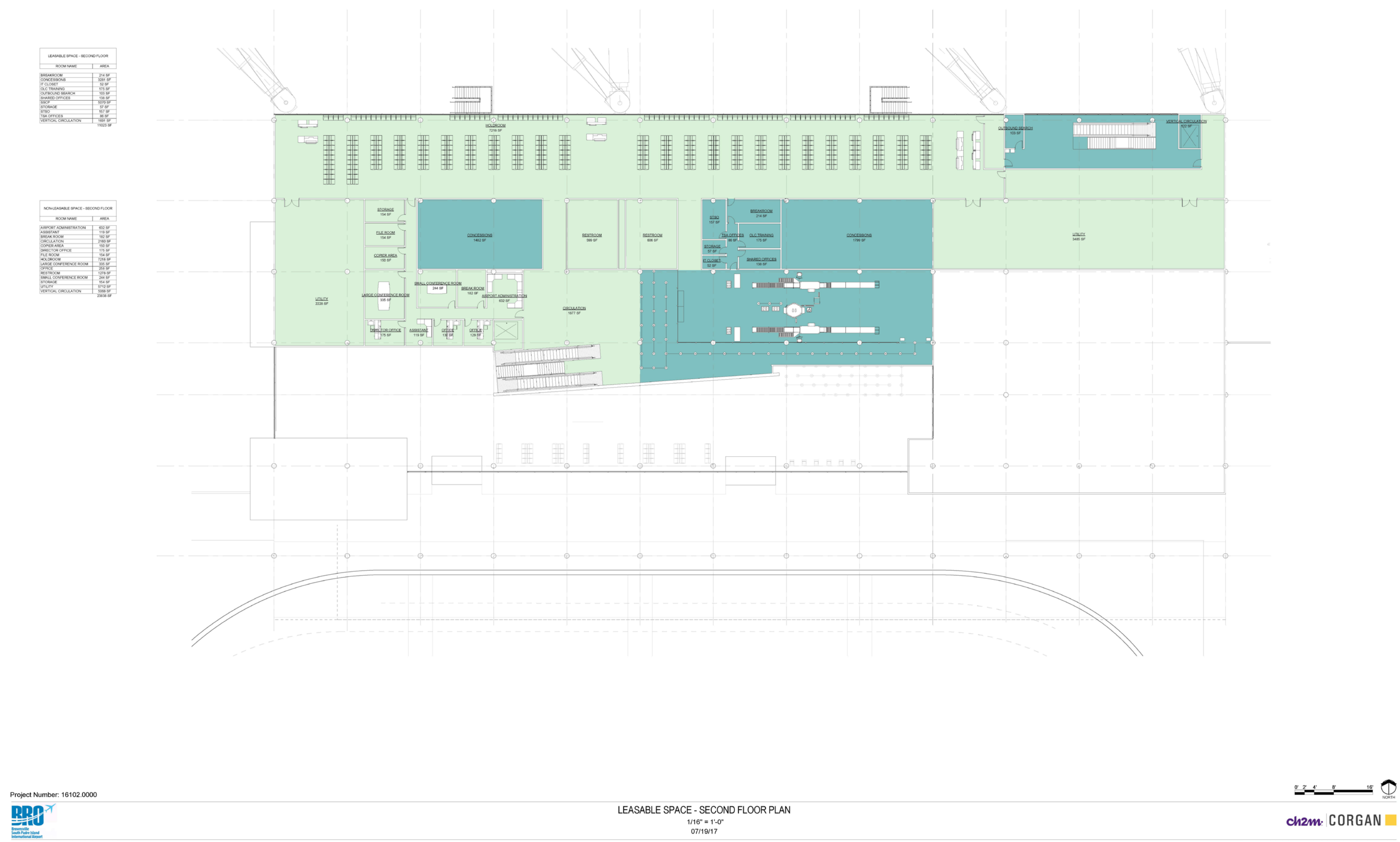

Figure 4-6. Terminal Building Floor Plan (Second Floor)

Figure 4-7. Preliminary Rendering of the Terminal Building

4.4 Access and Parking

4.4.1 Airport Access

BRO's main access point is Billy Mitchell Boulevard from Boca Chica Boulevard. The route leads directly to the main parking lot and airport terminal, and splits off to either Minnesota Avenue or Amelia Earhart Drive. Minnesota Avenue provides access south to Southmost Aviation and the Commemorative Air Force Museum, while Amelia Earhart Drive serves Hunt Pan Am Aviation. In addition to the main access roads on the western side of the airfield, the eastern side can be accessed via South Vermillion Avenue from Boca Chica Boulevard.

Airport access and parking location will be modified to accommodate for the new passenger terminal building. Preliminary planning is depicted in Chapter 2, *Inventory* on Figure 2-8.

4.4.2 Public Parking

Public parking space requirements are determined by applying planning factors to future passenger activity levels. At BRO, 501 passenger parking spaces are onsite, including 236 short-term daily and hourly parking, and 265 long-term and overflow daily parking. Demand for parking varies greatly by time of day, day of the week, and season. Typically, demand peaks around holidays, such as Thanksgiving, Christmas, and Spring Break.

It is recommended to plan for 900 to 1,400 parking spaces per million enplaned passengers, with 25% to 30% of spaces designated for short-term parking. Table 4-9 summarizes future demand. BRO parking can accommodate short-term demand during PALs 1 and 2. Additional parking to accommodate future demand may be required at the end of the planning period (PAL 3).

Table 4-9. Future Public Parking

	PAL 1	PAL 2	PAL 3
Passenger Enplanements	261,356	319,308	421,818
Approximate Number of Short-Term Parking Spaces	75-120	90-135	120-180
Approximate Number of Long-Term Parking Spaces	175-280	210-3151	280-420
Approximate Number of Parking Spaces	250-400	300-450	400-600

4.4.3 Employee Parking

Employee parking is provided adjacent to the southern side of the terminal building. There are 62 parking spaces available for airport employees. In addition, five parking space are provided for employees at the curb parking, for a total of 67 employees parking.

Employee parking supply should range from one space per 2.5 to 3.0 employees or 250 to 400 spaces per million enplanements. Table 4-10 summarizes future demand for employee parking. Employee parking is sized accordingly in the short term; however, as traffic continues to grow at BRO, additional employee parking may be needed to accommodate future demand. It is recommended the airport monitor the number of employees requiring parking at the airport in the future to accommodate employees' needs and tailor the number of parking spaces specifically to BRO needs. Additional employee parking is identified as part of Chapter 5, *Alternative Analysis*.

Table 4-10. Future Employee Parking

	PAL 1	PAL 2	PAL 3
Passenger Enplanements	261,356	319,308	421,818
Approximate Number of Employee Parking Spaces	65-110	80-130	105-170

4.4.4 Rental Car

The three major components for rental car operations are:

- Ready/Return from which customers pickup and return vehicles.
- Customer Service Area, in which customers and service agents perform transactions, and which includes common lobby, transaction counter area, back office, support areas, and employee amenities.
- Quick Turnaround (QTA) in which returned cars are washed, fueled and made ready for new customers. The QTA may also include facilities for light maintenance and fluids changes.

A common-use car rental storage parking lot is located north of the main terminal, across the overflow daily parking, and can accommodate 164 spaces. The car rental return lot is also located in this area and accommodates 34 spaces. In addition, the car rental ready parking lot is located south of the main terminal and accommodates 50 spaces. These are used by Avis, Budget, Dollar, Enterprise, Hertz, and National.

BRO is mainly a leisure market, so it was assumed half of the passengers would use a rental car with 1.8 passengers per vehicle. The expected daily number of rented vehicles is increased 100% (reflecting vehicle turnaround, maintenance, and daily peak-time variations) to estimate fleet size. Assuming 60% of the fleet is being used off-airport at any one time, the rental car parking spaces for ready/return and long-term vehicle storage was estimated for the remaining 40% of the fleet. Table 4-11 summarizes the vehicle fleet size and the number of spaces required for the rental cars throughout the planning period.

Additional demand for rental car parking may be required near the end of the planning period. In addition, during a survey conducted at the airport, rental car companies using the airport mentioned the need to have more ready spaces near the terminal building.

Table 4-11. Rental Car Space

	PAL 1	PAL 2	PAL 3
Passenger Enplanements (Peak Month)	24,497	28,082	36,789
Estimated Fleet Size (vehicles)	450	520	680
Rental Car Storage Requirements (spaces)	180	210	275
Existing Total number of spaces	248	248	248

4.5 General Aviation Facilities

GA facilities at BRO consists of two FBOs, which also provide aprons, tie-downs, and hangars for itinerant operations. In addition, the airport also accommodates based aircraft in hangars and tie-downs. This section outlines the facility requirements associated with accommodating the existing and future GA demand.

The FBOs at BRO are Hunt Pan Am and Southmost Aviation, which provide the following services: fueling, catering, lavatory service, rental car services, ground support, tie-down space, and hangar space.

4.5.1 General Aviation Demand

Chapter 3, *Forecast of Aviation Demand*, projects the itinerant and based aircraft that use BRO to reach 13,510 itinerant operations and 70 based aircraft by PAL 3, as summarized in Table-4-12.

Table 4-12. General Aviation Operations and Based Aircraft Summary

	PAL 1	PAL 2	PAL 3
General Aviation Itinerant Operations (70% of total operations)	8,715	9,030	9,457
General Aviation Local Operations (30% of total operations)	3,735	3,870	4,053
Total General Aviation Operations	12,450	12,900	13,510
Based Aircraft	62	65	75

4.5.2 Assumptions

The GA facility requirements consider the future demand for both based and itinerant aircraft. Space requirements for each aircraft type have been derived from a typical aircraft size to determine the overall GA aircraft storage requirement. Chapter 5, *Alternative Analysis*, includes several alternatives to meet the demand and requirements outlined in this section. In the past, flight schools have been using the airport. The alternatives analysis includes options to meet potential future demand from flight schools as well as demand beyond the forecasted GA traffic. GA facilities are demand-driven and should only be built when demand warrants.

Facility Sizing

Table 4-13 summarizes the hangar and apron space requirements per aircraft category used to determine the overall GA aircraft facility requirements. Apron space requirements are based on the area necessary to park a representative aircraft from each category. These requirements include wingtip clearance as well as aircraft circulation. Hangar space is based on the amount of storage area necessary to store a representative aircraft for each category. Conversely to other airport across the nation, the FBO currently reports no demand for T-hangars or individual hangar for small GA aircraft. The aircraft at BRO are stored in shared-space conventional hangars. The hangar space requirements were planned using the assumption that this trend would continue in the future and all aircraft would be stored in conventional hangars. Space requirements are based on representative aircraft dimensions with wingtip clearance one each side.

Table 4-13. Hangar and Apron Space Requirements

Aircraft Type	Tie-down/Apron Space Requirement (square feet)	Hangar Space Requirement (square feet)
Single-Engine (Cessna 210)	2,500	1,500
Multi-Engine (Beech 200)	5,500	5,000
Jet (G650)	15,000	15,000
Helicopter	6,400	3,000

Itinerant Aircraft Assumptions

Derived from the forecasted annual itinerant GA operations and fleet mix presented in Chapter 2, Table 4-14 summarizes estimated GA itinerant aircraft by type during the peak day.

Table 4-14. Itinerant Operations Forecast

	PAL 1	PAL 2	PAL 3
Total Peak Month GA Operations	1,494	1,548	1,621
Peak Month Itinerant Operations (70% of peak month traffic)	1,046	1,084	1,135
Peak Day Operations (20% higher than average day of peak month)	42	43	45
Peak Day Arrivals (50% of peak day operations)	21	22	23
Single-Engine (50% during peak day)	10	11	11
Multi-Engine (25% during peak day)	5	5	6
Jet (25% during peak day)	5	5	6

Based Aircraft Forecasts Assumptions

Table 4-15 summarizes the forecast GA based aircraft by type, per Chapter 3, *Forecast of Aviation Demand*.

Table 4-15. General Aviation Based Aircraft Summary

Aircraft Type	PAL 1	PAL 2	PAL 3
Single-Engine	47	50	59
Multi-Engine	9	9	10
Jet	4	4	4
Helicopter	2	2	2
Total	62	65	75

For planning purposes, the average percentage of hangar storage versus apron/tie-down of based aircraft has been estimated in Table 4-16.

Table 4-16. General Aviation Based Aircraft Storage Requirement

Aircraft Type	Hangar	Tie-down/Apron
Single-Engine	95%	5%
Multi-Engine	100%	-
Jet	100%	-
Helicopter	100%	-

4.5.3 Apron Space Requirements

This section presents the forecast apron space requirements for both itinerant and based aircraft at BRO. Facility requirements were derived from the forecast itinerant operations and based aircraft. The existing apron area is approximately 9.9 acres. Based on the apron space requirements per aircraft type and forecast information, the area required for apron space is approximately 3.04 acres at the end of PAL 3. Table 4-17 summarizes GA aircraft apron space requirements.

Preliminary analysis indicates enough apron space over the planning period; however, it should be noted that the existing apron space includes the north apron, which is in poor condition and barely used because of foreign object debris (FOD) and debris. In addition, ICE flights use the Hunt Pan Am GA apron. The analysis does not account for ICE flights, and ICE flights are analyzed in Section 4.5.5.

Table 4-17. Apron Space Requirement

	PAL 1	PAL 2	PAL 3
General Aviation Aircraft Apron		**Square Feet**	
Itinerant Aircraft Apron Space Requirements			
Single Engine	20,000	22,500	22,500
Multi Engine	22,000	22,000	27,500
Jet	60,000	60,000	75,000
Total Itinerant Aircraft Apron Space Requirements	**102,000**	**104,500**	**125,000**
Based Aircraft Apron Space Requirements			
Single Engine	5,000	5,000	7,500
Multi Engine	-	-	-
Jet	–	–	–
Helicopter	-	-	-
Total Based Aircraft Apron Space Requirements	**5,000**	**5,000**	**7,500**
Total Apron Space Requirement	***107,000 (2.46 acres)***	***109,500 (2.52 acres)***	***132,500 (3.04 acres)***
Existing Apron Space	431,000 (9.9 acres)	431,000 (9.9 acres)	431,000 (9.9 acres)
Excess/Deficiency	324,000 (7.44 acres)	321,500 (7.38 acres)	298,500 (6.86 acres)

Note:
Green = Excess Area

4.5.4 Hangar Space Requirements

This section presents the forecast hangar space requirements for both itinerant and based aircraft at BRO. Facility requirements were derived from the forecast itinerant operations and based aircraft. The existing hangar area is approximately 2.30 acres. Table 4-18 summarizes GA hangar space requirements. Additional hangar space may be required over the planning period. It should be noted that hangar space is leased by the FBOs, and aircraft are stored in shared space conventional hangars. Currently, there is no demand for individual hangars and T-hangars from small GA aircraft. The FBOs report hangar space is appropriate, and limited development in the future likely would allow them to meet the short-term demand. Additional hangars should be built only when and if demand warrants. Additional hangar development is analyzed in Chapter 5, *Alternative Analysis*, and is depicted on the Airport Layout Plan; however, new facilities should only be considered when demand warrants.

Table 4-18. Hangar Space Requirement

	PAL 1	PAL 2	PAL 3
General Aviation Aircraft Hangar		**Square Feet**	
Itinerant Aircraft Hangar Space Requirements			
Single Engine	3,000	3,000	3,000
Multi Engine	5,000	5,000	5,000
Jet	15,000	15,000	15,000
Total Itinerant Aircraft Hangar Space Requirements	**23,000**	**23,000**	**23,000**
Based Aircraft Hangar Space Requirements			
Single Engine	67,500	72,000	84,000
Multi Engine	45,000	45,000	50,000
Jet	60,000	60,000	60,000
Helicopter	6,000	6,000	6,000
Other	-	-	-
Total Based Aircraft Hangar Space Requirements	**178,500**	**183,000**	**200,000**
Total Hangar Space Requirement	***201,500 (4.62 acres)***	***206,000 (4.73 acres)***	***223,000 (5.12 acres)***
Existing Hangar Space	100,000 (2.30 acres)	100,000 (2.30 acres)	100,000 (2.30 acres)
Excess/Deficiency	-101,500 (-2.32 acres)	-106,000 (-2.43 acres)	-123,000 (-3.02 acres)

Note:
Red = Additional Area required

4.5.5 ICE Flights

ICE Air Operations, the transportation program of the U.S. Immigration and Customs Enforcement, are conducted from BRO using a combination of Boeing 737s and MD-80s, mainly the B737-400 and MD-83. These operations are conducted from the Hunt Pan Am ramp and use the Hunt Pan Am ground-handling services and facilities. These aircraft types are substantially larger than conventional GA aircraft. They do use the GA ramp, and it is not unusual for several aircraft to be staged at the same time on the Hunt Pan Am apron. Existing frequency is between two and three aircraft a day. Forecast of aviation demand projects traffic could increase up to 2,000 yearly operations, which would be approximately five to six aircraft a day. It is not anticipated all the aircraft would use BRO at the same time, but it would not be uncommon to have four aircraft parked at the same time on the ramp.

The buses used for the ground-handling portion are staged in an area collocated with parking Lot G north of the airport. The buses access the apron through the fence when aircraft are ready for departure.

Ideally, a mix use area would be available to accommodate both ICE flights and conventional GA traffic when ICE flights are not using the area. Analysis to accommodate this type of traffic is conducted in Chapter 5, *Alternative Analysis*.

4.5.6 General Aviation Summary

Table 4-19 summarizes the GA facility requirements. Additional hangar space may be required in the future; however, GA facilities are demand-driven, and it is important to keep in mind that these facilities will only be needed as demand warrants. Alternatives to meet future demand are considered in Chapter 5, *Alternative Analysis*. Accommodating ICE flights also are considered in Chapter 5, *Alternative Analysis*.

Table 4-19. General Aviation Space Requirement Summary

	PAL 1	PAL 2	PAL 3
		Square Feet (Acres)	
Total Apron Space Requirement	107,000 (2.46 acres)	109,500 (2.52 acres)	132,500 (3.04 acres)
Total Existing Apron Space	431,000 (9.9 acres)	431,000 (9.9 acres)	431,000 (9.9 acres)
Excess/Deficiency	324,000 (7.44 acres)	321,500 (7.38 acres)	298,500 (6.86 acres)
Total Hangar Space Requirement	201,500 (4.62 acres)	206,000 (4.73 acres)	223,000 (5.12 acres)
Total Existing Hangar Space	100,000 (2.30 acres)	100,000 (2.30 acres)	100,000 (2.30 acres)
Excess/Deficiency	-101,500 (-2.32 acres)	-106,000 (-2.43 acres)	-123,000 (-3.02 acres)
Total GA Space Requirement	308,500 (7.08 acres)	315,500 (7.25 acres)	355,500 (8.16 acres)
Total Existing GA Space	531,000 (12.2 acres)	531,000 (12.2 acres)	531,000 (12.2 acres)
Excess/Deficiency	222,500 (5.12 acres)	203,500 (4.95 acres)	175,500 (4.04 acres)

Notes:
Green = Excess Area
Red = Additional Area required

4.6 Air Cargo

Air cargo operations at BRO are conducted by South Texas Express operating from one hangar and apron located in the northeastern corner of the airfield near the intersection of South Vermillion Avenue and Boca Chica Boulevard. The anticipated rate of growth of cargo traffic is similar to the gross regional product of the Brownsville-Harlingen-Raymondville region (3.5%); however, the rail connection and additional SpaceX activities could lead to higher levels.

Air cargo facilities should provide easy transition between the apron and roadway to allow for both aircraft and trucks activities. Facilities needed will be dependent on the tenant. Chapter 5, *Alternative Analysis*, identifies the most suitable areas on the airport to meet future cargo demand when demand warrants.

4.6.1 Rail Connection and Foreign Trade Zone

Connecting the airport to the Port of Brownsville using rail is being considered, and the airport is monitoring the project. This connection could bring additional cargo traffic to the airport and help leverage the existing Foreign Trade Zone (FTZ).

OmniTracks is the rail operator that would provide the rail connection to BRO, and they anticipate using the FTZ site for cargo operations. Preliminary traffic anticipated at BRO includes the AN-24 and DC-8-73F aircraft. While these aircraft may not become the critical aircraft in the short-term future, runway length requirements have been evaluated for these two aircraft in Section 4.2.5.

In addition, Table 4-20 summarizes these aircraft dimensions. These aircraft are larger than those currently using the cargo area. Parking and unloading alternatives are analyzed in Chapter 5, *Alternative Analysis*.

Table 4-20. Cargo Aircraft Dimensions

	Length	Wingspan	ADG	TDG
DC-8-73	187.3	148.3	IV	4
AN-24-100	226.3	240.5	VI	5

4.7 Airline and Airport Support Facilities

4.7.1 Aircraft Rescue and Fire Fighting

Title 14, Code of Federal Regulations (CFR) Part 139 establishes the aircraft rescue and fire fighting (ARFF) requirements at certificated airports such as BRO. ARFF index ratings are based upon the length of the largest aircraft with an average of five or more daily departures. BRO is an Index B airport.

The ARFF building is located north of Taxiway H halfway between Runway 18-36 and the cargo area. The facility consists of space to accommodate two vehicle bays used to store and maintain ARFF vehicles and equipment. Four employees are on duty per shift, and the station is manned 24 hours per day, 7 days per week. The airport is equipped with two ARFF vehicles, a 1999 International 4800 and a 1999 E-One Titan.

Table 4-21 lists the ARFF index of the commercial aircraft using the airport. Based on the fleet mix and commercial service forecast, BRO likely will be classified as an ARFF Index B, with potential Index C needs during peak period, throughout the planning period.

The station location provides unobstructed views of both runways. The station could be expanded at its current location if needed in the future, and adding a third bay and additional water lines would allow for meeting future needs.

Table 4-21. Representative Aircraft Length and ARFF Index

Existing	Length (feet)	ARFF Index[a]
A319	111.0	B
A320	123.3	B
B737-300	109.1	B
B737-400	119.4	B
B737-800	129.1	C
B757-200	155.3	C
CRJ200	87.8	A
CRJ700	106.1	B
CRJ900	118.9	B
ERJ135	86.1	A
EMB120	65.1	A

Table 4-21. Representative Aircraft Length and ARFF Index

Existing	Length (feet)	ARFF Index[a]
EMB145	98.0	B
EMB175	103.9	B
MD82/83/88	147.8	C
Q400	107.8	B
Future		
A321	146.0	C
B737-900ER	138.2	C
DC-8-73F	182.9	D
EMB195	126.9	C
AN-124-200	226.3	E

[a] Index based on an average of five scheduled departures per day

4.7.2 Fuel Farm

Each FBO is equipped with aboveground storage tanks and trucks. Hunt Pan Am is equipped with three active Jet A tanks and one active Avgas tank, as well as four Jet A mobile trucks and two Avgas mobile trucks for an overall capacity of 46,000 gallons. Southmost Aviation has one 18,000-gallon Jet A tank, one 8,000-gallon Avgas tank, one 5,000-gallon Jet A truck, and one 3,000-gallon Avgas truck. Southmost Aviation is considering increasing Jet A capacity with a 12,000-gallon tank.

As operations increase, fuel storage requirements can be expected to increase proportionately. Table 4-22 lists the fuel storage requirements for each planning period. Additional fuel storage requirements may be necessary if the airport and FBOs want to maintain a 2-week supply during the peak month. In addition, Table 4-22 also includes data for a 1-week supply. The airport has sufficient capacity to maintain a 1-week supply over the planning period. Adding storage capacity should be an economic decision for the FBOs, driven by demand and their needs at the airport.

Table 4-22. Fuel Storage Requirements

	PAL 1	PAL 2	PAL 3
Peak Month Operations	3,382	3,511	3,763
Average Day of Peak Month Operations	113	117	125
Gallons Per operations	70	70	75
Two-week supply			
Two-week Operations	1,582	1,638	17,50
Fuel Storage (Gallons)	110,740	114,660	131,250
Existing Fuel Storage Capacity (Gallons)	80,000	80,000	80,000
Excess/Deficiency (Gallons)	-30,740	-34,660	-51,250
One-week supply			
One-week Operations	791	819	875

Table 4-22. Fuel Storage Requirements

	PAL 1	PAL 2	PAL 3
Fuel Storage (Gallons)	55,370	57,330	65,625
Existing Fuel Storage Capacity (Gallons)	80,000	80,000	80,000
Excess/Deficiency (Gallons)	24,630	22,670	14,375

Notes:
Green = Excess Area
Red = Additional Area required

4.7.3 Ground Service Equipment

As development and expansion of the terminal building and commercial aircraft apron occurs over the course of the planning period, it is essential that ground service equipment (GSE) maintenance and storage be located to provide quick/convenient access to aircraft. In addition, the aircraft parking position envelopes and the commercial aircraft apron should allow sufficient room for safe GSE equipment maneuvering.

The GSE fleet size is driven primarily by the number of gates and airlines. In addition, new entrant air carriers may require their own GSE fleet, and therefore, increase the demand for GSE storage and maintenance facilities.

4.7.4 Air Traffic Control Tower

BRO is equipped with an ATCT, located west of Runway 18/36, just across the main ramp from Taxiway D. The BRO ATCT is part of the FAA's contract tower program, which allows the FAA to contract air traffic control services to select airports and operated by RVA (Robinson Aviation). The ATCT has a clear line of sight to all four runway ends; however, according to the NFDC, the northwestern corner of Taxiway B (south of the Runway 13 hold line) is not visible from the ATCT. Because of the proximity with the Mexican airspace, the BRO ATCT is a veritable asset for commercial aircraft and GA aircraft.

4.7.5 Helicopter Pad

There is no designated helicopter parking at BRO. Helicopters use the existing runways and taxiways and park on the apron. There is potential for helicopter operators to operate in and out of BRO to serve the offshore oil platforms in the Gulf of Mexico. If helicopter traffic increases, a designated helicopter parking position would help better segregate helicopter traffic from airplane and provide designated areas for helicopter to park. It is not anticipated a full helipad would be required. Helicopter traffic would still use the runways and taxiways to operate in and out of the airport but would have designated parking positions. An area suitable for helicopter parking is identified in Chapter 5, *Alternative Analysis*.

4.7.6 Spaceport Designation

Although there are no immediate plans in the short-term, BRO may desire to obtain a spaceport designation and license to operate a launch site in the future during the planning period. 14 CFR Part 420 – *License to Operate a Launch Site* prescribes the information and demonstrations required as part of the license application, as well as conditions for the license approval. Subpart B lists the criteria and information requirements for obtaining a license. The following lists briefly summarizes the information needed per 14 CFR 420.15:

- Launch site operator: Name and address of the applicant, and name, address, and telephone number of any person to whom inquiries and correspondence should be directed

- Launch site: Name and location of the proposed launch site
  - List of downrange equipment
  - Description of the layout of the launch site, including launch points
  - Types of launch vehicles to be supported at each launch point
  - Range of launch azimuths planned from each launch point
  - Scheduled operational date
- Foreign ownership
- Environmental: Information for the FAA to analyze the environmental impacts associated with the operation of the proposed launch site. The information provided by an applicant must be sufficient to enable the FAA to comply with the requirements of the National Environment Policy Act, 42 United States Code 4321 et seq.
- Launch site location demonstrating compliance with 14 CFR 420.19-420.29.
- Explosive site plan that complies with 14 CFR Parts 420.63, 420.65, 420.67, and 420.69.
- Launch site operations providing the information necessary to demonstrate compliance with the requirements of 14 CFR Parts 420.53, 420.55, 420.57, 420.59, 420.61, and 420.71.

Before issuing a license, the FAA will complete an analysis of the environmental impacts associated with the proposed operation of the launch site, in accordance with the National Environmental Policy Act, 40 CFR Parts 1500–1508, and FAA Order 1050.1F.

To gain approval for a launch site location, BRO would need to demonstrate that the launch site provides a risk level estimated not to exceed an expected average number of 0.00003 casualties (Ec) to the collective member of the public exposed to hazards from the flight ($E_c \leq 30 \times 10^{-6}$). In addition, the minimum distance from the launch point to launch site boundary depends on the launch vehicle class and type of suborbital launch vehicle. This distances ranges from 7,300 feet for small orbital expendable launch vehicle to 10,600 feet for medium large expendable launch vehicles. The airport would also need to identify a flight corridor.

FINAL REPORT

Development Alternatives

Prepared for

Brownsville South Padre Island International Airport

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ch2m

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Acronyms and Abbreviations

°C	degrees Celsius
°F	degrees Fahrenheit
AC	Advisory Circular
ADG	Airplane Design Group
ALP	Airport Layout Plan
ASDA	accelerate stop distance available
CAP	Civil Air Patrol
FAA	Federal Aviation Administration
FBO	fixed-base operator
ft^2	square feet
FTZ	Foreign Trade Zone
GA	general aviation
ICE	Immigration and Customs Enforcement
LDA	landing distance available
MRO	maintenance, repair, and overhaul
PAL	planning activity level
ROFA	Runway Object-Free Area
RPZ	Runway Protection Zone
RSA	Runway Safety Area
TODA	takeoff distance available
TORA	takeoff run available

SECTION 5

Development Alternatives

This chapter explores alternative development concepts to meet the requirements presented in Chapter 4. Alternatives development focused on the airfield and general aviation (GA) areas; landside and automobile parking were also considered. The alternatives are described in detail and compared with each other for merits and demerits.

5.1 Alternatives Development

The initial concept development process began following facility requirements analysis presented in Chapter 4. The process involved creating and right-sizing concepts so they are sufficient for use by the projected aircraft fleet mix and accommodate future growth. Alternatives were then refined to reach the concept detailed in this chapter.

5.1.1 Process and Concepts

The concept development process involved analyzing existing conditions of the airport and identifying potential development areas and interdependency between terminal area and airfield to enhance capacity of the airport so that it sustains projected growth of activity through three planning activity levels (PALs). Alternative concepts were developed separately for each of three critical components of the airport – airfield, GA, and landside.

5.1.2 Evaluation of Alternatives

A set of evaluation criteria was developed to measure the preferred alternative against goals and objectives at BRO. Table 5-1 presents the alternatives evaluation criteria. A green-yellow-red methodology for measuring against the criteria was applied, where each option was determined to either fully satisfy the criterion (green), partially satisfy the criterion (yellow), or not to satisfy the criterion (red).

Table 5-1. Alternative Evaluation Criteria

Evaluation Criteria	Details
1. Meet Future Demand - Expandability	Assess the ability of the alternative of meeting existing and future demand as well as the potential for future expansion
2. Meet Airport Goals and Objectives	Assess the ability of the alternative of meeting existing and future airport goals and objectives
3. Meet Design Standard	Assess the ability of the alternative of meeting the current FAA design/safety standards
4. Airfield and Airspace Operations Impacts	Assess the operational impacts of the alternative on existing and future airfield and airspace
5. Costs and Financial Feasibility	Assess costs and financial feasibility of the alternative
6. Construction Phasing Plan	Assess the feasibility of the alternative as it relates to phasing and construction plan
7. Environment	Assess the alternatives from an environmental standpoint

5.2 Airfield Alternatives

The facility requirements analysis drove the airfield needs and design options considerations. Several factors were considered to develop alternative concepts for the airfield including airfield capacity, Federal Aviation Administration (FAA) design standards, runway length requirements, and pavement conditions.

5.2.1 Facility Requirements Summary and Assumptions

BRO accommodates air traffic on two runways. The primary runway, Runway 13/31, is an Runway Design Code C-IV runway and is 7,399 feet long. The secondary runway, Runway 18/36, is 6,000 feet in length, with reduced takeoff run available (TORA) and takeoff distance available (TODA) of only 5,532 feet for Runway 36. Several future airfield needs were identified. The main findings of airfield facility requirements analyzed are as follows:

- Annual airfield capacity sufficient to meet forecast demand. Runway 13/31 will remain the primary runway at BRO, and because of crosswinds, one crosswind runway is required to meet the minimum 95% wind coverage for small GA aircraft.
- Runway length requirements were considered independently for both runways. Existing demand justifies the extension of Runway 13/31.
- Airfield requirements includes pavement rehabilitation and maintenance, which is needed over the planning period. Existing pavement should be maintained and rehabilitated as required based on pavement condition and deteriorations to maintain appropriate condition of the airfield.
- Runways 13 and 18 Runway Protection Zones (RPZs) are not entirely clear of obstructions and roads, including Boca Chica Boulevard, and buildings are located within the RPZs.
- The taxiway system needs improvements to meet design standards, including high energy intersections, right angle intersections, and direct access to a runway. In addition, new taxiway fillet standards have been developed and should be used the next time the taxiway requires rehabilitation.
- Additional taxiways and taxilanes will be developed as demand warrants to reach future developable areas. Extension of the taxiways/taxilanes should only be planned when demand warrants.

5.2.2 Airfield Development Considerations

Per the facilities requirements summary detailed in Section 5.1.2.1, several options were analyzed to address airfield needs. There are no major airfield capacity needs, but existing traffic justifies a runway extension. Rehabilitating runway pavement is another airfield need. These two runway projects are interrelated, as the runway rehabilitation to Runway 18/36 needs to occur before extending Runway 13-31. This phased approach is needed for maintaining aircraft operations during construction.

Runway extension and taxiway design standards were addressed individually. In addition, extension of the taxiways and taxilanes is detailed in the GA sections as new taxiways and taxilanes are only needed to reach new developable areas, and not for capacity reasons.

5.2.3 Runway Extension

Four runway extension options were considered as part of this phase of the Master Plan. A No Action option was not considered for further analysis. No Action does not support future facility and aviation demand requirements.

5.2.3.1 Alternative 1

Alternative 1 extends the four runway ends to the limits of the airport property and includes a blast pad for each runway. This alternative does not include offsite runway extension.

Declared distances would be enforced for the four runways so that the Runway Safety Area (RSA) and Runway Object-Free Area (ROFA) would remain on existing developed airport property. The RPZ for these runway ends would meet the requirements outlined in FAA Advisory Circular (AC) 150/5300-13A and in *Interim Guidance on Land Uses Within a Runway Protection Zone*. The RPZs would be cleared of incompatible land uses, including Boca Chica Boulevard and other roads as well as buildings and houses, by bringing them on airport property and using declared distances.

This alternative does not require land acquisition, and it includes compliant RPZs. Table 5-2 summarizes the declared distances that would be obtained with Alternative 1; Figure 5-1 depicts this alternative.

Table 5-2. Alternative 1 Runway Length Summary

	Existing (feet)	Alternative 1 (feet)
Runway 18 Takeoff (TORA, TODA, ASDA)	6,000	5,664
Runway 18 Landing (LDA)	5,810	4,647
Runway 36 Takeoff (TORA, TODA, ASDA)	5,532	5,506
Runway 36 Landing (LDA)	5,532	4,864
Runway 13 Takeoff (TORA, TODA, ASDA)	7,399	7,680
Runway 13 Landing (LDA)	7,399	5,621
Runway 31 Takeoff (TORA, TODA, ASDA)	7,399	7,290
Runway 31 Landing (LDA)	7,399	6,568

ASDA = accelerate stop distance available
LDA = landing distance available

Although this alternative includes additional pavement, it would not be sufficient to fully compensate the RPZ displacement and would reduce the takeoff and landing distances available for the four runway ends. Subsequently, it would not allow the airport to meet future needs. However, it is fully compatible with FAA design standards and has the fewest environmental impacts.

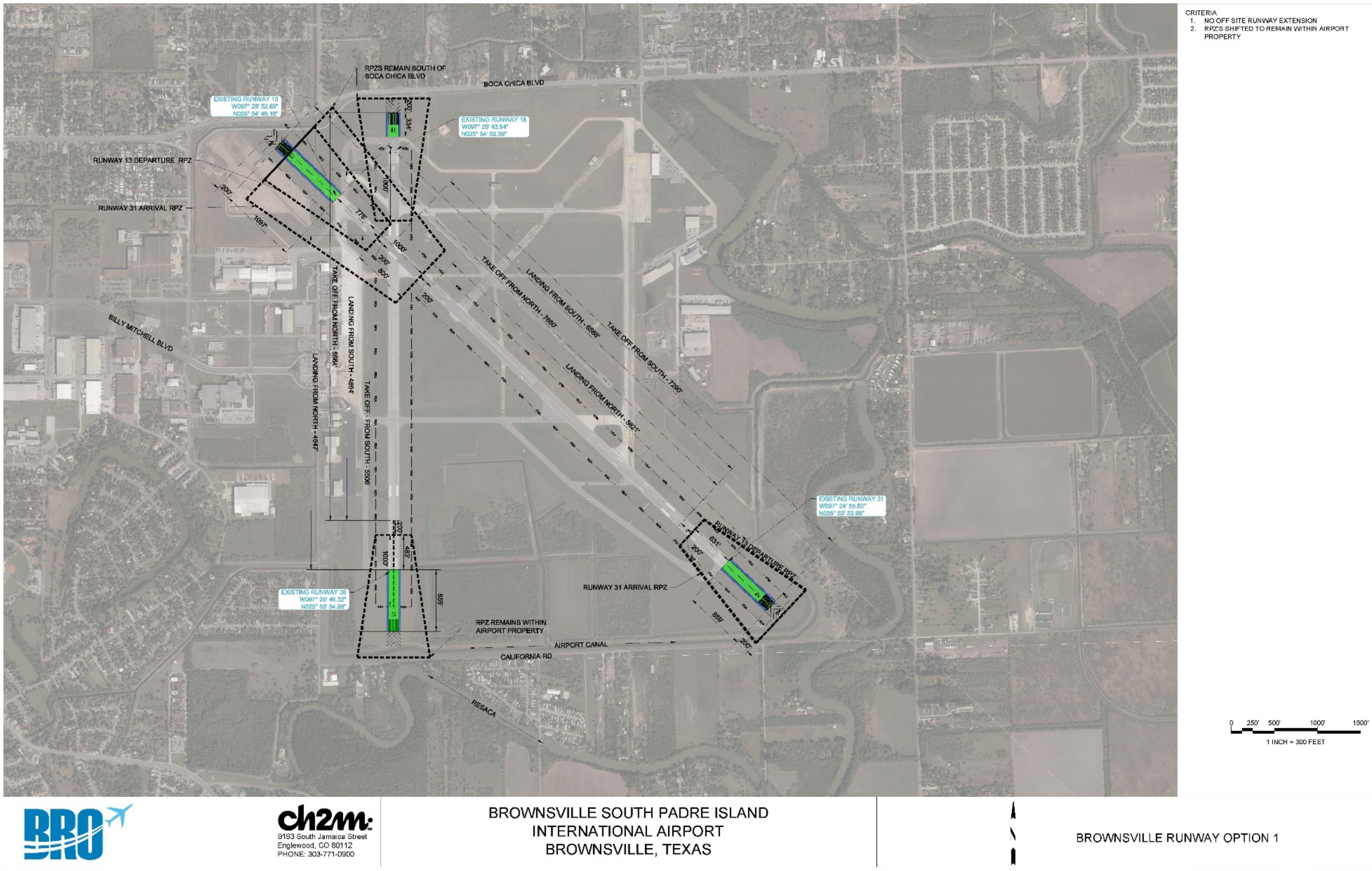

Figure 5-1. Runway Alternative 1

5.2.3.2 Alternative 2

Alternative 2 has similar improvements as Alternative 1; it extends the four runway ends to the limits of the airport property and includes a blast pad for each runway. Declared distances would be enforced for the four runways so the RSA and ROFA would remain on existing developed airport property. However, Alternative 2 would maintain the RPZs at their current location off-airport property and would maintain existing incompatible land uses. This alternative does not require land acquisition. Table 5-3 summarizes the declared distances that would be obtained with Alternative 2; Figure 5-2 depicts this alternative.

Table 5-3 Alternative 2 Runway Length Summary

	Existing (feet)	**Alternative 2 (feet)**
Runway 18 Takeoff (TORA, TODA, ASDA)	6,000	6,357
Runway 18 Landing (LDA)	5,810	5,811
Runway 36 Takeoff (TORA, TODA, ASDA)	5,532	6,416
Runway 36 Landing (LDA)	5,532	5,557
Runway 13 Takeoff (TORA, TODA, ASDA)	7,399	8,510
Runway 13 Landing (LDA)	7,399	7,399
Runway 31 Takeoff (TORA, TODA, ASDA)	7,399	8,268
Runway 31 Landing (LDA)	7,399	7,399

This alternative includes additional pavement and maintains the RPZs at their location, which slightly increases or maintains the takeoff and landing distances available for the four runway ends. This alternative limits the possibility of future airport expansion and does not address long-term needs of the airport. In addition, it would require a modification of standards for the noncompliant uses in the RPZs. Alternative 2 has similar environmental impacts as Alternative 1.

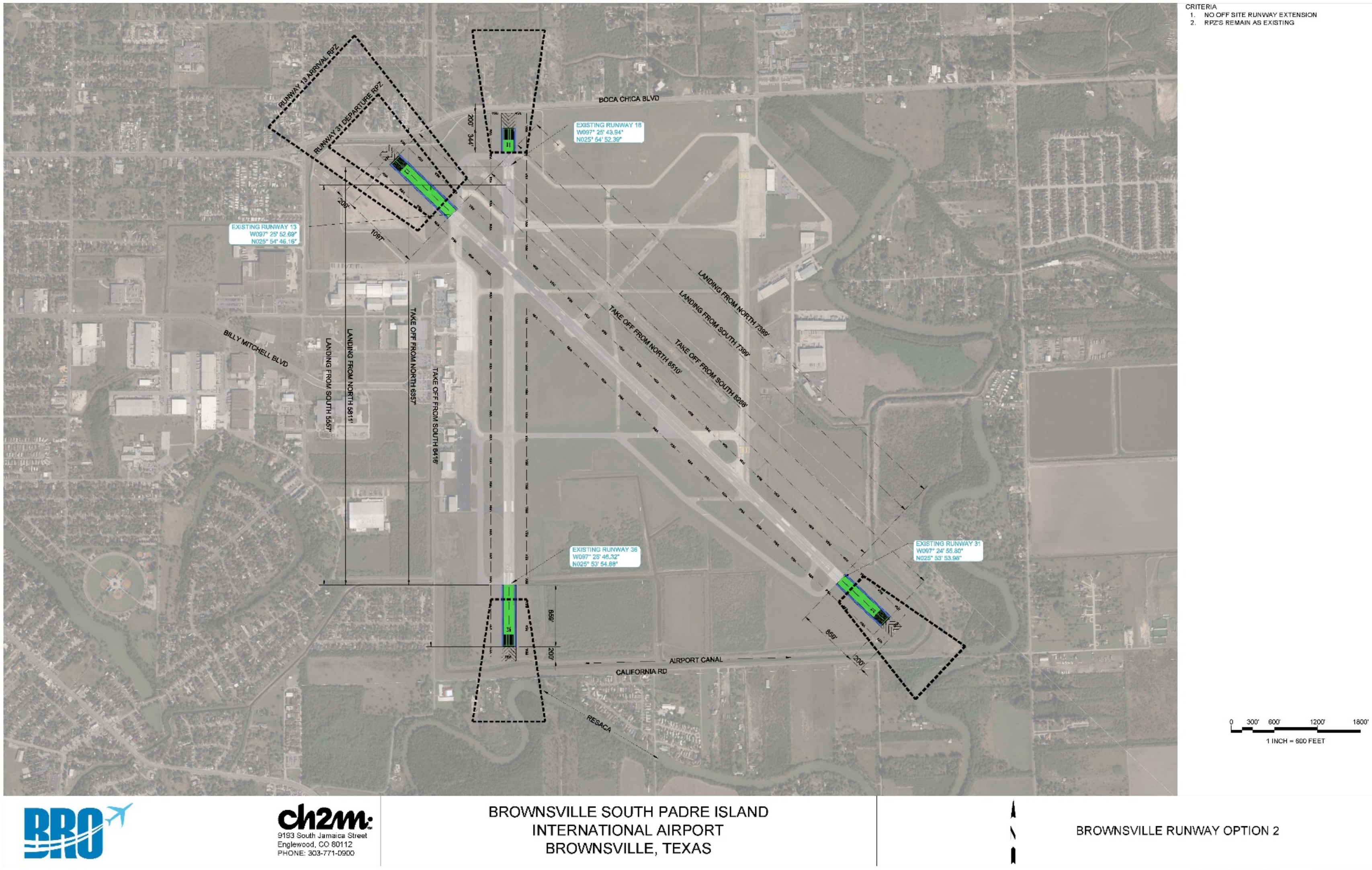

Figure 5-2. Runway Alternative 2

5.2.3.3 Alternative 3

Alternative 3 would extend Runways 36 and 31 on the southern side of the airport onto adjacent property. Both runways and RSAs would cross the airport canal and a resaca south of the airport, requiring fill or a bridge structure. Runways 13 and 18 thresholds and RPZs would be maintained at their existing location, and existing incompatible land uses in the RPZs would be maintained.

This alternative requires the acquisition of 16 acres at Runway 36 end and 45 acres at Runway 31 end. Table 5-4 summarizes the declared distances that would be obtained with Alternative 3; Figure 5-3 depicts this alternative.

Table 5-4 Alternative 3 Runway Length Summary

	Existing (feet)	Alternative 3 (feet)
Runway 18 Takeoff (TORA, TODA, ASDA)	6,000	7,280
Runway 18 Landing (LDA)	5,810	7,090
Runway 36 Takeoff (TORA, TODA, ASDA)	5,532	6,828
Runway 36 Landing (LDA)	5,532	6,828
Runway 13 Takeoff (TORA, TODA, ASDA)	7,399	10,000
Runway 13 Landing (LDA)	7,399	10,000
Runway 31 Takeoff (TORA, TODA, ASDA)	7,399	10,000
Runway 31 Landing (LDA)	7,399	10,000

This alternative maintains the Runway 13 and 18 RPZs at their location and increases the takeoff and landing distances available for the four runway ends. Alternative 3 provides the longest runway extension and addresses long-term needs of the airport. Alternative 3 would require a modification of standards for the noncompliant uses in the RPZs. It would require a detailed environmental analysis and has the potential to impact several resources, including a park and Section 4(f), wetlands, and floodplains.

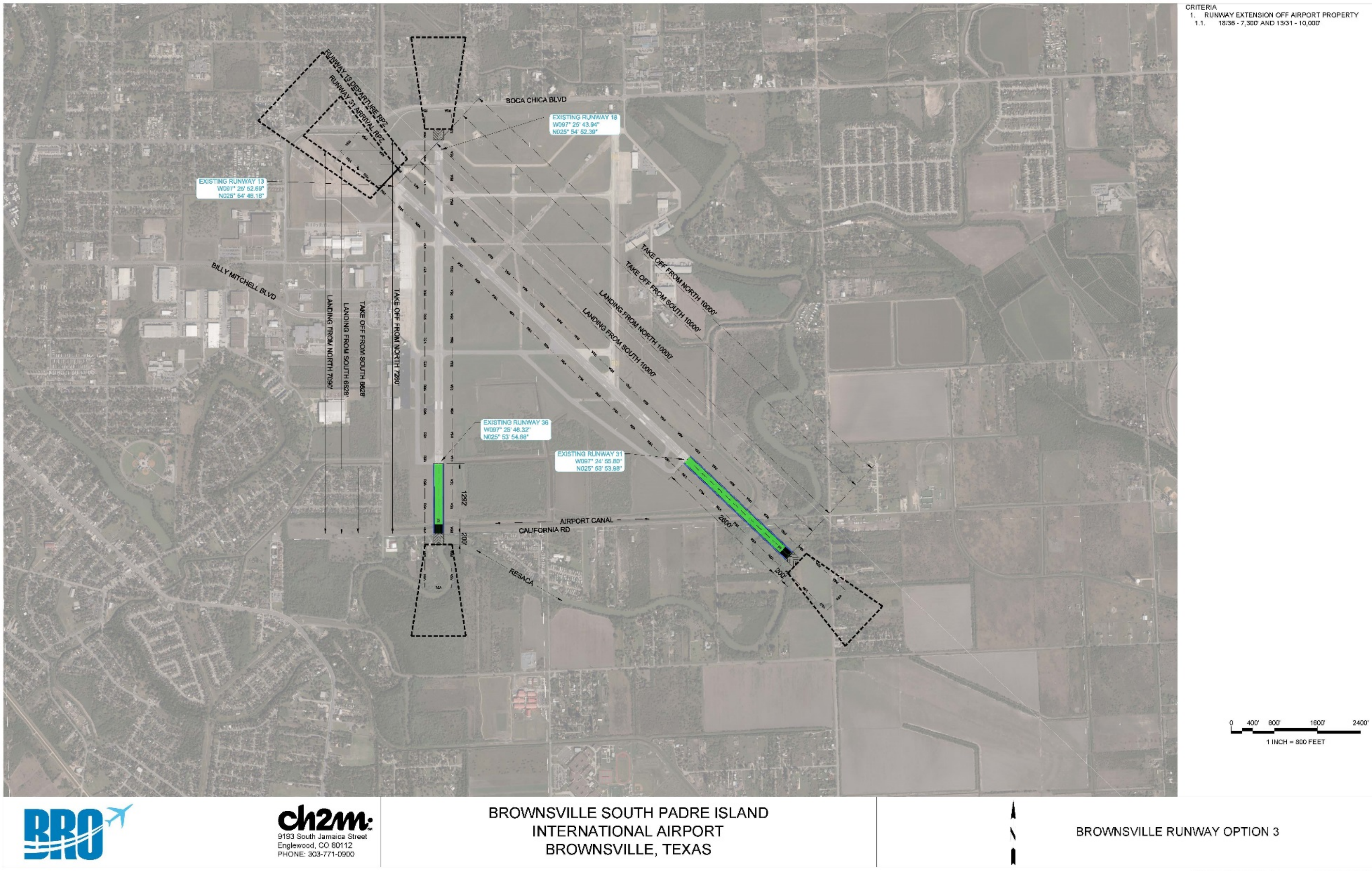

Figure 5-3. Runway Alternative 3

5.2.3.4 Alternative 4

Alternative 4 requires similar improvements to the runway ends as Alternative 3; however, Alternative 4 would meet the requirements outlined in FAA AC 150/5300-13A and the *Interim Guidance on Land Uses Within a Runway Protection Zone*. Runways 18 and 36 RPZs would be cleared of incompatible land uses, including Boca Chica Boulevard and other roads as well as buildings and houses, by bringing them on airport property and using declared distances.

This alternative requires the acquisition of 81 acres at Runway 36 end and 63 acres at Runway 31 end. Table 5-5 summarizes the declared distances that would be obtained with Alternative 4; Figure 5-4 depicts this alternative.

Table 5-5. Alternative 4 Runway Length Summary

	Existing (feet)	Alternative 4 (feet)
Runway 18 Takeoff (TORA, TODA, ASDA)	6,000	7,280
Runway 18 Landing (LDA)	5,810	7,090
Runway 36 Takeoff (TORA, TODA, ASDA)	5,532	5,926
Runway 36 Landing (LDA)	5,532	5,926
Runway 13 Takeoff (TORA, TODA, ASDA)	7,399	10,000
Runway 13 Landing (LDA)	7,399	8,223
Runway 31 Takeoff (TORA, TODA, ASDA)	7,399	9,023
Runway 31 Landing (LDA)	7,399	10,000

Alternative 4 extends the four runway ends, displaces Runway 13 and 18 RPZs to mitigate for incompatible land uses, and would be compliant with FAA design standards. Alternative 4 increases the takeoff and landing distances available for the four runway ends, slightly less than Alternative 3, but still addressing long-term needs of the airport. As with Alternative 3, Alternative 4 would require a detailed environmental analysis and has the potential to impact several resources, including a park and Section 4(f), wetlands, and floodplains.

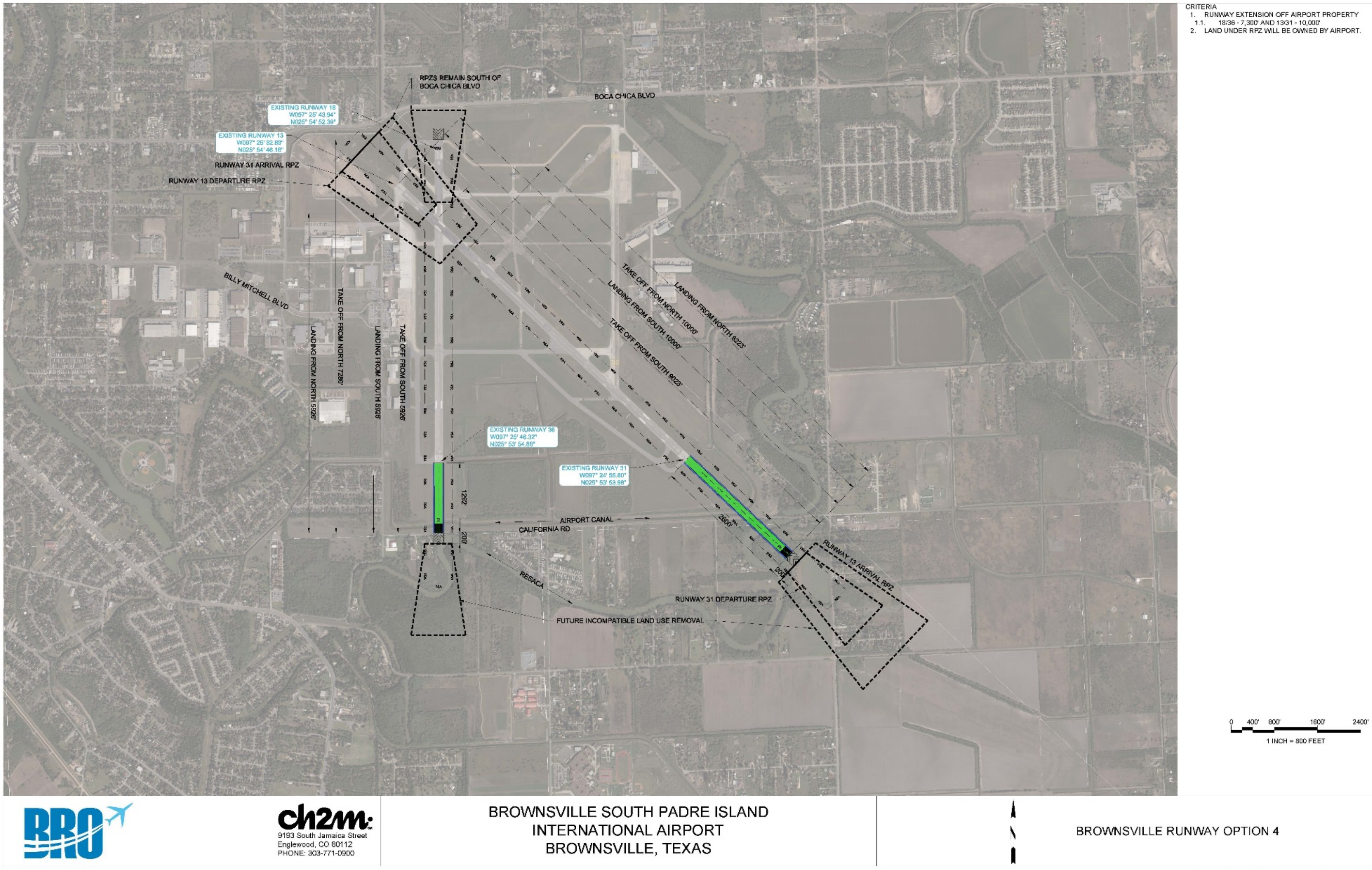

Figure 5-4. Runway Alternative 4

5.2.3.5 Alternative Comparison

Table 5-6 provides a comparison of the four alternatives' declared distance as well as a comparison with existing declared distances. Alternative 1 is the most constraining, and usable takeoff and landing distances would be lower than existing distances for nearly all the runway ends, except Runway 13. Alternative 3 offers the longest available distances, but maintains existing incompatible land uses in the RPZs. Both Alternatives 3 and 4 have the potential to affect environmental resources, including wetlands, floodplains, parks, Section 4(f), and endangered species. Environmental impacts of Alternatives 1 and 2 would be limited compared to Alternatives 3 and 4, but these alternatives do not meet the long-term needs of the airport.

Table 5-6. Alternatives Runway Length Summary

	Existing (feet)	Alternative 1 (feet)	Alternative 2 (feet)	Alternative 3 (feet)	Alternative 4 (feet)
Runway 18 Takeoff (TORA, TODA, ASDA)	6,000	5,664	6,357	7,280	7,280
Runway 18 Landing (LDA)	5,810	4,647	5,811	7,090	7,090
Runway 36 Takeoff (TORA, TODA, ASDA)	5,532	5,506	6,416	6,828	5,926
Runway 36 Landing (LDA)	5,532	4,864	5,557	6,828	5,926
Runway 13 Takeoff (TORA, TODA, ASDA)	7,399	7,680	8,510	10,000	10,000
Runway 13 Landing (LDA)	7,399	5,621	7,399	10,000	8,223
Runway 31 Takeoff (TORA, TODA, ASDA)	7,399	7,290	8,268	10,000	9,023
Runway 31 Landing (LDA)	7,399	6,568	7,399	10,000	10,000

Preliminary costs were computed for each of the four alternatives using the following assumptions:

- No calculations were made for acquiring new land or avigation easements.
- Taxiway design was not factored into this analysi.s
- Bituminous pavement section thicknesses were assumed based on other asphalt runways with known thickness.
- Alternatives 3 and 4:
  - Bridge costs included but do not account for total cost of additional drainage impacts, floodway/floodplain impacts, or any other costs.
  - All canals and resaca were assumed to be spanned by bridges, for width up to the RSA (500 feet), using cost estimates per similar design estimates for aviation bridges.

Preliminary cost estimates for Alternatives 1 and 2 are upward of $19.4 million each, while preliminary cost estimates for Alternatives 3 and 4 are upward of $72.9 million each. These estimates do not account for land acquisition costs for Alternatives 3 and 4, nor the costs to clear the RPZs from incompatible land use for Alternative 4. Costs are rough order of magnitude for planning purposes, and several refinements are needed when design advances.

The primary difference between Alternatives 1, 2, 3, and 4 is the need to span or bridge the resaca for Alternatives 3 and 4. It is recommended that additional design and engineering studies be conducted to better estimate costs and resaca-crossing solutions.

Table 5-7. Alternatives Evaluation Criteria

Evaluation Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4
1. Meet Future Demand - Expandability	🔴	🟡	🟢	🟡
2. Meet Airport Goals and Objectives	🔴	🔴	🟢	🟢
3. Meet Design Standard	🟢	🟡	🟡	🟢
4. Airfield and Airspace Operations Impacts	🟡	🟡	🟡	🟡
5. Costs and Financial Feasibility	🟡	🟡	🔴	🔴
6. Construction Phasing Plan	🟡	🟡	🔴	🔴
7. Environment	🟢	🟢	🟡	🟡
Total	14	14	14	14

🟢 +3 🟡 +2 🔴 +1

5.2.3.6 Preferred Alternative

Using unweighted criteria, the four alternatives obtain similar total scores. After discussion with the airport, the preferred alternative is a composite of Alternatives 2 and 3. Alternative 2 was selected as the preferred alternative for Runway 18/36. It offers a compromise between runway length, costs, and environmental impacts. It does not require bridging the resaca or impacting Las Palomas Wildlife Management Area Voshell Unit, which is just south of the Runway 36 end and is operated by the Wildlife Division of Texas Parks and Wildlife.

Alternative 3 was selected as the preferred alternative for Runway 13/31; this option meets future demand and provides the longest takeoff and landing distance for Runway 13/31. It is the alternative that meets the most airport goals and objectives for Runway 13/31. Figure 5-5 depicts the preferred airside alternative and will be depicted on the Airport Layout Plan (ALP). The preferred alternative maintains existing noncompliant uses in the RPZs, and a modification to standards will be required.

5.2.4 Runway 13/31 and Runway 18/36 Operation Evaluation

A previously completed Pavement Condition Study indicates rehabilitation of the two runways is necessary. In addition, complete closure of Runway 13/31 will be necessary to complete construction. To close this runway, all traffic must be moved to secondary Runway 18/36.

Runway 13/31 is 7,399-feet in length, and Runway 18/36 is 6,000-feet in length with the shortest TODA at 5,532 feet because of declared distances when Runway 36 is in use. The Runway 18/36 pavement structure is older and in worse condition than that at Runway 13/31.

Airlines operations are conducted using regional jets, and as traffic grows, it is anticipated these could be replaced by small narrow-body aircraft such as the A319/320 and B737 series. In addition, Immigration and Customs Enforcement (ICE) flights are conducted at BRO using a combination of Boeing 737s and MD-80s. ICE flights operate several times a week and do meet the substantial use threshold. Cargo operations are also conducted using a variety of aircraft including Boeing 737 and MD-80s.

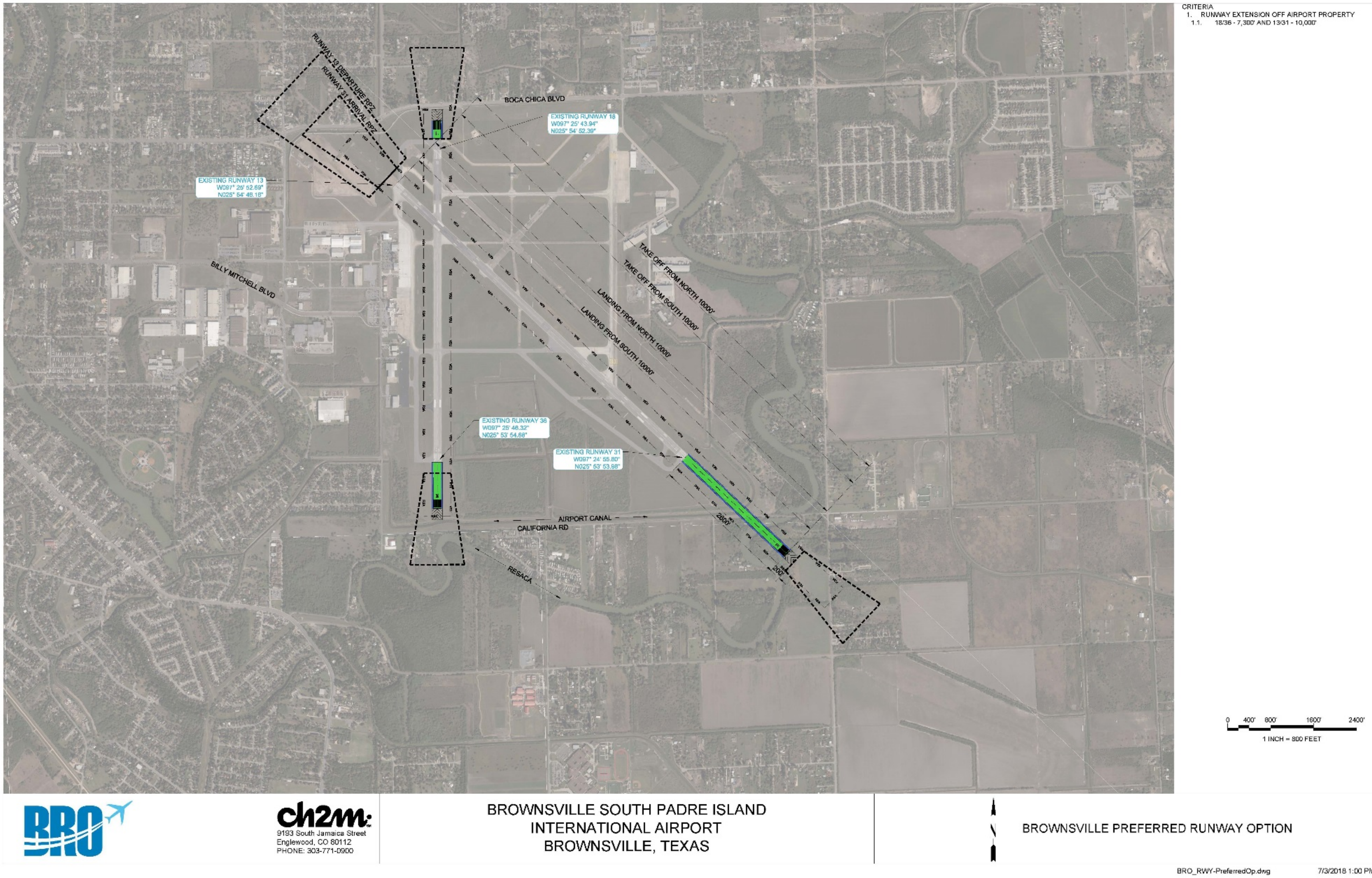

Figure 5-5. Preferred Runway Alternative

Runway length requirements for a variety of aircraft were analysis in Chapter 4. Table 4-6 lists takeoff runway length requirements for aircraft currently using the airport. Because of the high temperatures at Brownsville, none of the regional jets and narrow-body jet aircraft using the airport can take off at maximum takeoff weight during the summer days in 7,000 feet and much less 5,532 feet. This includes the ICE flights, which meet the substantial use threshold. Small narrow-body aircraft such as the A319/320 and B737 series requires 8,000 to 9,000 feet and up to 12,000 feet for the B737-900. MD-80s series also requires 8,000 to 9,000 feet depending on the version. Commercial operators, including some of the larger business jets, would have to reduce their payload to continue operating from the airport during the hot summer months. As such, pavement maintenance on Runway 13/31 would have an important impact on the traffic at BRO and the revenues of the airport and fixed-base operator (FBO).

Per Section 4.1.1, the critical aircraft are the Boeing B737-400 and the MD-80 series used for ICE flights. Per the aircraft planning manuals and assumptions previously summarized, these aircraft require a runway length of 8,900 feet, and 8,800 feet for the MD 83 at BRO. Runway lengths were calculated at International Standard Atmosphere + 15 degrees Celsius (°C), or 30°C at sea level, which corresponds to 86 degrees Fahrenheit (°F) instead of the mean daily maximum temperature of 94.4°F at BRO. As such, these values underestimate the runway length required in the summer months.

The four alternatives previously described would increase Runway 18/36 length and reduce the impacts of closing Runway 13/31 compared to a no-built action. Although Alternative 2 does not fully mitigate for Runway 13/31 closure, it provides an additional 357 feet of takeoff length when using Runway 18 and 910 feet of takeoff length when using Runway 36, which would increase the maximum payload available to commercial operators. Alternative 3 is the option that offers the longest runway extension and that would provide distances equivalent to the existing length of Runway 13/31. However, the costs and environmental impacts of this alternative outweigh the benefits. Indeed, Alternative 3 would require bridging a Resaca, which would significantly increase construction costs. In addition, it would require impacting Las Palomas Wildlife Management Area Voshell Unit, which is operated by the Wildlife Division of Texas Parks and Wildlife and is just south of the Runway 36 end.

Alternative 2 is the recommended alternative to lengthen Runway 18/36 and maintain existing traffic and demand at BRO when Runway 13/31 is closed and undergoing pavement maintenance.

5.2.5 Post-Planning-Period Runway Requirements

Extending Runway 13/31 to 12,000 feet was identified on the previous ALP update for consideration beyond the planning horizon. In addition, based on the data available in the airport planning manuals and because of the high temperature in the summer at BRO, it is recommended to provide a 10,000 feet runway within the 20 years planning period, as demand already exists. Ultimately, a 12,000-foot runway is recommended in the long term, if demand and especially cargo traffic warrants the length.

While existing and forecast demand does not justify this extension during the 20-year planning period, additional cargo demand at the airport, including demand from the planned rail liaison to the Port of Brownsville, could require runway length over 10,000 feet and up to 12,000 feet. Figure 5-6 depicts the 12,000-foot runway. Although it is not depicted on the ALP, prudent planning practice supports protecting land use in the vicinity of the airport up to the 12,000 feet extension.

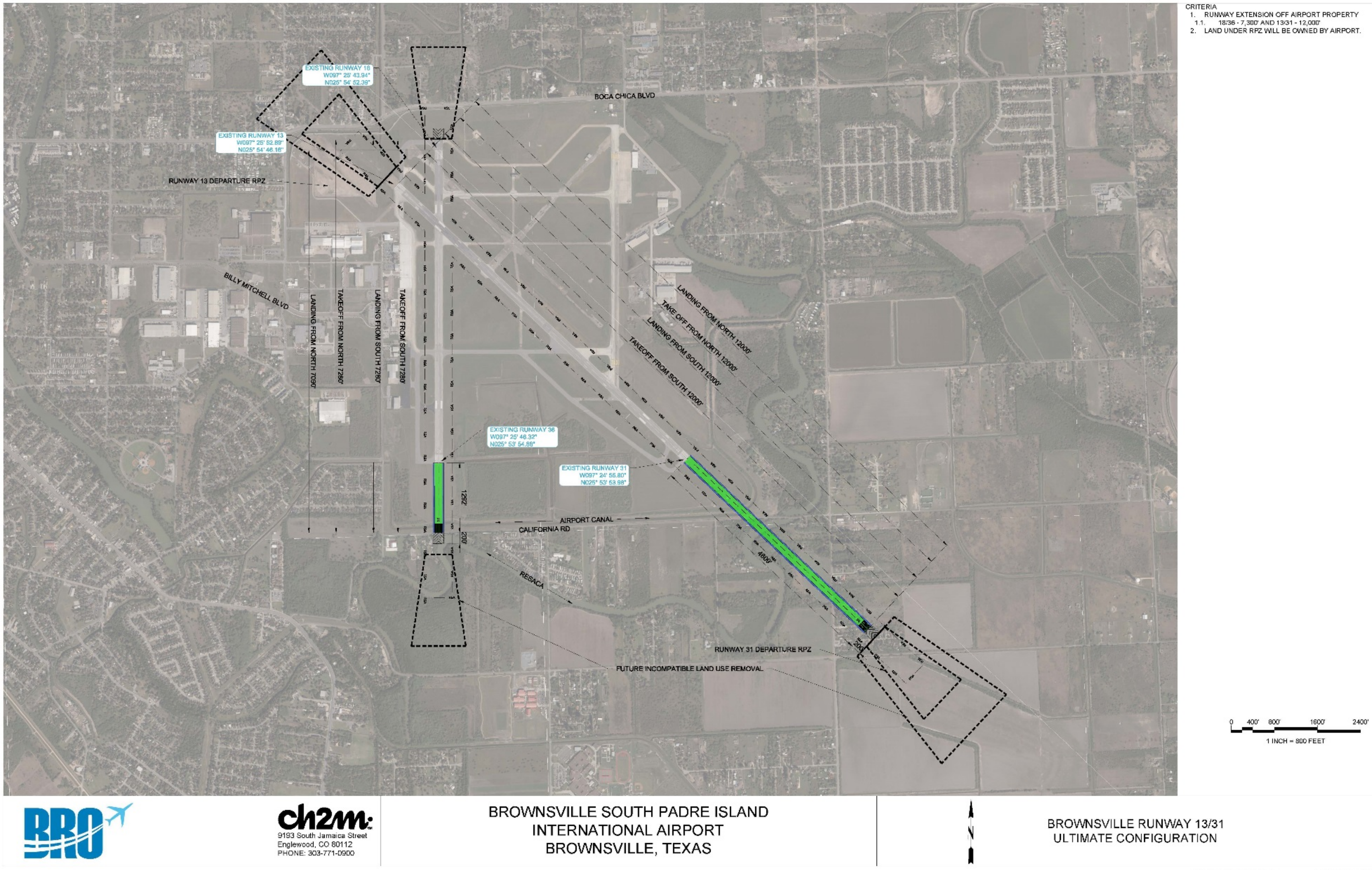

Figure 5-6. Ultimate Runway Alternative

5.2.6 Pavement Maintenance Needs

Runway 13/31 and Runway 18/36 are both grooved asphalt reported in good condition in the National Flight Data Center; however, both runways are expected to need rehabilitation in the short term. The latest Pavement Condition Index survey was completed in 2008. Runway 18/36 has several sections in fair and poor condition and will need to be rehabilitated in the short term. Runway 13/31 will also require rehabilitation in the short- to mid-term. Both runways are nearing the end of their useful life and will need to be rehabilitated in the future. In addition, most of the aprons, as well as portions of Taxiways D, E, H, J, and N are estimated to be in fair or poor condition.

Key design elements of necessary pavement maintenance are as follows:

- Pavement maintenance and rehabilitation to maintain existing airside facilities needed over the planning period.
- Construction and extension of additional taxiways and taxilanes only as demand warrants to reach new developable areas.
- First pavement priority needs include Runway 18/36, the north apron, and portions of Taxiways D, E, H, J, and N.
- Second priority needs include Runway 13/31.
- Pavement maintenance should be conducted as needed to maintain this pavement condition.

5.2.7 Airfield Configuration Alternatives

As identified in Chapter 4, the taxiway system needs improvements to meet design standards, including high energy intersections, right angle intersections, and direct access to a runway. In addition, new taxiway fillet standards have been developed and should be used the next time the taxiway requires rehabilitation.

One alternative was developed for the airfield to meet safety design standards as well as the needs of the airport. A No Action option was not considered for further analysis. No Action does not support future facility and aviation demand requirements.

The preferred alternative is depicted on Figure 5-7 and includes several modifications to the taxiway system, including realigning taxiways to provide right angle intersections, relocating taxiways to remove direct access to a runway, and removing pavement.

5.3 Terminal Area

The terminal area includes both landside (curb front, roadways, parking, shuttle service, and rental car facilities) and airside (terminal, apron, and taxilanes). The terminal complex at BRO is being updated with a new passenger terminal building, relocated commercial apron, and relocated access and parking.

Passenger terminal building and terminal complex alternatives have been addressed as part of the Terminal Area Master Plan Study as well as part of the terminal building design. No additional alternatives were developed for the terminal building and commercial apron.

The future terminal building and commercial apron could be expanded to accommodate a larger number of contact gates as well as more passengers, when demand warrants. Future terminal building extension will be depicted on the ALP for long-term land use and airspace planning purposes.

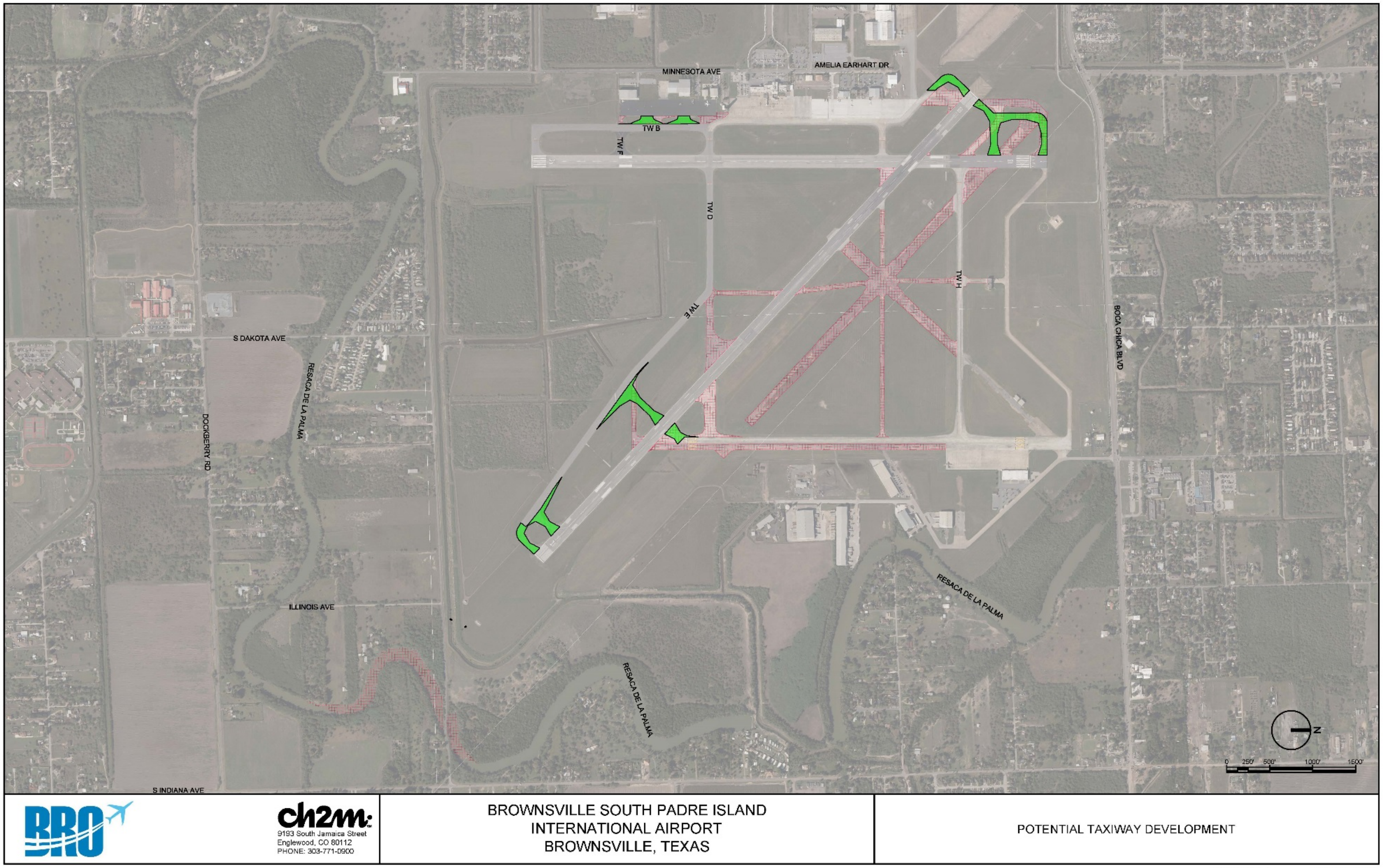

Figure 5-7. Preferred Taxiway Configuration

5.4 Access and Parking

The Terminal Area Master Plan Study addresses access and parking alternatives, and part of the new terminal building design in conjunction with the footprint of the terminal building expansion. No additional alternatives were developed for the access and parking. Additional long-term PAL automobile parking will be depicted on the ALP for long-term land use protection purposes.

5.5 Landside and On-Airport Land Use

BRO airport property includes several landside developable areas that can be used for industries, commerce, cargo, and various landside businesses. Main developable areas include the landside near the passengers' terminal building, the cargo area on the eastern side of the airport (including the Foreign Trade Zone [FTZ]) as well as an area south of the airport, north of California Road between the runways. The following sections identify development concepts for each of these areas.

5.5.1 Cargo Area and Foreign Trade Zone

The cargo area and FTZ are on the eastern side of the airport. One alternative was developed for this area and includes new hangars and apron for aeronautical cargo activities as well as new facilities for industries and commerce without airside access. This alternative accounts for a potential future rail connection with the Port of Brownsville that could attract additional businesses to the airport and in the FTZ. In addition, this alternative also accounts for a relocation of the Civil Air Patrol (CAP) facilities north of the airport. This alternative would include approximately 540,000 square feet of new hangars with aeronautical access as well as 790,000 square feet for FTZ development. Figure 5-8 depicts the cargo area alternative. Additional refinement will need to be conducted when demand warrants and if the rail connection with the Port of Brownsville is finalized. The preferred alternative includes a preliminary rail connection for land use conservation purposes.

5.5.2 Passenger Terminal Building Complex

The passenger terminal building complex is on the western side of the airport. Several vacant parcels could be developed to accommodate businesses and improve passenger experience and quality of service. One alternative was developed for this area and includes only facilities for industries and commerce with no airside access.

This area is better suited for businesses that could improve the passenger experience such as hotels, restaurants, and a gas station to facilitate rental car return. Approximately 150,000 square feet have been saved for a new rental car facility including a quick turnaround area for cleaning and long-term storage of the rental car fleet. Approximately 215,000 square feet were preserved for long-term and automobile parking as the airport and passenger terminal building expands. This alternative includes approximately 970,000 square feet for other facilities, including restaurants, hotel, and retail. Figure 5-9 depicts the passenger terminal building complex landside alternative. Additional refinement will need to be conducted when demand warrants.

5.5.3 Airport South Area

The airport south area is south of the airfield, north of the airport canal and California Road in an area between the two runways. One alternative was developed for this area and includes approximately 1,754,000 square feet (40.3 acres) for aeronautical and aerospace commercial facilities with airside access, and 1,141,000 square feet (26.2 acres) only for industrial, commerce, technology, and business park facilities with no airside access. Figure 5-10 depicts the south area landside alternative. Additional refinement will need to be conducted when demand warrants.

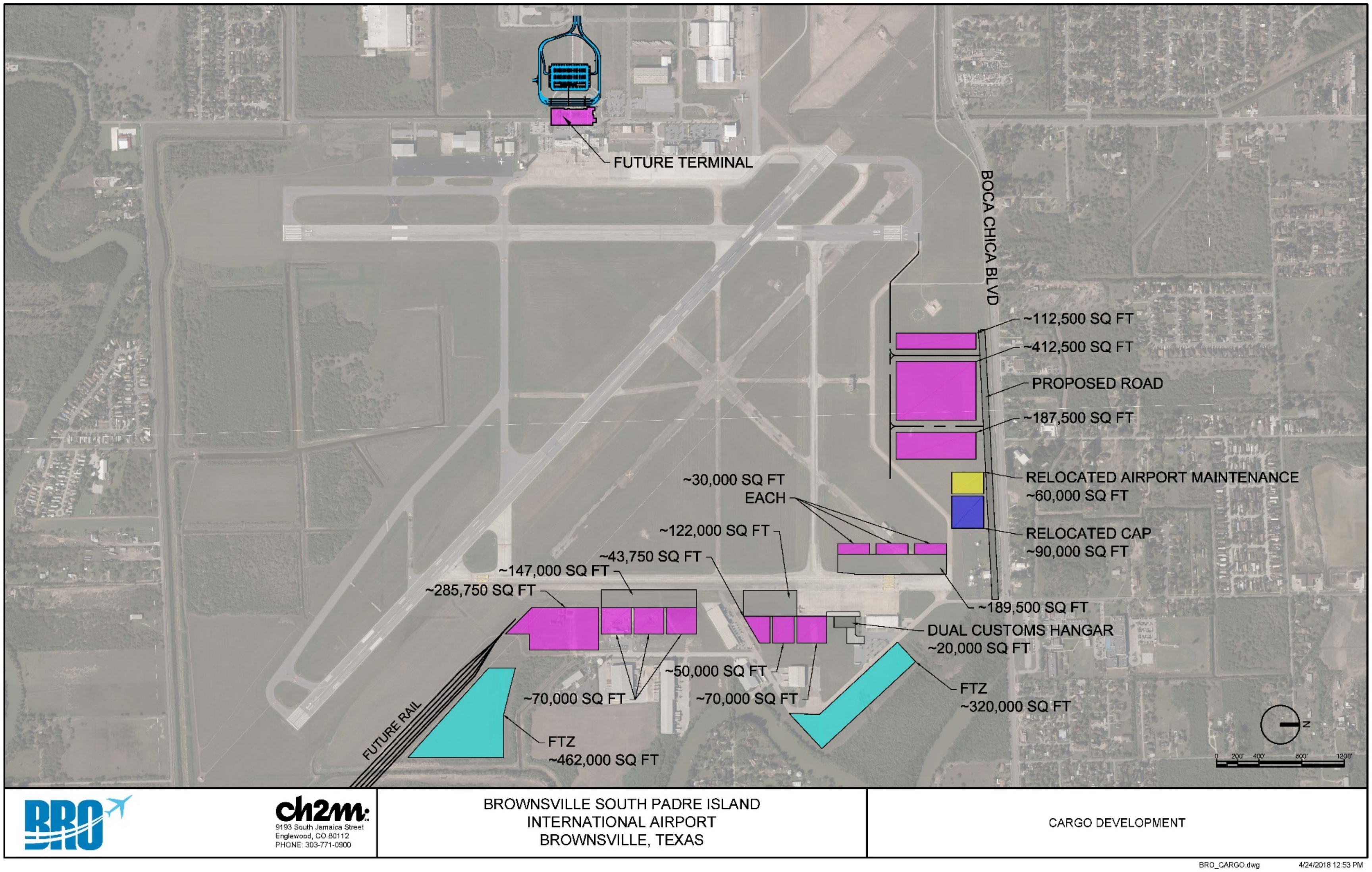

Figure 5-8. FTZ Alternative

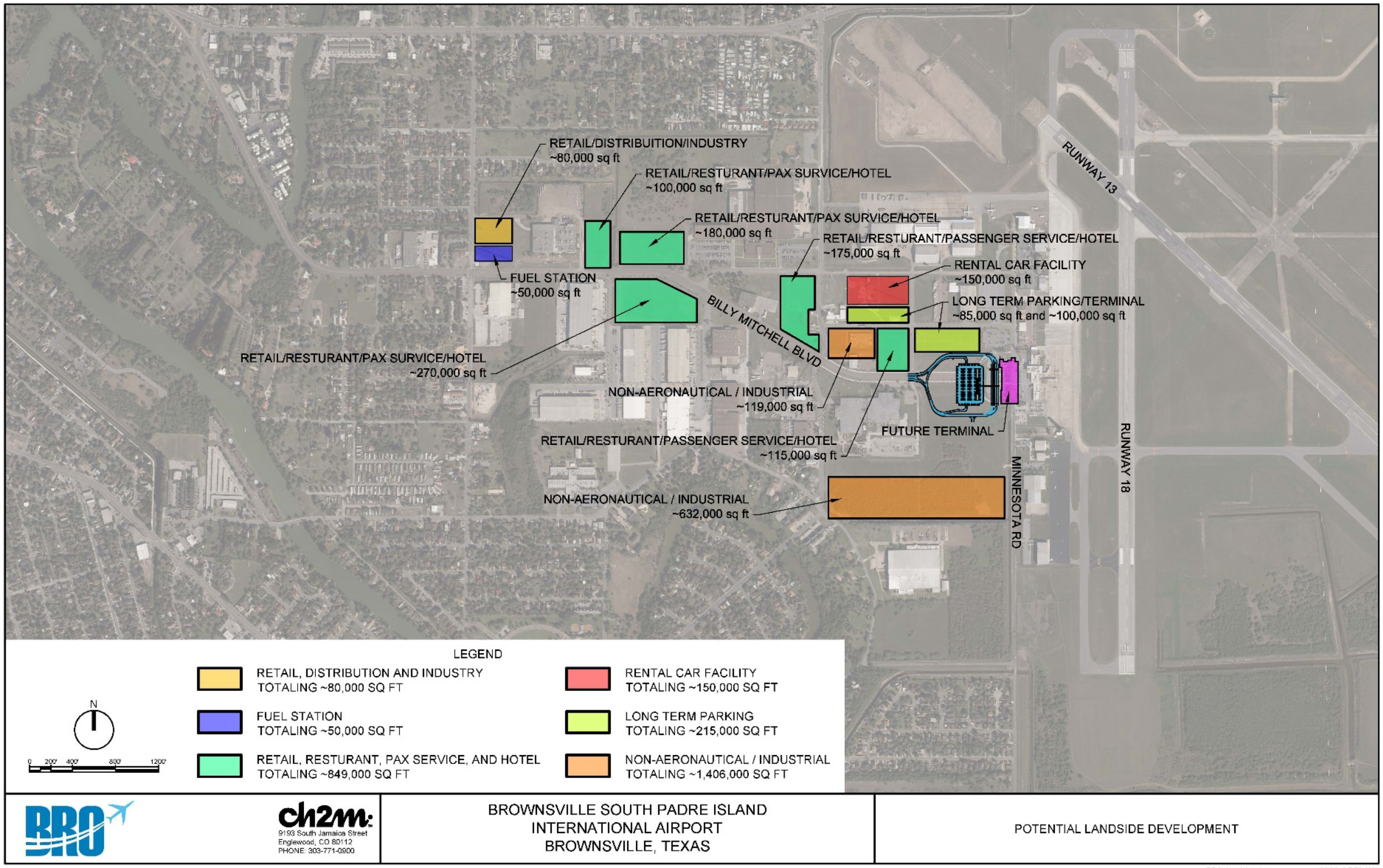

Figure 5-9. Airport West Side Alternative

Figure 5-10. Airport South Side Preferred Alternative

5.6 General Aviation

From the GA facility requirements analysis presented in Chapter 4, existing GA facilities will not meet the forecast increase in demand from based and itinerant aircraft by the end of the 20-year planning period. Expansion of GA facilities (hangars, tie-downs, apron, and taxilanes) is needed and expected to be needed within the next 20 years to meet forecast growth.

Table 5-8 presents a summary of the GA facility area requirements incrementally through the planning period. Although apron space is sufficient for the overall planning period, additional hangar space may be needed in PAL 1 and beyond; however, hangar space should only be built when demand warrants. Approximately 3 additional acres of hangars may be required at the end of PAL 3. To meet this objective, three areas were identified on airport property for GA development.

Table 5-8. General Aviation Space Requirement Summary

	PAL 1	**PAL 2**	**PAL 3**
		Acres	
Total Apron Space Requirement	107,000 (2.46 acres)	109,500 (2.52 acres)	132,500 (3.04 acres)
Total Existing Apron Space	431,000 (9.9 acres)	431,000 (9.9 acres)	431,000 (9.9 acres)
Excess/Deficiency	324,000 (7.44 acres)	321,500 (7.38 acres)	298,500 (6.86 acres)
Total Hangar Space Requirement	201,500 (4.62 acres)	206,000 (4.73 acres)	223,000 (5.12 acres)
Total Existing Hangar Space	100,000 (2.30 acres)	100,000 (2.30 acres)	100,000 (2.30 acres)
Excess/Deficiency	-101,500 (-2.32 acres)	-106,000 (-2.43 acres)	-123,000 (-3.02 acres)
Total GA Space Requirement	308,500 (7.08 acres)	315,500 (7.25 acres)	355,500 (8.16 acres)
Total Existing GA Space	531,000 (12.2 acres)	531,000 (12.2 acres)	531,000 (12.2 acres)
Excess/Deficiency	222,500 (5.12 acres)	203,500 (4.95 acres)	175,500 (4.04 acres)

Figure 5-11 depicts three potential GA areas. The first area, Site A, is located along Taxiway A, in immediate proximity with the existing FBOs and GA facilities. This site is approximately 11.8 acres and has good automobile and aircraft access. Site A could be developed to meet the demand of based and/or itinerant aircraft in the short term.

The second developable area, Site B, is located along the North Ramp. Site B is approximately 15 acres. Portions of the site, approximately 3.5 acres, are within the 35-foot Building Restriction Line, and hangar height and apron would have to be limited to avoid becoming obstruction to air navigation. This area also has good automobile and aircraft access.

The third area, Site C, is located north of Taxiway H and is approximately 70 acres. This area has mainly good access, although it would need to be improved to reach all areas. Although there are no immediate needs to develop this area, it offers a greenfield that could be partially developed to accommodate long-term demand and could be a mixed use of cargo and GA.

A No Action option was not considered for further analysis. A No Action option does not meet the needs of nor supports future facility and aviation demand requirements.

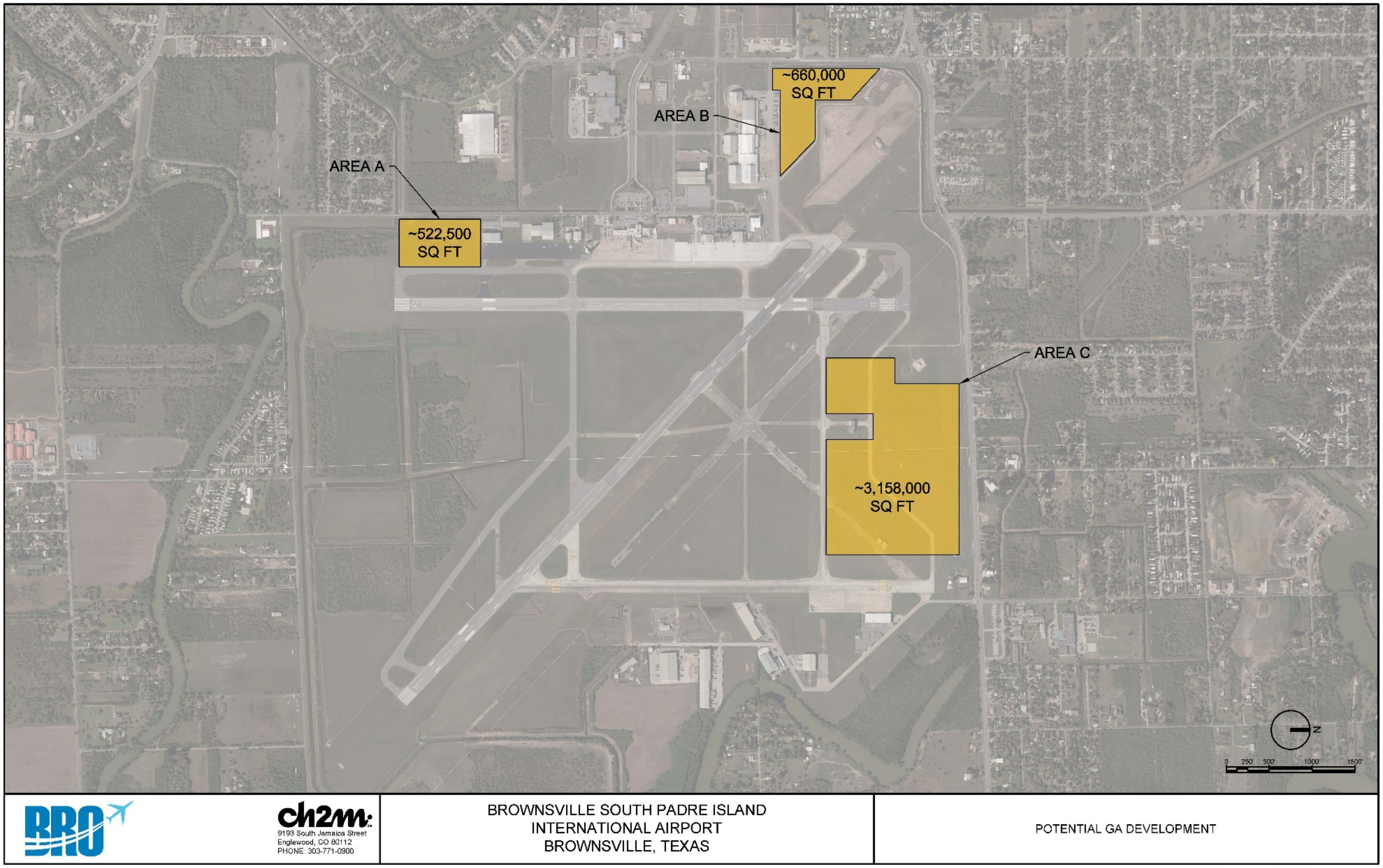

Figure 5-11. Potential General Aviation Development Areas

5.6.1 Alternative 1A

Alternative 1A mainly includes hangar space, as it is the main need of the airport, with apron space in front of the hangars. It is designed for a mix of small GA aircraft and larger business jets and turboprop aircraft. Alternative 1A is located along Taxiway B; no taxiway extension would be needed, but additional taxilanes would be required to reach this area. Alternative 1A assumes a mix of itinerant and based aircraft using this area and includes large corporate hangars, similar to the existing hangars used by the FBOs. Table 5-9 lists the key design elements of Alternative 1A; Figure 5-12 depicts this alternative.

Table 5-9. General Aviation Alternative 1A: Key Design Elements

	General Aviation Alternative 1A
Use	Mixed use for itinerant and based aircraft
Design Criteria	ADG II
Hangar Count	Six 10,000-ft^2 corporate hangars One 20,000-ft^2 corporate hangar
Apron Size	Three 41,400-ft^2 apron One 12,100-ft^2 apron
Remarks	No impact to existing facilities Requires three new taxilanes to access the area Can be easily phased to satisfy demand as needed

ADG = Airplane Design Group
ft^2 = square foot

5.6.2 Alternative 2A

Alternative 2A is very similar to Alternative 1 A. It also located along Taxiway B and would also requires new taxilanes to reach this area. It offers both apron and hangar space. However, Alternative 2A includes larger corporate hangars. Table 5-10 lists the key design elements of Alternative 2A; Figure 5-13 depicts this alternative.

Table 5-10. General Aviation Alternative 2A: Key Design Elements

	General Aviation Alternative 2A
Use	Mixed use for itinerant and based aircraft
Design Criteria	ADG II
Hangar Count	Five 20,000-ft^2 corporate hangar
Apron Size	Two 41,400-ft^2 apron One 12,100-ft^2 apron
Remarks	No impact to existing facilities Requires two new taxilanes to access the area Can be easily phased to satisfy demand as needed

5.6.3 Alternative 3A

Alternative 3A is also located along Taxiway B. It includes a large pavement area in front of four corporate hangars. Hangars are pushed back compared to the existing hangar line to provide sufficient airspace clearance with the Part 77 transitional surface for aircraft parking in front of the hangars.   5-11 lists the key design elements of Alternative 3A; Figure 5-14 depicts this alternative.

Table 5-11. General Aviation Alternative 3A: Key Design Elements

	General Aviation Alternative 3A
Use	Mixed use for itinerant and based aircraft
Design Criteria	ADG II
Hangar Count	Five 20,000-ft^2 corporate hangar
Apron Size	One 196,500-ft^2 apron One 12,100-ft^2 apron
Remarks	No impact to existing facilities Consistent with the existing facilities Requires large initial amount of pavement and more difficult to phase than other alternatives

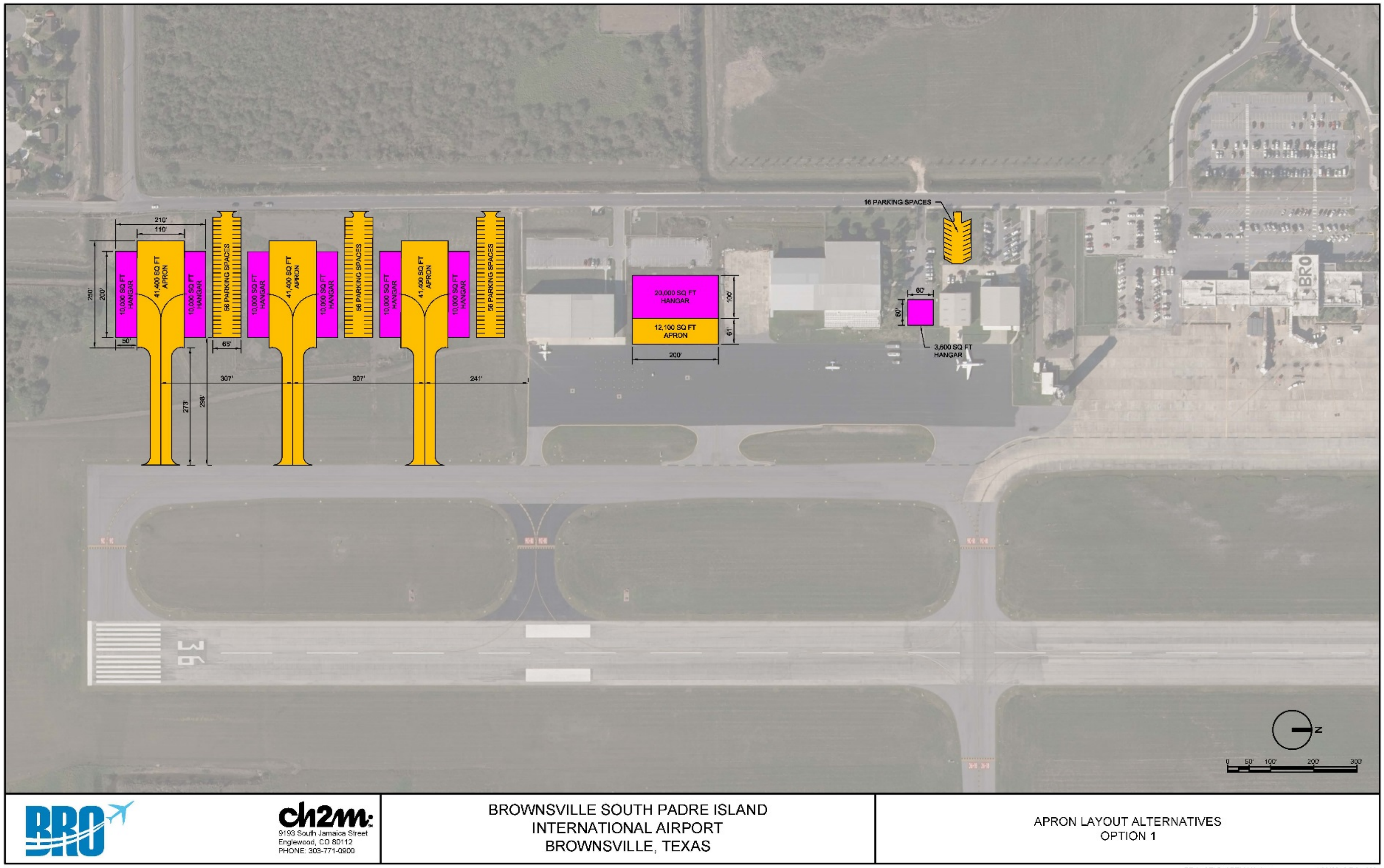

Figure 5-12. GA Alternative 1A

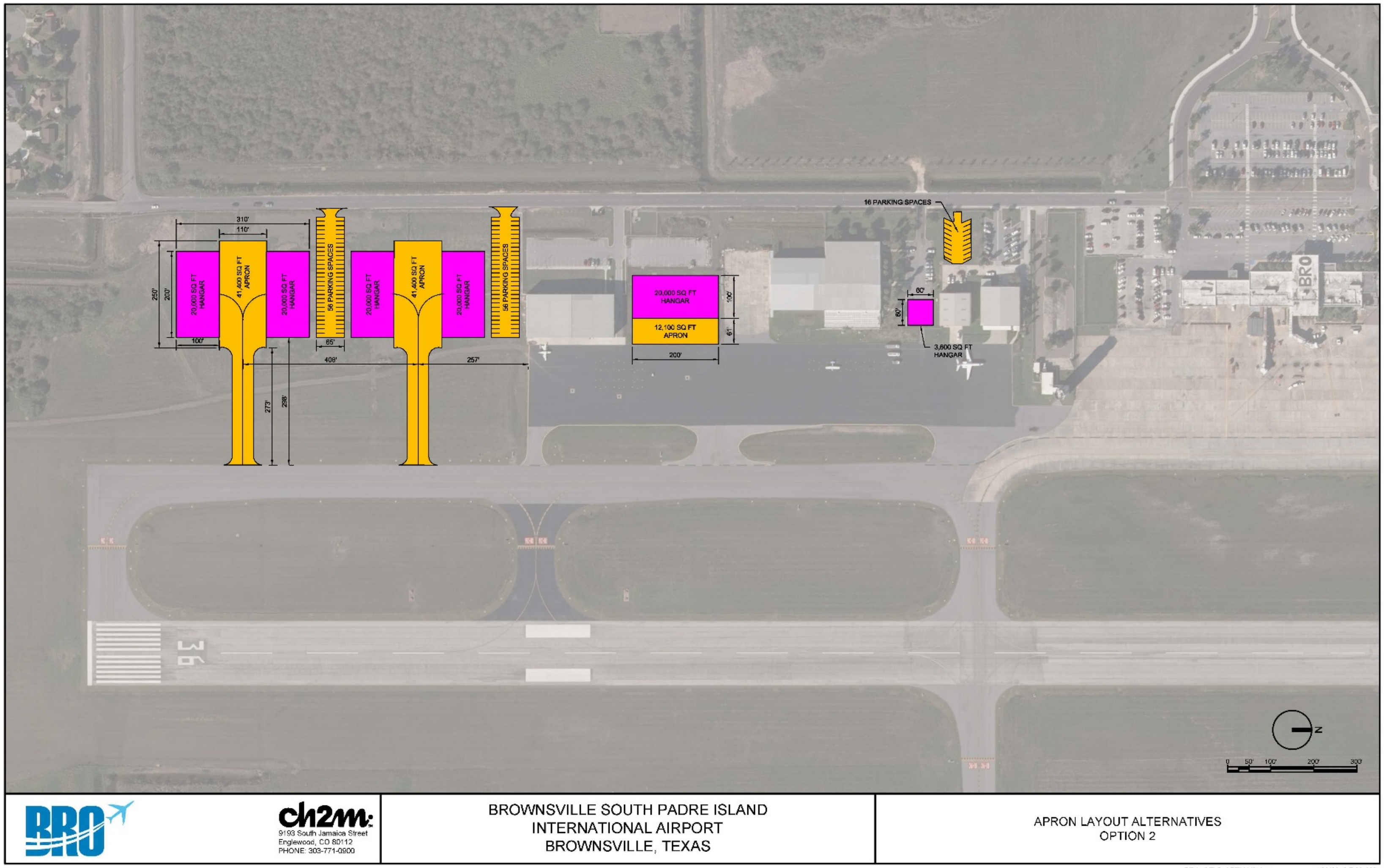

Figure 5-13. GA Alternative 2A

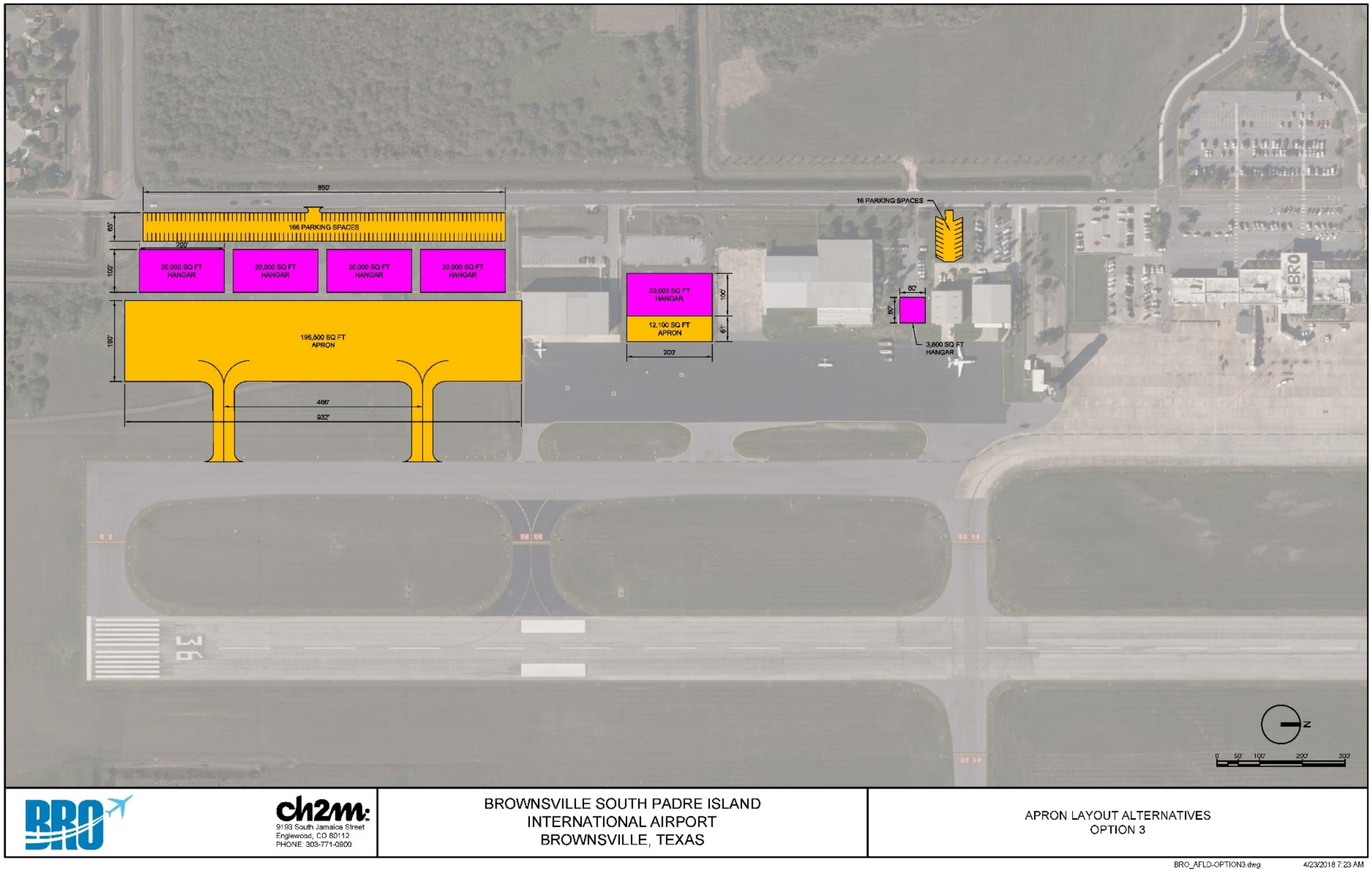

Figure 5-14. GA Alternative 3A

5.6.4 Alternative 1B

Alternative 1B is located along Iowa Avenue, in the vicinity of the Fisher Dynamics hangars. This site is geared to a maintenance, repair, and overhaul (MRO) facility with large shops and hangars. It would include two large hangars as well as an apron. This alternative would require using some of the area currently used for storage by Fisher Dynamics to create a truck turnaround area in the vicinity of Iowa Avenue. Table 5-12 lists the key design elements of Alternative 1B; Figure 5-15 depicts this alternative.

Table 5-12. General Aviation Alternative 1B: Key Design Elements

	General Aviation Alternative 1B
Use	MRO or large aircraft storage
Design Criteria	ADG III and IV
Hangar Count	Two 60,000-ft^2 hangars
Apron Size	68,000 ft^2
Remarks	Maintains the vehicle service road location Requires relocating some of the Fisher Dynamics facilities Apron is on the side of the hangars aircraft and does not provide hangar access Aircraft tugged in and out of hangars would have to be stored on the taxilane

5.6.5 Alternative 2B

Similar to Alternative 1B, Alternative 2B is located in the vicinity of the Fisher Dynamics hangars. This alternative includes two hangars larger than Alternative 1B as well as an apron, which would be located in front of the hangars, and provides more convenient access. This alternative would also require using some of the area currently used for storage by Fisher Dynamics to create a truck turnaround area in the vicinity of Iowa Avenue. Alternative 2B also requires relocating the Vehicle Service Road. Table 5-13 lists the key design elements of Alternative 2B; Figure 5-16 depicts this alternative.

Table 5-13. General Aviation Alternative 2B: Key Design Elements

	General Aviation Alternative 2B
Use	MRO or large aircraft storage
Design Criteria	ADG III and IV
Hangar Count	One 160,000-ft^2 hangar One 150,000-ft^2 hangar
Apron Size	190,000 ft^2
Remarks	Requires relocating the Vehicle Service Road Location Requires relocating some of the Fisher Dynamics facilities Maintains aircraft outside the taxilane

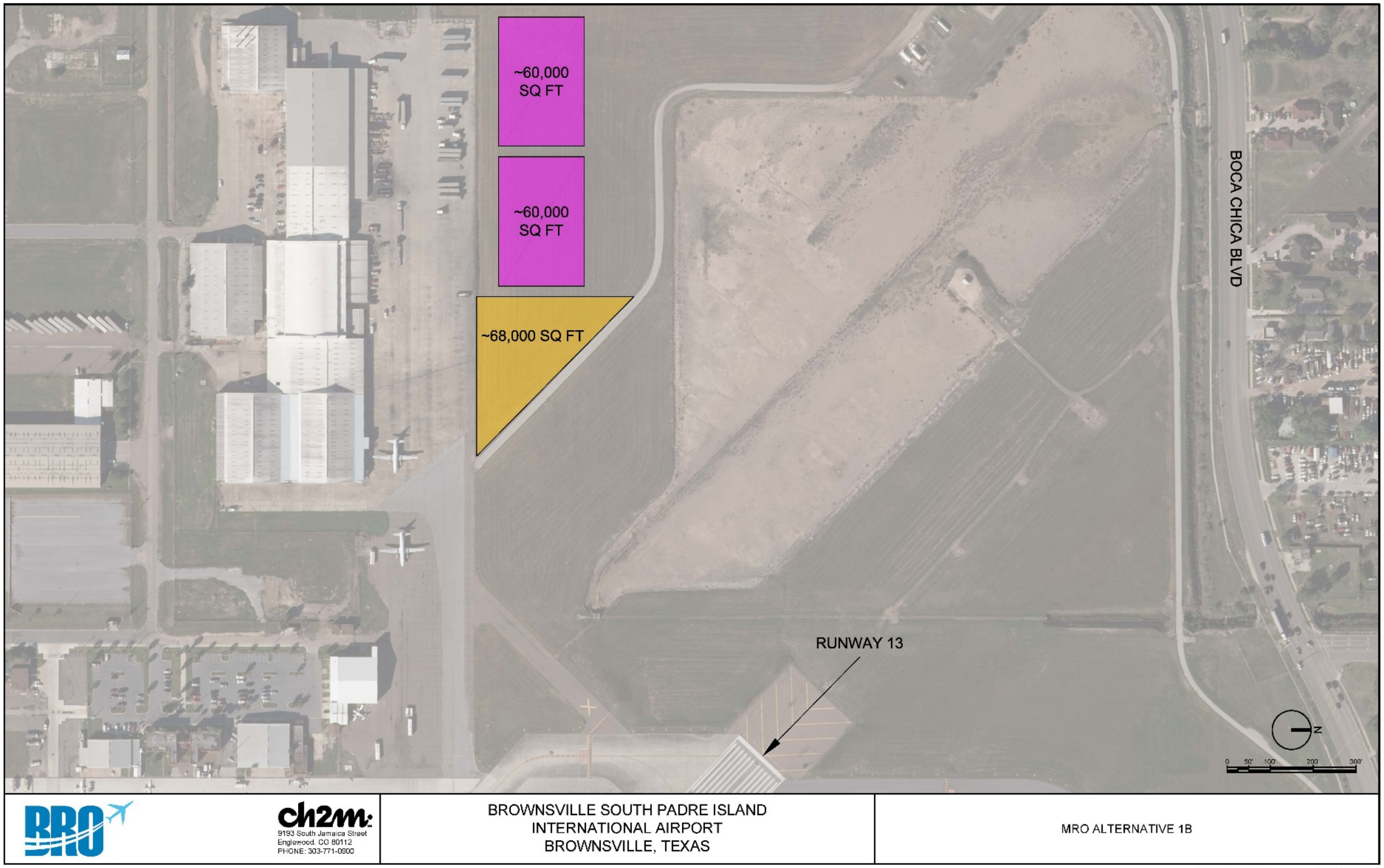

Figure 5-15. GA Alternative 1A

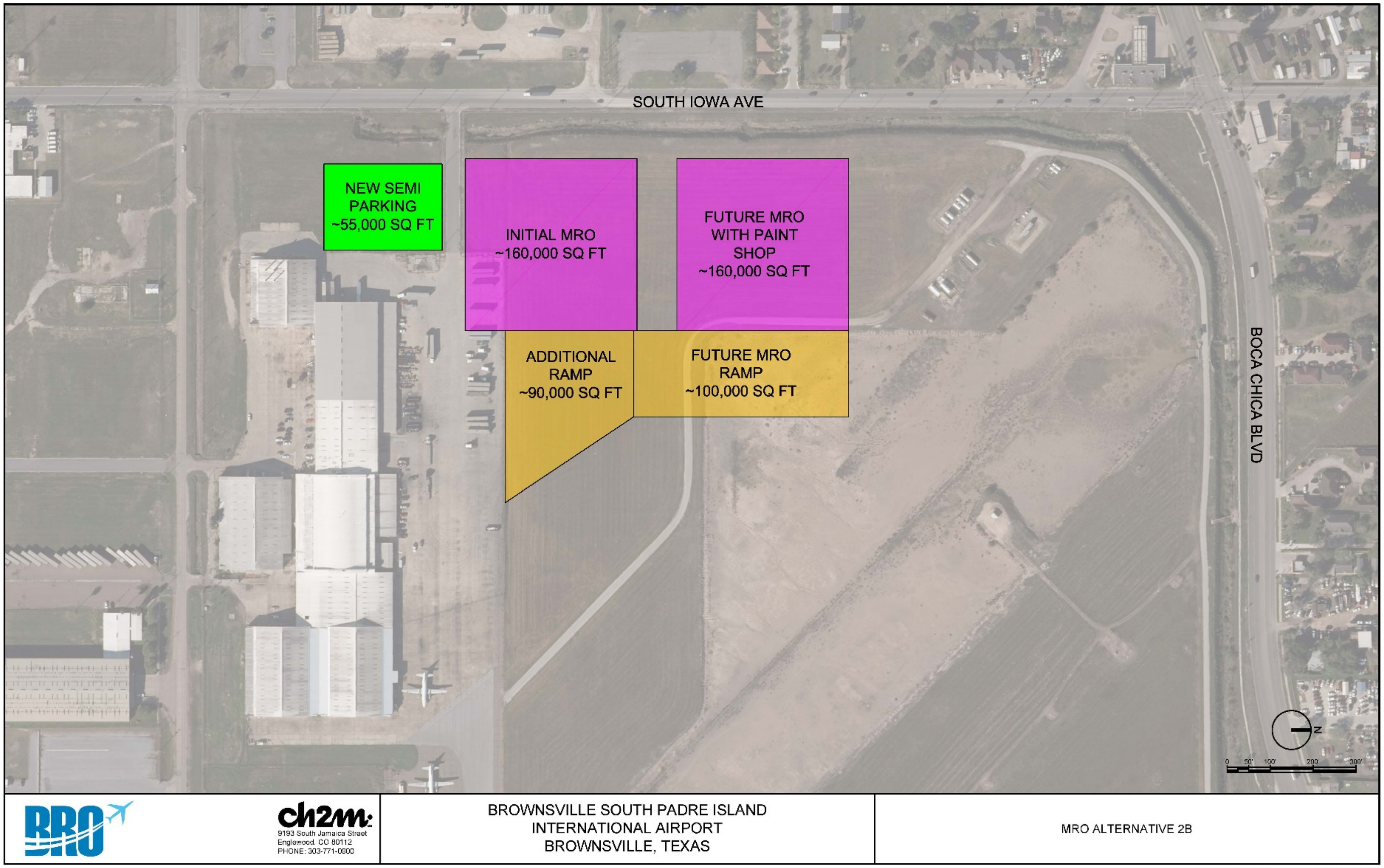

Figure 5-16. GA Alternative 2B

5.6.6 Alternative 1C

Site C, located north of Taxiway H, is approximately 70 acres. There is no immediate need for this area to be developed; however, preliminary ultimate development was considered. Development should be refined, and this area should only be developed when demand warrants. Site C could accommodate long-term demand and could be a mixed use of cargo and GA. Table 5-14 lists the key design elements of Alternative 1C; Figure 5-17 depicts this alternative.

Table 5-141. General Aviation Alternative 1C: Key Design Elements

	General Aviation Alternative 1C
Use	Preliminary development only for land use protection
Design Criteria	Mix of ADG II and III for the GA depending on demand
Hangar Count	Needs refinement when demand warrants
Apron Size	Needs refinement when demand warrants
Remarks	Requires new roadway to access the area Requires utilities improvements

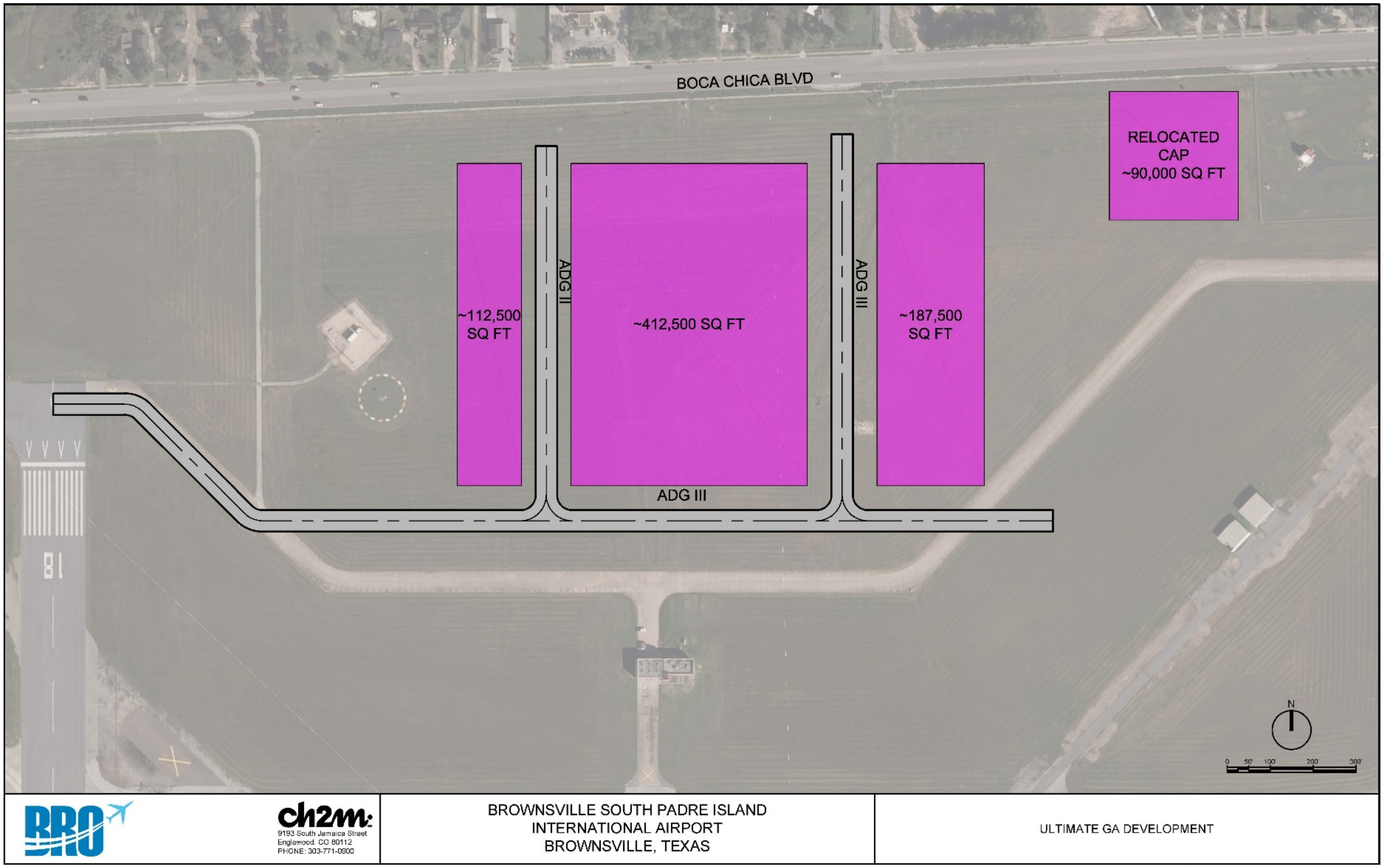

Figure 5-17. GA Alternative 1C

5.6.7 General Aviation Alternative Summary

Table 5-15 presents the basic elements of the GA alternatives. After discussion with the airport, the preferred alternatives are Alternative 2A, because it offers the most hangar space with the least amount of additional pavement, Alternative 2B because it allows for aircraft parking and larger hangars, and Alternative 1C, which will be used as a placeholder on the ALP.

Table 5-15. General Aviation Alternatives: Key Design Elements

GA Alternative 1A	GA Alternative 2A	GA Alternative 3A
Six 10,000-ft^2 corporate hangar One 20,000-ft^2 corporate hangar	Five 20,000-ft^2 corporate hangar	Five 20,000-ft^2 corporate hangar
Three 41,400-ft^2 apron One 12,100-ft^2 apron	Two 41,400-ft^2 apron One 12,100-ft^2 apron	One 196,500-ft^2 apron One 12,100-ft^2 apron
No impact to existing facilities Requires three new taxilanes to access the area Can be easily phased to answer demand as needed	No impact to existing facilities Requires two new taxilanes to access the area Can be easily phased to answer demand as needed	No impact to existing facilities Consistent with the existing facilities Requires large initial amount of pavement and more difficult to phase
GA Alternative 1B	**GA Alternative 2B**	
Two 60,000-ft^2 hangars	One 160,000-ft^2 hangar One 150,000-ft^2 hangar	
68,000 ft^2	190,000 ft^2	
Maintains the Vehicle Service Road Location Requires relocating some of the Fisher Dynamics facilities Apron is on the side of the hangars aircraft and does not provide hangar access Aircraft tugged in and out of hangars would be on the taxilane	Requires relocating the Vehicle Service Road Location Requires relocating some of the Fisher Dynamics facilities Maintains aircraft outside the taxilane	
GA Alternative 1C		
Needs refinement when demand warrants		
Needs refinement when demand warrants		
Requires new roadway to access the area Requires utilities improvements		

5.7 Shadeports

BRO has been recently approached to build shadeports to store small GA aircraft, such as Cessna 172. Several alternatives have been evaluated for this use: near the existing FBO/hangar area, near the CAP and airport maintenance area, and near the aircraft rescue and firefighting station.

5.7.1 Shadeport 1

The first area identified for Shadeport 1 is near the existing Hunt Pan Am facilities, along the North Ramp. This site allows for 14 hangars to be installed. Figure 5-18 depicts this alternative. It would prevent larger (ADG IV) aircraft from turning from the North Ramp into the adjacent taxilane under their own power but would provide protection for up to ADG III aircraft; larger aircraft could still be tugged in and out in this area.

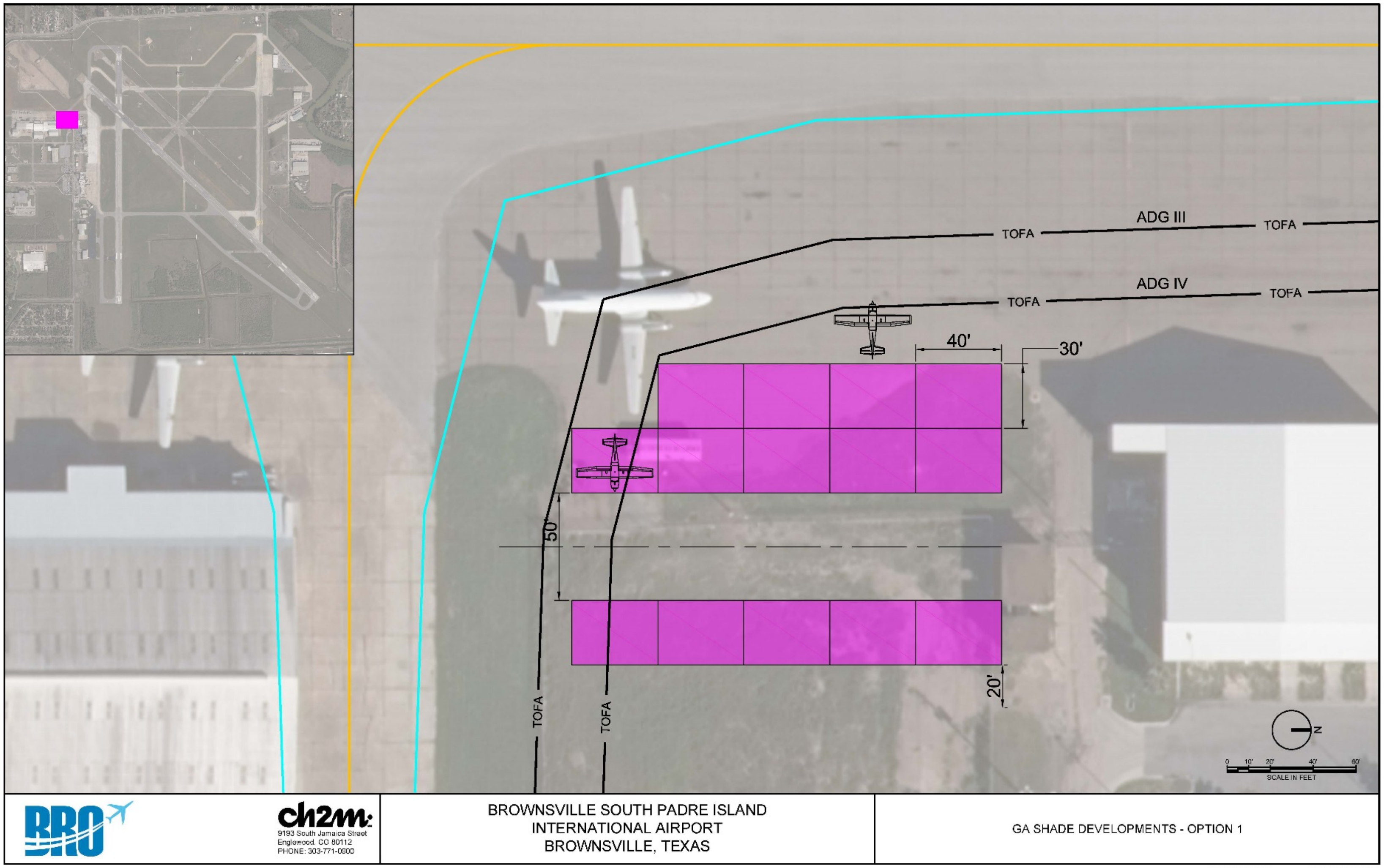

Figure 5-18. Shadeport Alternative 1

5.7.2 Shadeport 2

The second area identified for shadeports is on the eastern side of the airport, near the CAP facilities. Several options were developed for this area as depicted on Figures 5-19 and 5-20. The option requiring the least pavement would be to locate the shadeports along Taxiway G. Several locations would be possible, including abeam the CAP and abeam the airport maintenance hangar. This area would be suitable in the short term but would require relocation in the long term, as it is a prime area for cargo development with airside access.

5.7.3 Shadeport 3

The third area identified for shadeports is north of Taxiway H near the existing aircraft rescue and firefighting station. This area would require the most initial investment with additional pavement and utilities needed. Figure 5-21 depicts this alternative.

5.8 ICE Parking

ICE Air Operations are an important activity at BRO and use large commercial aircraft such as B737s and MD-80s, mainly the B737-400 and MD-83. The aircraft currently park near the FBO, and the aircraft tail is an obstruction to the transitional surface. One alternative was analyzed to park these aircraft outside the transitional surface.

Aircraft currently power in and out of their parking position, and no tug is used. In addition, two aircraft may use the airport at the same time. The alternative was designed for two aircraft entering and exiting the parking position under their own power. If tugs were to be used, the pavement could be used as a mixed-use area to store additional aircraft, including GA and business jet aircraft. The alternative is near the Hunt Pan Am FBO and the area used for ICE Operations. The apron would be approximately 210,000 square feet and could accommodate two ADG III TDG IV aircraft such as the MD-80s or B737. Figure 5-22 depicts this alternative.

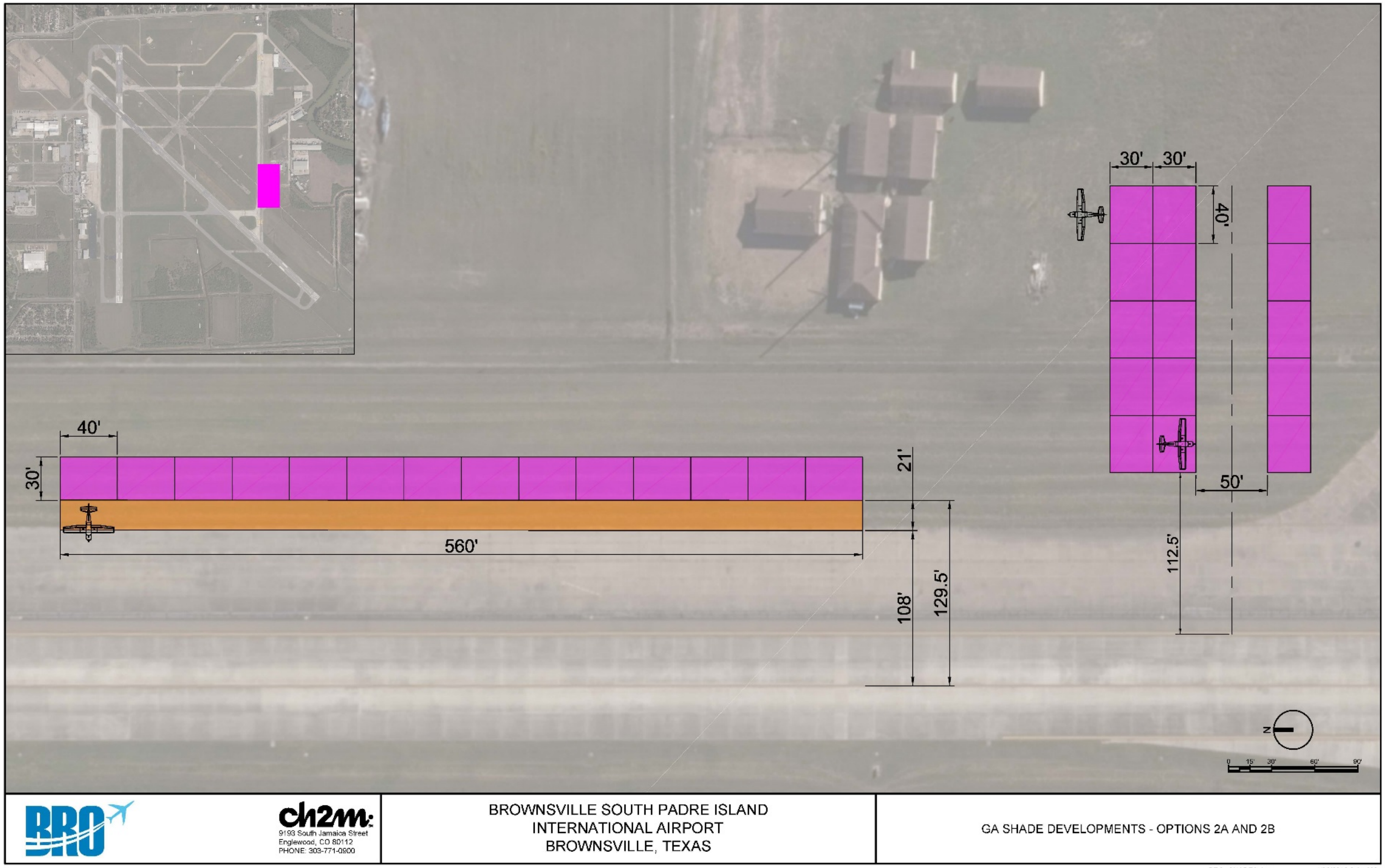

Figure 5-19. Shadeport Alternative 2

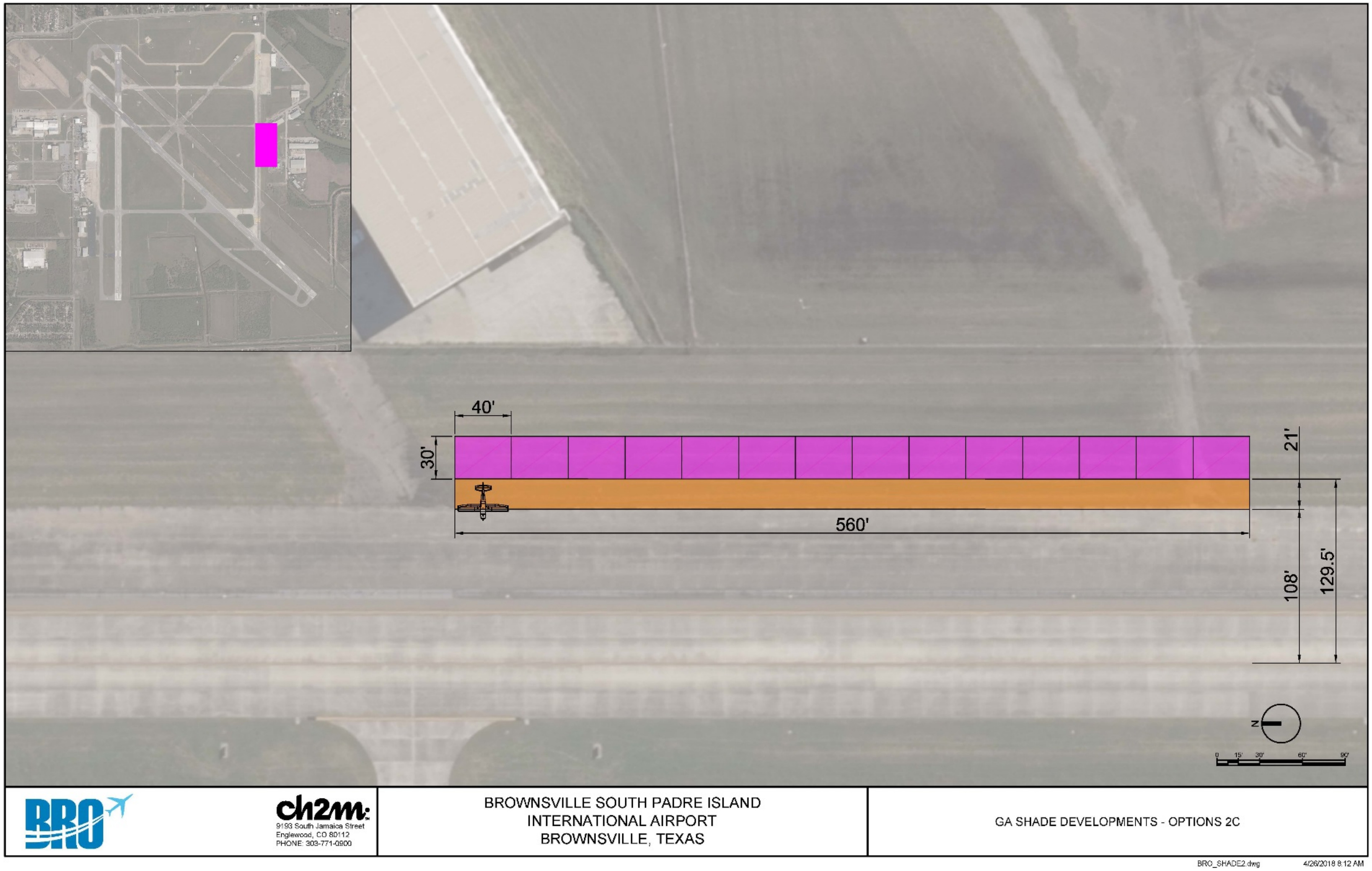

Figure 5-20. Shadeport Alternative 2b

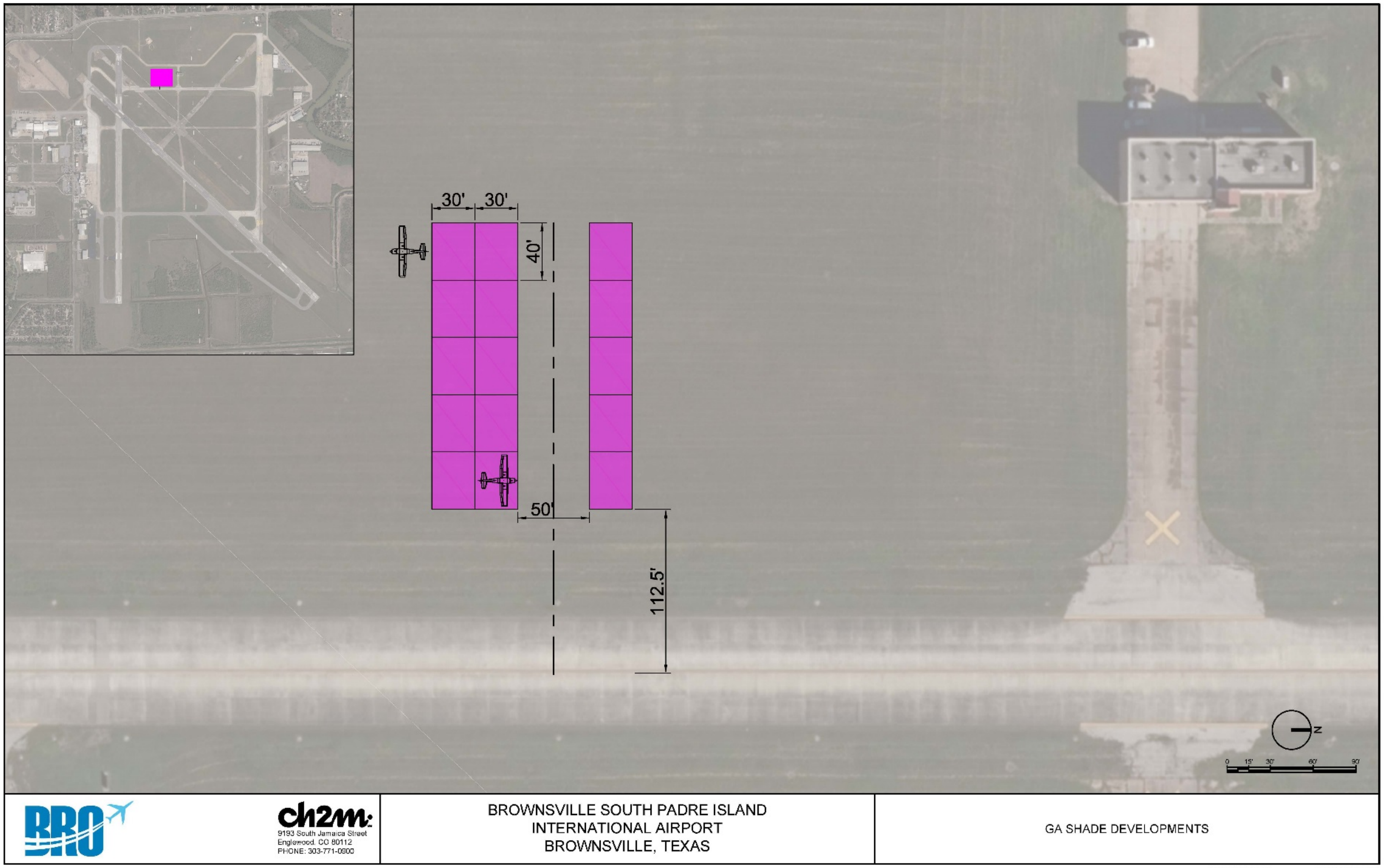

Figure 5-21. Shadeport Alternative 3

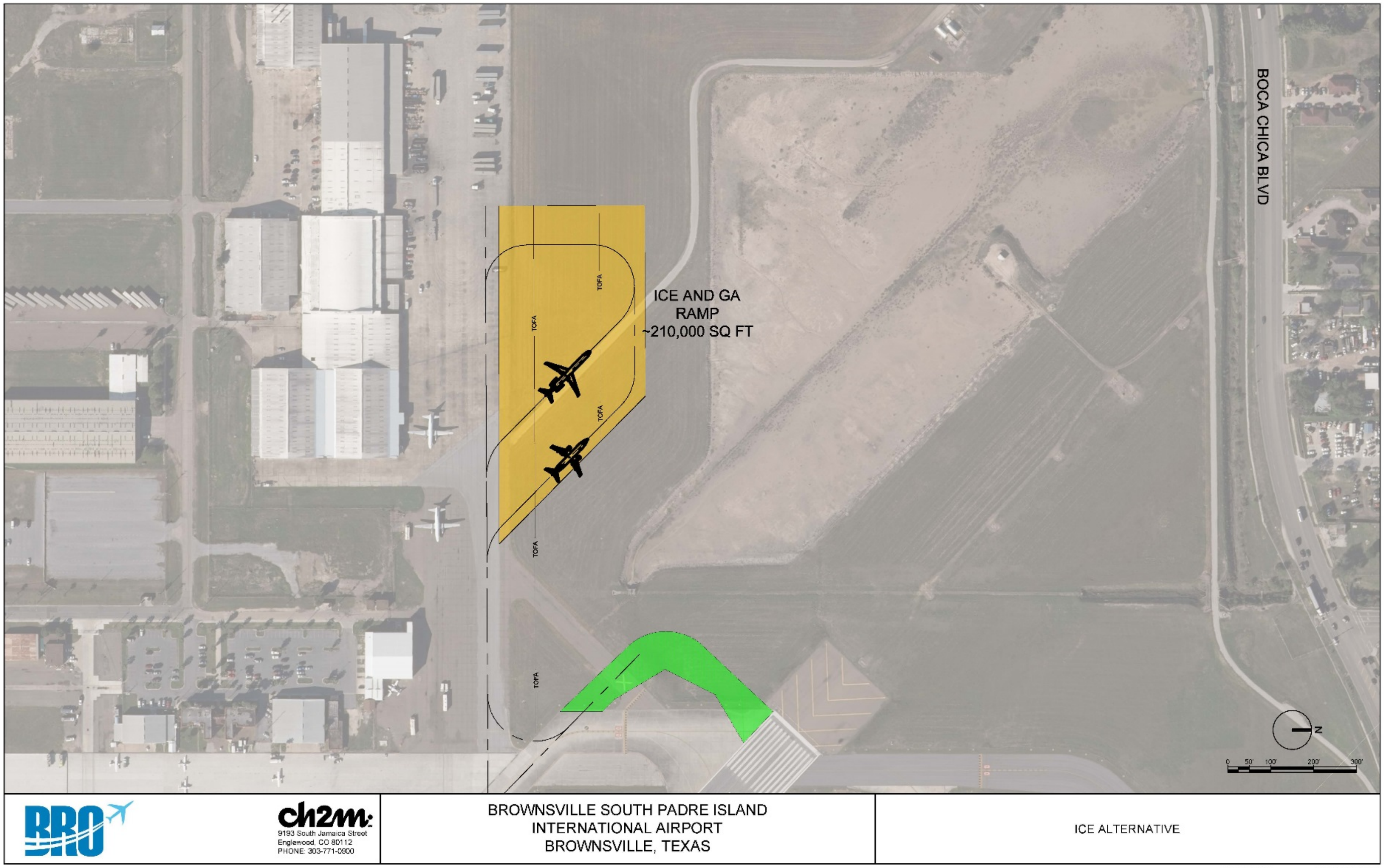

Figure 5-22. ICE Apron Alternative

DRAFT

Environmental Overview and NEPA Compliance Chapter

Prepared for

Brownsville South Padre Island International Airport

August 2019

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Contents

SECTION 6

Environmental Overview and NEPA Compliance

Airport improvement projects that receive Federal funding, including planning projects, must be assessed from an environmental standpoint. Environmental guidance and regulations that govern airport projects include the: National Environmental Protection Act (NEPA) of 1969, Airport and Airway Improvement Act of 1982, FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, and FAA Order 5050.4B, *NEPA Implementing Instructions for Airport Actions*. Additionally, the FAA 1050.1F Desk Reference provides explanatory guidance for compliance with NEPA regulations and the FAA Advisory Circular 150/5070-6B provides guidance on the preparation of Master Plans for airports.

This chapter presents the existing environment setting in the Brownsville South Padre Island International Airport vicinity. It details potential environmental impacts from the alternatives. Potential environmental impacts resulting from each alternative are briefly mentioned in each environmental category as well as anticipated environmental permitting. It also provides a brief overview on available sustainability documentation and best practices

The information contained in this Environmental Overview chapter was derived through desktop level analysis by conducting online searches of available information related to site conditions and examining previous documents completed for the airport, including the April 2015 Final Environmental Assessment (EA) for the Brownsville South Padre Island International Airport New Passenger Terminal and the May 2010 Part 150 Noise Compatibility Study. Updated city maps were reviewed for boundary information and the location of public parks. Other sources of information include:

- Environmental Data Resources, Inc. (EDR) database (hazardous materials)
- Federal Emergency Management Agency (FEMA) floodplains
- Land Water Conservation Fund database (6(f) properties)
- National Register of Historic Places (NRHP)
- Texas Parks and Wildlife Department (TPWD) Rare, Threatened, and Endangered Species of Texas (rTest) County List for Cameron County, Texas
- Texas Natural Diversity Database (TXNDD)
- U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Web Soil Survey
- U.S. Fish and Wildlife Service (USFWS) Critical Habitat Mapper
- USFWS Information, Planning, and Consultation System (IPAC)
- USFWS National Wetlands Inventory

According to FAA Advisory Circular 150/5070-6B, the evaluation of potential environmental impacts in master planning efforts should only be done to the level necessary to evaluate and compare how each alternative would involve sensitive environmental resources. The environmental resource categories examined in this chapter are from FAA Order 1050.1F and focus on those resources the alternatives are likely to affect based on the desktop level of assessment. These resources include: biological resources; climate, historical, architectural, archeological and cultural resources; section 4(f) and section 6(f) resources; farmlands; hazardous materials; noise and compatible land use; environmental justice;

floodplains; and wetlands. Known potential impacts are identified for each resource category. There is potential for additional constraints to be identified during more detailed environmental review following the Master Plan process.

The following resources listed in 1050.1F were screened out from inclusion in the Master Plan either because these resources are not present in the planning area (approximately 1 mile around the airport) or because existing conditions related to these resources are not anticipated to differentiate between alternatives: air quality, coastal resources, solid waste and pollution prevention, land use, environmental health and safety risk, natural resources and energy supply, and visual effects.

6.1 Biological Resources

6.1.1 Environmental Setting

Biological resources include fish, wildlife, plants, special status species (threatened or endangered, and species of concern), as well as environmentally sensitive or critical habitat. Las Palomas Wildlife Management Area Voshell Unit, which is operated by the Wildlife Division of Texas Parks and Wildlife, is just south of the Runway 36 end, beyond the airport boundary. In addition, three National Wildlife Refuge Lower Rio Grande Valley Units are over 1 mile south and southeast of the airport.

The following publicly available databases on special-status species (including federal- and state-listed [endangered, threatened, candidate, or proposed] species and their critical habitat), and Migratory Bird Treaty Act species were reviewed as part of this desktop analysis:

- Texas Parks and Wildlife Department (TPWD) Rare, Threatened, and Endangered Species of Texas (rTest) County List for Cameron County, Texas
- Texas Natural Diversity Database (TXNDD)
- USFWS Information, Planning, and Consultation System (IPAC)
- USFWS Critical Habitat Mapper

According to the USFWS listings of endangered, threatened, or candidate species, there are 24 listed species with a high likelihood of occurrence within the planning area, and 26 listed species with a moderate likelihood (Appendix A). This habitat determination is based on a review of aerial photography, topographic maps, and biological knowledge of the region. Habitat requirements of listed species were evaluated to determine the potential for habitat of a listed species to be present within the planning area. Critical habitat has not been identified in the planning area.

6.1.2 Potential Environmental Impacts

The airport property lacks suitable habitat for these listed species and the potential for presence of these species on the airport property is limited. However, in the event off-airport property is utilized, there would be a greater potential to impact federal- and state-listed threatened, endangered, and rare species.

Runway Alternatives 1 and 2: All physical improvements are on existing airport property. Therefore, Runway Alternatives 1 and 2 are likely to have minimal direct impacts to federal- and state- listed threatened, endangered, and rare species. Indirect impacts will depend on further analysis, especially for potential noise impacts.

Runway Alternatives 3 and 4: Runway Alternatives 3 and 4 would require physical improvements off airport property, impacting the Las Palomas Wildlife Management Area Voshell Unit, riparian and forested habitat, and aquatic resources. Therefore, there is greater potential for these alternatives to impact federal- and state-listed threatened, endangered, and rare species as compared to Runway Alternatives 1 and 2.

Preferred Runway Alternative: The Preferred Runway Alternative is a combination of Alternative 2 and 3. It would require physical improvements off airport property, impacting riparian and forested habitat, and aquatic resources. The Preferred Runway Alternative would have greater potential to impact federal- and state-listed threatened, endangered, and rare species as compared to Runway Alternatives 1 and 2, but less potential for this impact than Runway Alternatives 3 and 4 since Runway Alternatives 3 and 4 would require physical improvements within the Las Palomas Wildlife Management Area Voshell Unit. Indirect impacts would depend on further analysis, especially for potential noise impacts.

Landside, On-Airport Use, General Aviation, Shadeports, ICE Apron: All physical improvements are on airport property and therefore impacts are anticipated to minimal, similar to Runway Alternatives 1 and 2.

6.2 Climate

6.2.1 Environmental Setting

Increasing concentrations of greenhouse gasses (GHGs) in the atmosphere affect global climate. GHG emissions result from anthropogenic sources including the combustion of fossil fuels. GHGs are defined as including carbon CO2, methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6). CO2 is the most important anthropogenic GHG because it is a long-lived gas that remains in the atmosphere for up to 100 years.

Climate change is a global phenomenon that can have local impacts. Scientific measurements show that Earth's climate is warming, with concurrent impacts including warmer air temperatures, increased sea level rise, increased storm activity, and an increased intensity in precipitation events. Research has shown there is a direct correlation between fuel combustion and GHG emissions.

As described in Section 6.9, Water Resources, Brownsville South Padre Island International Airport is in an area that is at risk of flooding. Climate change increases the amount of precipitation during storms and the likelihood of a storm occurring, which will increase the flood risk at the airport. It is recommended the airport adopts a plan to prepare for the impacts from climate change.

6.2.2 Potential Environmental Impacts

All runway alternatives: Airline operations are currently conducted using regional jets; the runway alternatives would allow these to be replaced by small narrowbody aircraft. The runway alternatives could increase GHG emissions at the airport since larger aircraft, which require more fuel, would be accommodated. However, such aircraft could hold larger loads (of either cargo or people) and could be more efficient than continuing to operate under current conditions. Also, if no action is taken, the need for transportation will continue to grow with market demand either at another airport or via truck or train. These other transportation options would have GHG emissions associated with them that could be equal to or worse than GHG emissions from the runway alternatives.

Because of the high temperatures at Brownsville, none of the regional jets and narrowbody jet aircraft currently using the airport can take off at maximum takeoff weight during the summer days. The runway alternatives would allow for flights to take off with maximum weight and fewer flights would be needed during the summer months. This would increase efficiency and would be a beneficial climate impact.

Overall, operational GHG emissions from the runway alternatives are anticipated to be negligible. Specific project level environmental analysis may calculate CO2 emissions or fuel burn to document climate impacts.

All improvements would result in a short-term increase in GHG emissions from equipment during construction.

Climate change could also increase the number of flooding events at the airport. These effects are discussed in Section 6.9, Water Resources.

Landside, On-Airport Use, General Aviation, Shadeports, ICE Apron: These physical improvements would not change operational use of the airport significantly enough to increase GHG emissions. Significant operational climate impacts from these alternatives are not anticipated. All improvements would result in a short-term increase in GHG emissions from equipment during construction.

6.3 Department of Transportation Act, Section 4(f)

6.3.1 Environmental Setting

6.3.1.1 Section 4(f)

The U.S. Department of Transportation (DOT) Act of 1966, Section 4(f) protects significant publicly owned parks, recreational areas, wildlife and waterfowl refuges, and public and private historic sites. Prior to taking any federal action in relation to projects that include the use of resources protected under Section 4(f), FAA would determine that no feasible and prudent avoidance alternatives exist. There are no known historic sites in the study area that would also be considered Section 4(f) resources. Section 4(f) resources in the planning area and their approximate distances from the airport include:

- North Brownsville Little League fields (on airport property),
- Morningside Park (0.75 mile south),
- Las Palomas Wildlife Management Area Voshell Unit (directly adjacent to the south),
- National Wildlife Refuge Lower Rio Grande Valley (three units 1.1 miles southwest),
- Ruiz Park (1.1 miles west),
- Central Park (0.3 mile north),
- Cabler Park (0.6 mile northwest),
- Portway Acres Park (1 mile northwest), and
- Pedro Benavides County Park (0.7 mile east).

Section 4(f) resources are shown on Figure 6-1.

6.3.1.2 Section 6(f)

The Land and Water Conservation Funds Program provides grants to state and local governments for the acquisition and development of public outdoor recreation areas and facilities. Section 6(f) of the Land and Water Conservation Act of 1965 requires that the conversion of lands or facilities acquired with these funds be coordinated with the Department of Interior to ensure that all practical alternatives be evaluated. If there is no practical alternative to the project element that affects the resource, replacement lands of equal value would be identified. A review of the Land Water and Conservation Fund database was conducted and none of the 4(f) properties above would qualify as Section 6(f) resources. Therefore, there are no 6(f) properties on or adjacent to the airport.

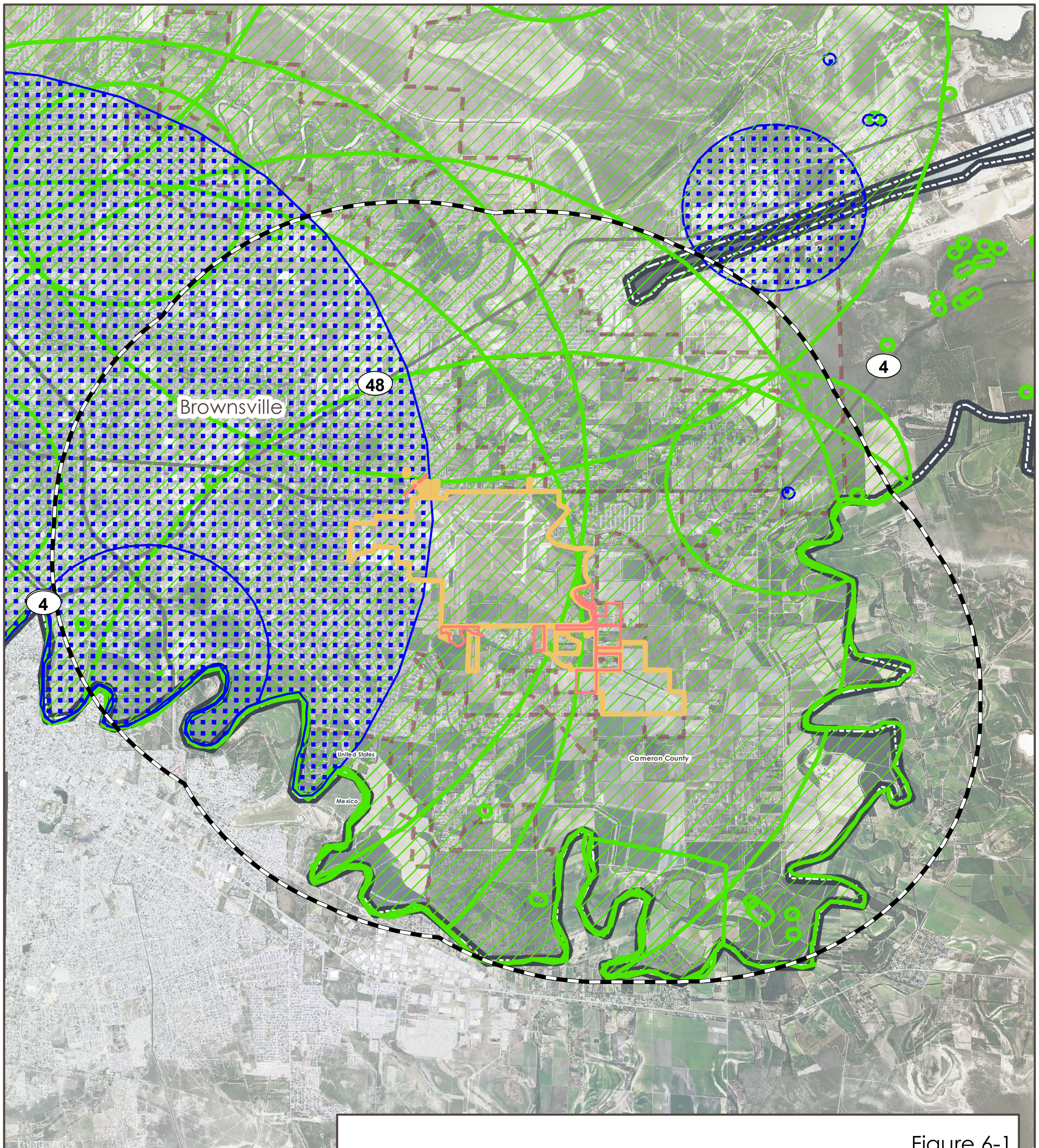

Figure 6-1

Federal and State Listed Threatened and Endangered Species
Brownsville South Padre Island International Airport
Master Plan Update

Legend

- 3-mile study area
- Potential Acquisition
- Existing Airport Boundary
- City Boundary
- County Boundary
- National Boundary

Threatened and Endangered Species
Federal or State Listing

- Endangered (Federal and State)
- Threatened (State)

0 0.5 1 2 Miles

Data Source: StratMap, TPWD

6.3.2 Potential Environmental Impacts

A significant impact under NEPA would not occur if mitigation measures eliminate or reduce the effects of the use below the threshold of significance. Some examples of potential measures to mitigate impacts to Section 4(f) properties included in FAA Order 1050.1F are:

- Changing project design to lessen the impact on the Section 4(f) property
- Replacement of land or facilities (for example, replacement of a neighborhood park)
- Monetary compensation to enhance the remaining segments of the affected Section 4(f) property
- Building noise walls or installing visual or vegetative buffers to lessen adverse impacts

Future analysis of structures within the planning area could result in the identification of resources eligible for listing on the NRHP database that would also be Section 4(f) resources.

Runway Alternatives 1 and 2: All physical improvements and easements associated with Runway Alternatives 1 and 2 are on existing airport property. Therefore, these alternatives are not anticipated to have direct impacts to Section 4(f) properties, including the Las Palomas Wildlife Management Area Voshell Unit. However, Runway Alternatives 1 and 2 could potentially result in a constructive use of the Las Palomas Wildlife Management Area Voshell Unit as a result of noise impacts. Also, Runway Alternative 1 would require roadway closures where the roadway is deemed incompatible as determined by FAA regulations. This could affect access to the North Brownsville Little League fields, which are on airport property.

Runway Alternatives 3 and 4: Runway Alternatives 3 and 4 would extend physical improvements such as Runway 36 and the RSA/ROFA into Las Palomas Wildlife Management Area Voshell Unit, which is a known 4(f) resource. In accordance with FAA Order 1050.1F, extension of the RSA into the Las Palomas Wildlife Management Area Voshell Unit would likely result in a significant impact to the Section 4(f) resource unless mitigation measures that eliminate or reduce the effects of the use are adopted such that the effects are reduced below the threshold of significance. Both Runway Alternatives 3 and 4 could also potentially result in a constructive use of the Las Palomas Wildlife Management Area Voshell Unit as a result of noise impacts.

Preferred Runway Alternative: Physical improvements and easements associated with the Preferred Runway Alternative would not directly alter any Section 4(f) properties, including the Las Palomas Wildlife Management Area Voshell Unit. Therefore, no direct impacts to Section 4(f) resources is anticipated to occur. The Preferred Runway Alternative could potentially result in a constructive use of the Las Palomas Wildlife Management Area Voshell Unit because of noise impacts. The Preferred Runway Alternative would have a similar potential for Section 4(f) impacts as Runway Alternatives 1 and 2, and less potential for Section 4(f) impacts than Runway Alternatives 3 and 4.

Landside, On-Airport Use, General Aviation, Shadeports, ICE Apron: These alternatives are located on airport property and are not anticipated to affect Section 4(f) properties including the Las Palomas Wildlife Management Area Voshell Unit or the North Brownsville Little League Fields.

6.4 Farmlands

6.4.1 Environmental Setting

Prime and unique farmlands, and farmlands of statewide or local importance are protected by federal, state and local regulations, including the Farmland Protection Policy Act (FPPA), 7 U.S.C. Chapter 73, which regulates federal actions that have the potential to convert important farmlands to non-agricultural use. Prime farmland is land having the best combination of physical and chemical characteristics for producing agricultural crops with minimal use of fuel, fertilizer, pesticides, or products. Unique farmland is land used for producing high-value or high-yield food and fiber crops (i.e., soil quality, location, growing season, and moisture).

The USDA NRCS web soil survey data was used to identify prime and unique farmlands. Much of the area in the airport vicinity is mapped by the USDA as prime farmland (see Figure 6-2); however, FPPA Section 2 (c)(1)(A) indicates that the area is exempt because the planning area is within the U.S. Census Urbanized Area for Brownsville, Texas. Prime farmland does not include land already in or committed to urban development.

6.4.2 Potential Environmental Impacts

All Runway Alternatives, Landside, On-Airport Use, General Aviation, Shadeports, ICE Apron: These alternatives would be exempt from the FPPA.

Ultimate Runway Configuration: While existing and forecast demand does not justify this extension during the 20-year planning period, it is carried forward on the Plan for consideration in the post planning period. The 12,000-foot runway extension would impact land outside the Urbanized Area on the Census Bureau Map and has the potential to impact farmlands. Although there are no short-term plans to build up to 12,000 feet, appropriate consideration of farmlands impacts will be required prior to the 12,000-foot extension. The FAA may determine whether the site of the alternative(s) is prime, unique, state, or locally important farmland using criteria provided in 7 CFR § 658.5. If the FAA does not make its own determination, the FAA may elect to initiate coordination with NRCS by completing Form AD-1006, a land evaluation and site assessment system used by NRCS to determine a rating score and establish impacts to farmlands. Per FAA Order 1050.1F, if the total score ranges between 200 and 260 points, a significant impact would occur. FAA Order 1050.1F provides that if mitigation is required for farmlands, the FAA should coordinate with NRCS and other applicable federal, state, or local regulatory agencies on appropriate measures that may include adjusting the size or location of the alternative(s) to reduce the amount of farmland taken out of production. Where local, state, tribal, or regional agencies have established a mitigation program for farmland impacts, it may be possible to provide compensation for farmland conversion through such programs.

6.4 Historical, Architectural, Archeological, and Cultural Resources

6.5.1 Environmental Setting

According to the National Register of Historic Places (NRHP) there are no known properties or potentially eligible properties in the planning area. There are several NRHP-listed properties and historic districts located approximately 3 miles to the west of the airport and one cemetery approximately 2 miles to the east. As described in FAA Order 1050.F, the FAA must identify historic properties that are either on, or eligible for listing on the NRHP as set forth in 36 CFR § 800.4(b). Since not all eligible resources are known, the FAA would carry out appropriate identification efforts (i.e., background research, consultation, oral history interviews, and field surveys).

In addition, there are no known cultural resources in the planning area. The Brownsville South Padre Island International Airport New Passenger Terminal April 2015 Final EA identified no cultural resources in the area of the airport terminal. A cultural resource investigation would be needed during the NEPA process, in the area of potential effect (APE), to determine if there are any resources eligible for listing on the NRHP.

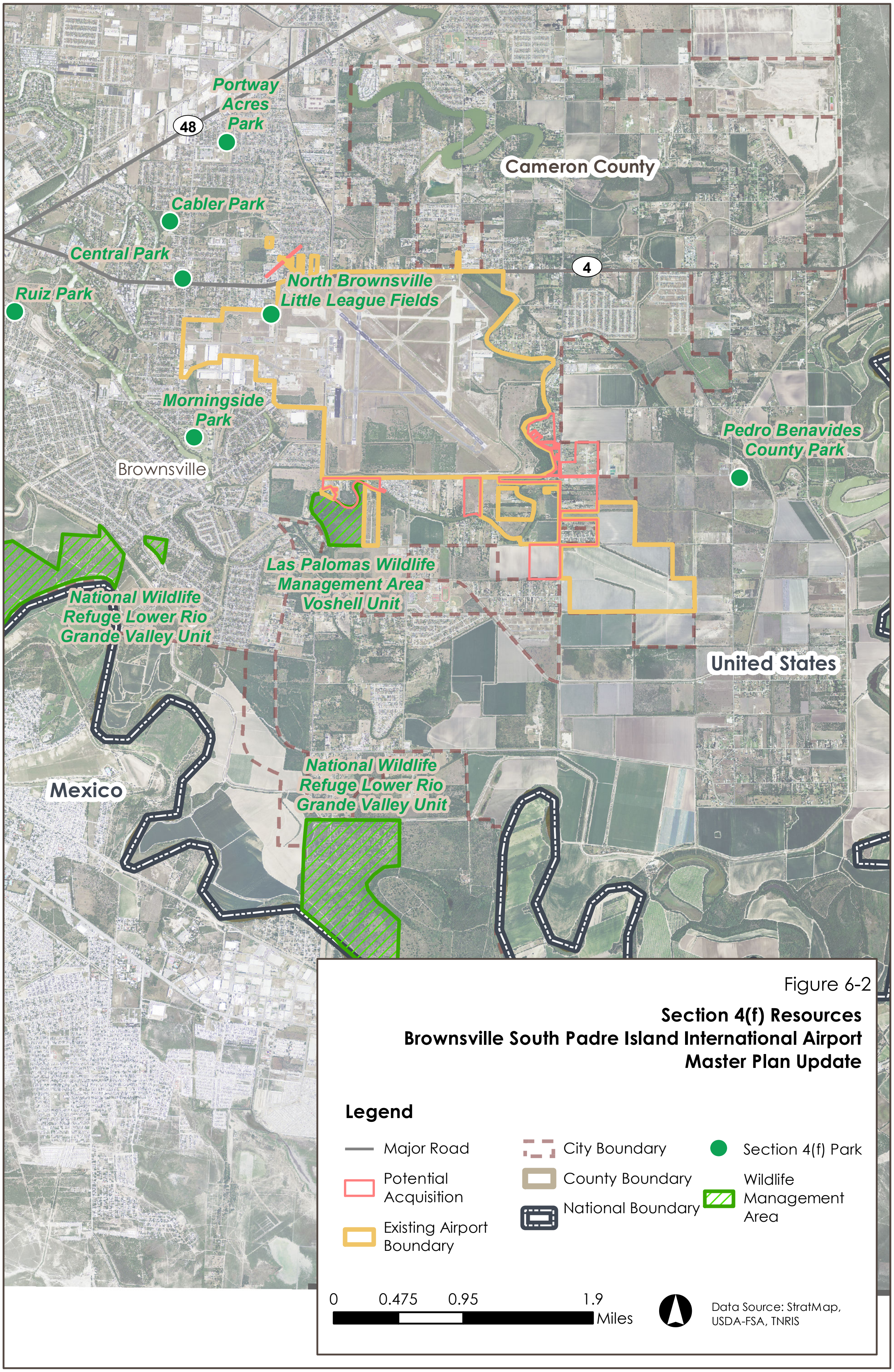

Figure 6-2

Section 4(f) Resources
Brownsville South Padre Island International Airport
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6.5.2 Potential Environmental Impacts

Development in the planning area should be considerate of any properties deemed eligible for listing on the NRHP. Further, any construction in undeveloped areas, earth-moving activities have the potential to inadvertently affect previously unidentified archeological resources.

Runway Alternatives 1 and 2: Based on desktop analysis, cultural resources are not known to exist in the project area. Therefore, cultural resources are not constraints to Runway Alternatives 1 and 2 and these alternatives are not anticipated to have direct impacts on known cultural resources. In addition, indirect effects (for example from noise and visual quality) are also not anticipated given the distance of known cultural resources from the airport property.

Preferred Runway Alternative and Runway Alternatives 3 and 4: If further examination of structures in the APE during the NEPA analysis results in the identification of NRHP-eligible resources in an area where a runway or RSA would be extended, direct impacts could occur. Indirect effects (for example from noise and visual quality) could also occur on nearby NRHP-eligible sites. Also, because these alternatives include construction in undeveloped areas, earth-moving activities have the potential to inadvertently affect previously unidentified archeological resources.

The Preferred Runway Alternative would have a greater potential to impact to historical, architectural, archeological, and cultural resources than Runway Alternatives 1 and 2, but less potential for impacts than Runway Alternatives 3 and 4. This is because the Preferred Runway Alternative would not expand the Runway 36 end but would expand the Runway 31 end and impacts are more likely to occur beyond airport property that has already been developed.

Landside, On-Airport Use, General Aviation, Shadeports, ICE Apron: Since these alternatives are on airport property where no known cultural resources exist, impacts would be anticipated to be minimal, similar to those described for Runway Alternatives 1 and 2.

6.6 Noise and Compatible Land Use

6.6.1 Environmental Setting

Federal Aviation Regulation (FAR) Part 150 provides guidance and procedures on how to evaluate noise at airports and surrounding areas and how to determine noise exposure and compatible land use. FAR Part 150 includes two main tools: Noise Exposure Maps (NEM) that depict aircraft noise contours relative to land uses in the airport vicinity, and Noise Compatibility Programs (NCP) that include proposed actions to minimize existing and future noise issues.

The FAA has established the day-night average sound level (DNL) as the measure to analyze noise around airports. The DNL is the average noise level over a 24-hour period, with the noise between the hours of 10:00 pm and 7:00 am artificially increased. The FAA considers that all uses with noise level below 65-DNL are permitted.

A noise sensitive area, as defined in FAA Order 1050.1F, is an area where noise interferes with normal activities associated with its use. Normally, noise sensitive areas include residential, educational, health, and religious structures and sites, and parks, recreational areas, areas with wilderness characteristics, wildlife refuges, and cultural and historical sites. Noise sensitive areas include such areas within the day-night average sound level (DNL) 65 decibel (dB) noise contour.

Known noise sensitive areas in the planning area include residences, churches, schools, parks and recreation areas, which are located to the north, west, and south of the airport. Noise sensitive uses in the project area are shown on Figure 6-3. The Las Palomas Wildlife Management Area Voshell Unit is located immediately to the south of the airport and two National Wildlife Refuge Lower Rio Grande Valley Units are located to the south west. Single-family residences around the airport are mostly concentrated to the north and the west.

The Part 150 Noise Compatibility Study prepared in May 2010 includes noise exposure maps for 2009 existing conditions and 2015 future conditions. The 2009 existing condition noise exposure map shows that the DNL 65 dB noise contour is within the airport property. In the 2015 future conditions, the DNL 65 dB noise contour was predicted to extend beyond the airport property and into zoned residential areas at the Runway 13 and 31 ends, primarily as a result of increased aircraft operations (URS, 2010). Preparation of an updated Part 150 Noise Compatibility Study is planned for 2019.

6.6.2 Potential Environmental Impacts

Because an updated Part 150 Noise Compatibility Study is not available, existing noise exposure around the airport is not known and it is not possible to precisely predict how or if the alternatives would affect the existing DNL 65 dB noise contour. However, the effect the alternatives would have on proximity of aircraft to noise sensitive areas can be commented on in general terms.

Runway Alternatives 1 and 2: For Runway Alternatives 1 and 2, aircraft would take off closer to the airport boundary (at all four runway ends) and consequently closer to noise sensitive areas, primarily residential areas and the Las Palomas Wildlife Management Area Voshell Unit. For Runway Alternative 1, aircraft would land further down all the runways so they would be slightly higher over noise sensitive areas than they are currently. Some buildings would need to be removed per FAA regulations. For Runway Alternative 2, there would be no change to landing aircraft.

Runway Alternatives 3 and 4: For Runway Alternative 3, there would be no change to takeoff or landing at the ends of Runway 18 and 13, where most of the noise sensitive receptors are. For Runway Alternative 4, aircraft would take off further down Runways 18 and 13 and consequently would be further from noise sensitive residential areas than currently. Aircraft would also land further down the runways so would be higher over the residential areas than currently. At the Runway 31 and 36 ends for both Runway Alternatives 3 and 4, aircraft would take off beyond existing airport boundary and consequently closer to noise sensitive areas, primarily residential areas and the Las Palomas Wildlife Management Area Voshell Unit. Additionally, aircraft landing on these runway ends would also land closer to, and lower over, these noise sensitive areas than aircraft are currently.

Preferred Runway Alternative: For Runway 18/36, aircraft would take off closer to the airport boundary (at both runway ends) and consequently closer to noise sensitive areas, primarily residential areas and the Las Palomas Wildlife Management Area Voshell Unit. There would be no change to takeoff or landing at the end of Runway 13, where most of the noise sensitive receptors are. At the Runway 31 end, aircraft would take off closer to the airport boundary and consequently closer to noise sensitive areas, primarily residential areas. Additionally, aircraft landing on these runway ends would also land closer to, and lower over, these noise sensitive areas than aircraft are currently. The Preferred Runway Alternative would have a greater potential for noise impacts than Runway Alternatives 1 and 2, but less potential for noise impacts than Runway Alternatives 3 and 4.

Landside, On-Airport Use, General Aviation, Shadeports, ICE Apron: Uses associated with these structures are anticipated to have minimal noise impacts.

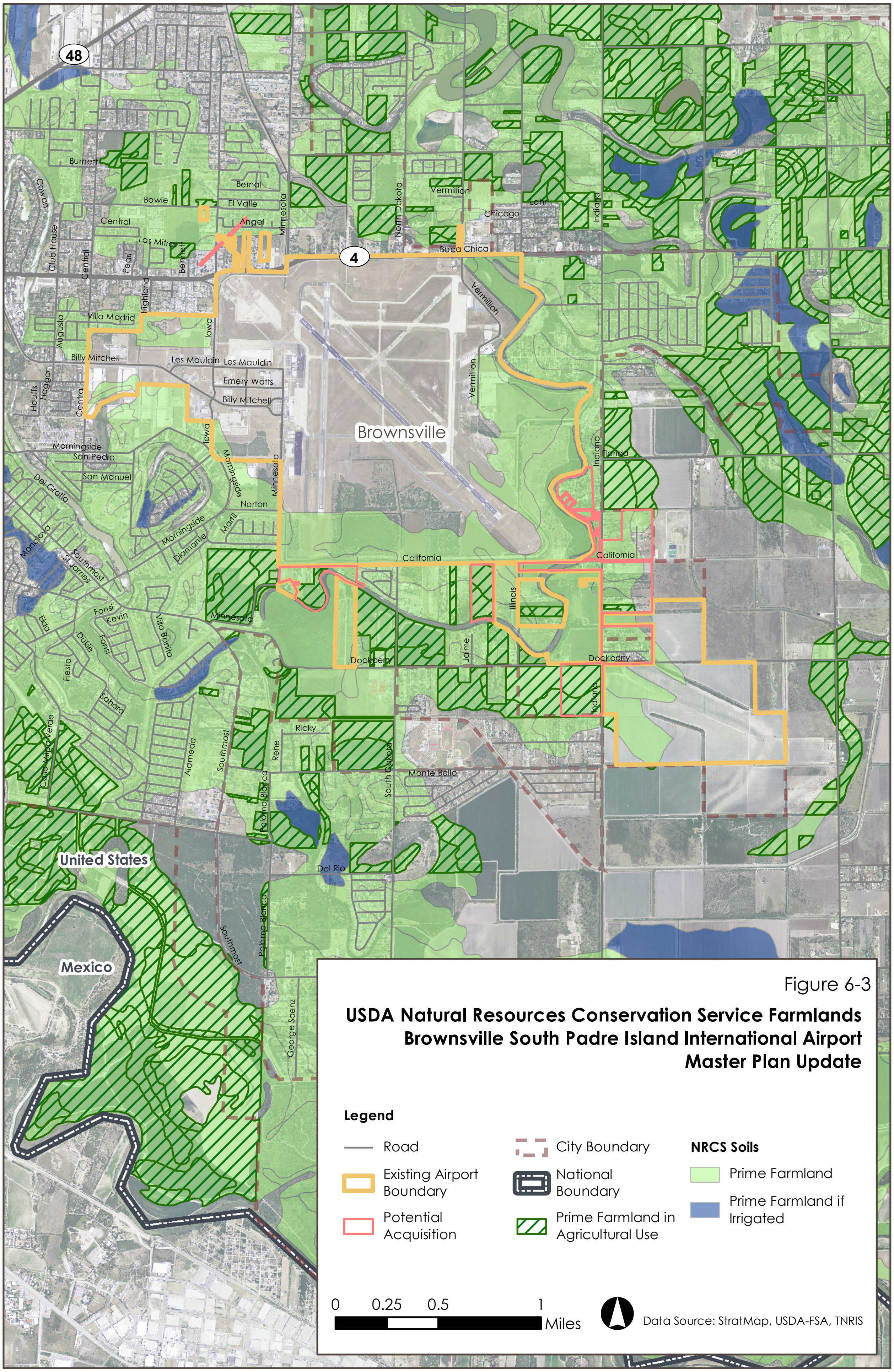

Figure 6-3

USDA Natural Resources Conservation Service Farmlands
Brownsville South Padre Island International Airport
Master Plan Update

6.7 Hazardous Materials

6.7.1 Environmental Setting

Hazardous materials require special handling and disposal. Hazardous materials are regulated under several state and federal laws. Encountering hazardous materials during construction has potential to pose risks to human health and the environment or can create control or cleanup requirements.

Information used to evaluate potential impacts of the alternative(s) has been obtained from databases maintained by the U.S. Environmental Protection Agency (EPA) and Texas Commission on Environmental Quality (TCEQ) to track sites with potential or confirmed hazardous material releases to the environment and facilities that manage hazardous materials as part of their operations. Environmental database searches for sites within the airport property and within a 1-mile search radius around the airport (as specified in the ASTM Standard Practice for Environmental Site Assessments (E 1527-13)) were conducted on November 6, 2017 (EDR, 2017a, b). The database searches identified sites within the study area that may have a record of hazardous material, substance, or waste handling or that have the potential to be contaminated or have been contaminated in the past. A summary of the findings is presented below:

- No sites with a record of hazardous material, substance, or waste handling or that have the potential to be contaminated or have been contaminated in the past have been identified within the airport property or the project area.
- A historic automobile repair shop listed as Arturos Transmissions at 15 Sarita Dr, is located about 1/8 mile southeast of the potential acquisition area at the Runway 36 end. This site is not likely to have an impact on the alternative(s) given its location across the wetland area south of the airport.
- An Underground Storage Tank (UST) site listed as Benavidez Country Store at 3100 S Indiana Avenue, is located less than 1/8 mile south of the potential acquisition area at the end of Runway 31. This site did not have documented release and is therefore not likely to have an impact on the alternative(s).
- A closed sanitary landfill listed as Brownsville Sanitary Landfill is located 1/4 to 1/2 mile southeast of the proposed acquisition area at the end of Runway 31. This landfill, closed in 1972, was reported to have accepted industrial waste although no burning has been observed.

6.7.2 Potential Environmental Impacts

Based on this desktop analysis, there would be low potential for encountering contaminated materials during construction.

6.8 Environmental Justice

6.8.1 Environmental Setting

Environmental justice is described by the EPA Office of Environmental Justice as “the fair treatment and meaningful involvement of all people, regardless of race, color, national origin or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies. Fair treatment means that no group of people including racial ethnic, or socioeconomic group should bear disproportionate share of the negative environmental effects resulting from industrial, municipal and commercial operations or the execution of Federal, State, local, and tribal programs and policies.”

According to the 2015 Final EA, high concentrations of minority and low-income populations are located in the area surrounding the airport. The low-income populations around the airport are higher than those of the City of Brownsville and Cameron County. However, the area within 0.5 mile of the airport has similar concentrations of minority populations when compared with the city and the County.

6.8.2 Potential Environmental Impacts

There is a possibility the runway alternatives may have disproportionate impacts on low-income populations, particularly as a result of land acquisition and potential noise impacts. The Landside, On-Airport Use, General Aviation, Shadeports, ICE Apron alternatives would not be anticipated to have impacts on the surrounding environment and therefore would not have disproportionate impacts to low-income populations.

6.9 Water Resources

6.9.1 Environmental Setting

6.9.1.1 Floodplains

FEMA floodplain data indicates that the central airfield area of the airport is within the 100-year floodplain where flooding reaches depths of between 1 and 3 feet. Small portions of the airport are also susceptible to floods between the 100-year and 500-year flood (see Figure 6-4). County floodplain maps confirm the FEMA data shown in Figure 6-4.

6.9.1.2 Wetlands

The USFWS NWI is a mapping database of wetland types and locations. According to the National Wetland Inventory (NWI) data, there are wetlands in and around the airport (see Figure 6-5). Freshwater emergent wetlands are located in what are likely drainage ditches on the border of the airport, just past the ends of Runways ends 13, 36, and 31. Freshwater wetlands are located in the freshwater pond at the ends of Runways 36 and 31 (outside the airport property). A jurisdictional determination would need to be completed after a formal wetland delineation to determine which resources fall under the jurisdiction of USACE.

6.9.2 Potential Environmental Impacts

6.9.2.1 Floodplains

To comply with Executive Order 11988, Floodplain Management, 42 Federal Register 26951, (May 25, 1977) and DOT Order 5650.2, Floodplain Management and Protection, and in accordance with FAA Order 1050.1F, all FAA actions must avoid floodplains if a practicable alternative exists. If no practicable alternative exists, actions in a floodplain must be designed to minimize adverse impacts to the floodplain’s natural and beneficial values.

In accordance with FAA Order 1050.1F, the extent to which the proposed action or alternative(s) could be affected by future climate conditions (based on published sources applicable to the study area) would be assessed in a subsequent environmental study. This study would include an analysis of the planning area’s ability to sustain impacts caused by climate changes. The planning area may be susceptible to flooding from increased severe weather events, such as hurricanes, or from sea level rise.

Runway Alternatives 1 and 2: The Runway 13 and 18 ends, and their respective RSAs, are within the 100-year and the 100 to 500-year floodplain. Therefore, Runway Alternatives 1 and 2 would result in floodplain encroachment. Per FAA regulations, FAA actions must avoid floodplains if a practicable alternative exists. If no practicable alternative exists, the FAA or applicant must incorporate mitigation measures to minimize potential harm to or within floodplains. These alternatives would also have to comply with all applicable local regulations relating to floodplains and a climate resiliency analysis would be completed as part of subsequent environmental review.

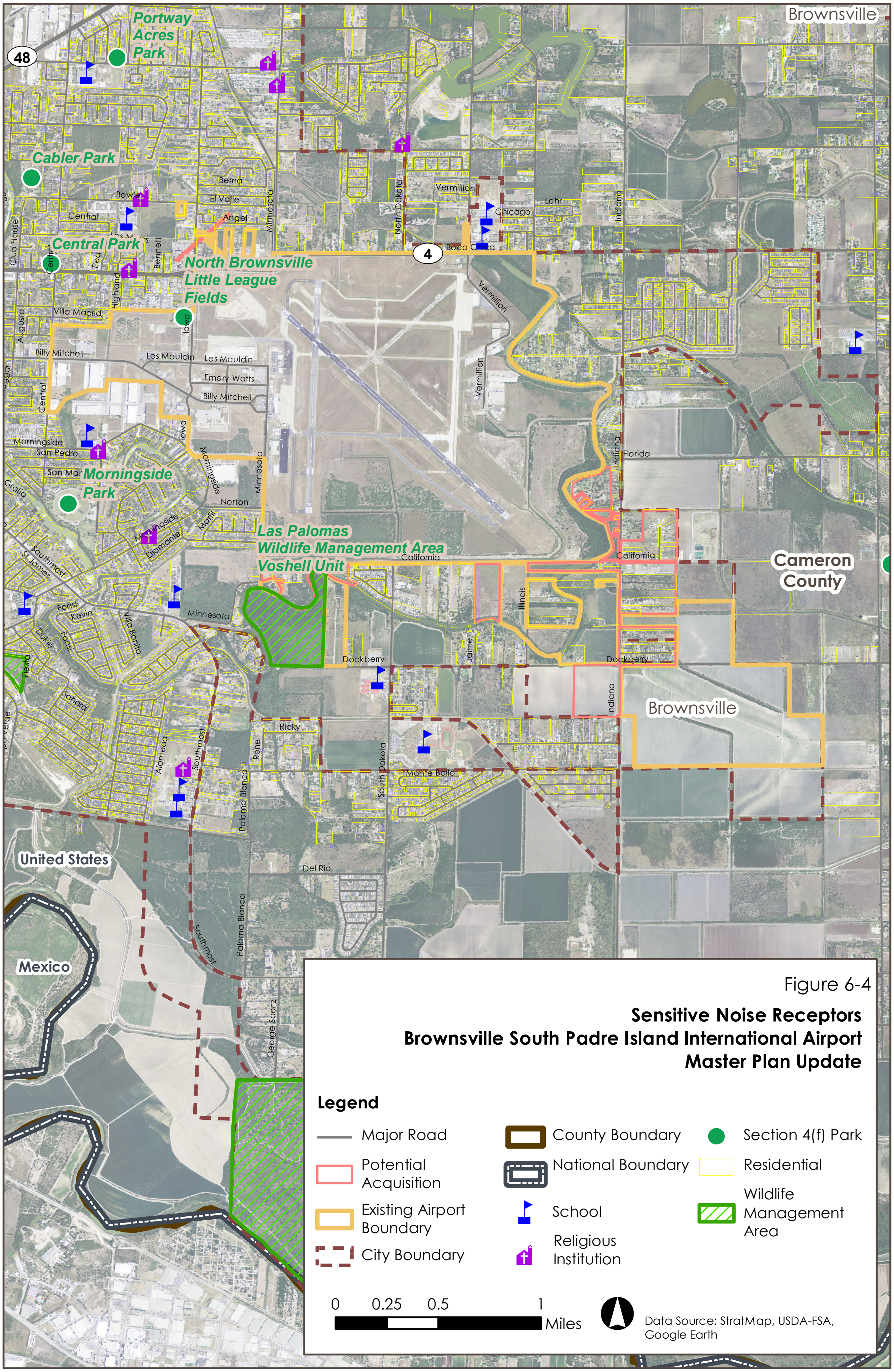

Figure 6-4

Sensitive Noise Receptors
Brownsville South Padre Island International Airport
Master Plan Update

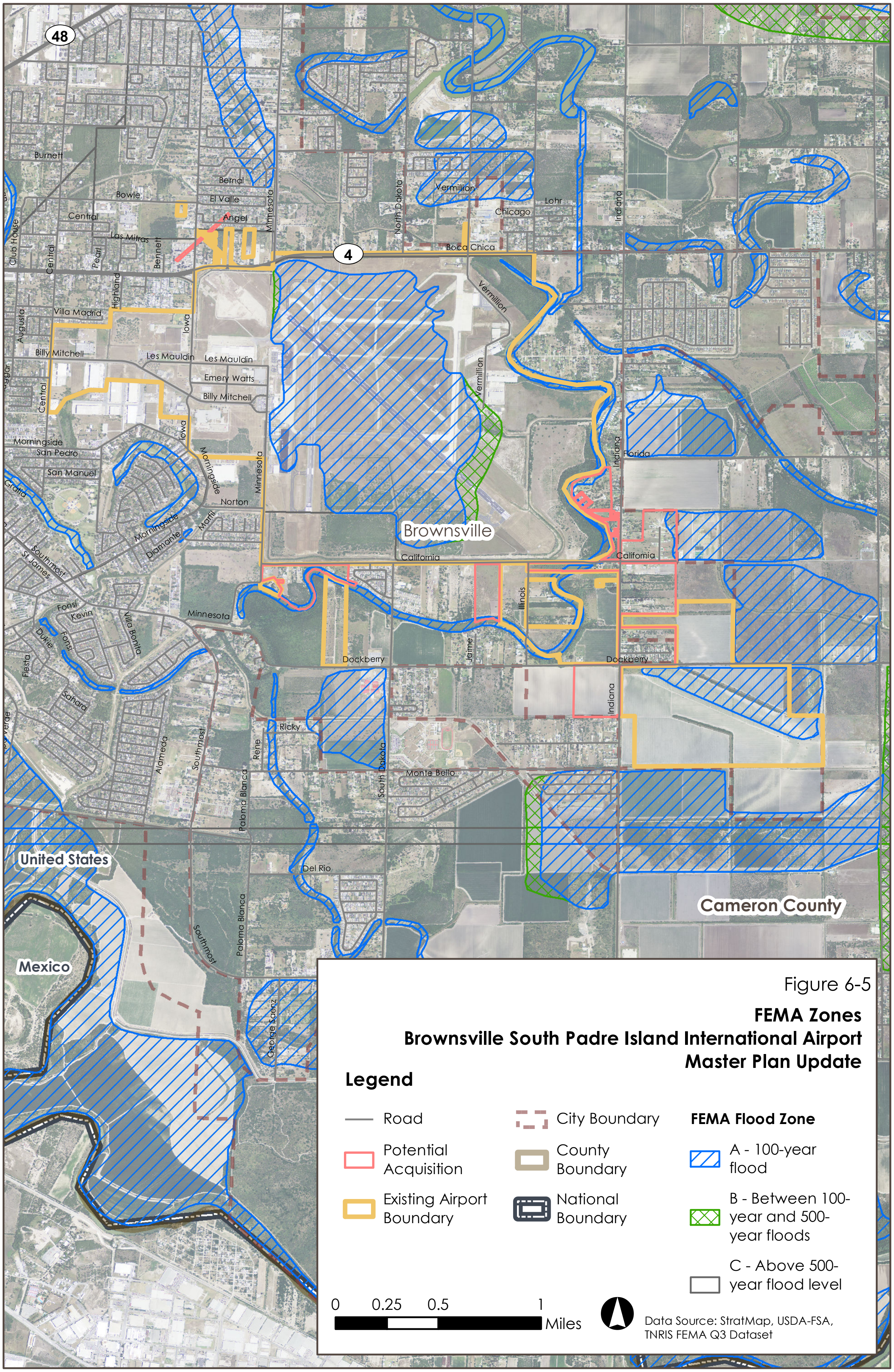

Figure 6-5

FEMA Zones
Brownsville South Padre Island International Airport
Master Plan Update

Runway Alternatives 3 and 4: Runway Alternatives 3 and 4 would extend the Runway 36 and 31 ends, and/or their respective RSAs, within the 100-year floodplain and result in floodplain encroachment. The Preferred Taxiway Configuration is also within the 100-year floodplain and would result in encroachment. Impacts, regulations and subsequential environmental analysis would be similar to those previously described for Runway Alternatives 1 and 2.

Preferred Runway Alternative: The Runway 13 end, and its respective RSA, is within the 100-year and the 100 to 500-year floodplain. The Runway 31 end, and its RSA would also be extended within the 100-year floodplain. Therefore, the Preferred Runway Alternative would result in floodplain encroachment. Impacts, regulations and subsequential environmental analysis would be similar to those previously described for Runway Alternatives 1 and 2. The Preferred Runway Alternative would have a greater potential for floodplain impacts than Runway Alternatives 1 and 2, and less potential for floodplain impacts than Runway Alternatives 3 and 4.

Landside, On-Airport Use, General Aviation, Shadeports, ICE Apron: The FTZ Alternative; Airport South Side Preferred Alternative; GA Alternatives 1A, 1C 2A, 2B, 3A; Shadeport Alternatives 1, 2A, 2B, 3; and the ICE Apron Alternative include buildings within the 100-year floodplain and/or the 100 to 500-year floodplain. Impacts, regulations and subsequential environmental analysis would be similar to those previously described for Runway Alternatives 1 and 2.

6.9.2.2 Wetlands

Federal agencies are required to avoid wetlands when a practical alternative exists. Per FAA Order 1050.1F, Executive Order 11990, Protection of Wetlands requires federal agencies to avoid to the extent possible long- and short-term adverse impacts associated with the destruction or modification of wetlands. It also requires agencies to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative.

Section 404 of the Clean Water Act (CWA) establishes a program to regulate the discharge of dredged or fill material into waters of the United States, including wetlands. Proposed activities are regulated through a permit review process. An individual permit is required for potentially significant impacts. Individual permits are reviewed by the U.S. Army Corps of Engineers (USACE). To obtain an Individual Section 404 permit for wetland fill, an applicant must demonstrate to USACE that a proposal is the least environmentally damaging practicable alternative that is available and capable of meeting the project purpose.

Runway Alternatives 1 and 2: The Runway 36 and 13 extensions are very close to freshwater emergent wetlands. Exact effects cannot be determined until wetlands are delineated and project level review is completed. Direct impacts (potentially filling) to the wetland or wetland buffer could occur. Because of the proximity of the wetland to the area of construction, temporary construction impacts (for example, from runoff or construction dust) are likely to occur.

Runway Alternatives 3 and 4: The extension of the Runway 31 and 36 ends, and the associated RSAs, would have direct adverse impacts to emergent freshwater wetlands, a freshwater pond, and their buffer areas. An area of these resources would be filled or bridged to construct the Runway 31 extension and the Runway 36 end and RSA/ROFA. Temporary construction impacts (for example, from runoff or construction dust) to these resources would also occur.

Preferred Runway Alternative: The extension of the Runway 31 end, and the associated RSA, would have direct adverse impacts to emergent freshwater wetlands, a freshwater pond, and their buffer areas. An area of these resources would be filled or bridged to construct the Runway 31 extension and RSA/ROFA. Temporary construction impacts (for example, from runoff or construction dust) to these resources would also occur. The Runway 36 extension is very close to freshwater emergent wetlands. Exact effects cannot be determined until wetlands are delineated and project level review is completed. Direct impacts (potentially filling) to the wetland or wetland buffer could occur. Because of the proximity of the wetland to the area of construction, temporary construction impacts (for example, from runoff or construction dust) are likely to occur.

The Preferred Runway Alternative would have a greater potential for wetland impacts than Runway Alternatives 1 and 2, but less potential for wetland impacts than Runway Alternatives 3 and 4.

Landside, On-Airport Use, General Aviation, Shadeports, ICE Apron: Buildings in the FTZ Alternative; Airport Westside Alternative; and the Airport Southside Preferred Alternative; Shadeport Alternatives 2A, 2B; and the ICE Apron Alternative are very close to freshwater emergent wetlands and/or freshwater ponds. Impacts would be similar to Runway Alternatives 1 and 2.

6.10 Cumulative Impacts

6.10.1 Environmental Setting

The Council on Environmental Quality (CEQ) Regulations define a cumulative impact as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions". Projects constructed at Brownsville Airport in the last 5 years and on-airport construction projects expected to occur in the next 5 years are listed in Table 6-1.

Table 6-1. Past and Reasonably Foreseeable Projects

Date	Project Name
2013	Terminal Roof Replacement and HVAC upgrade
2015	Taxiway B Rehabilitation and West Ramp Reconstruction
2015	Dual Customs Cargo Facility
2018	Benefit Cost Analysis - Runway 18/36 Extension

6.10.2 Potential Environmental Impacts

The past projects did not have significant environmental impacts and it is not expected that the reasonably foreseeable future projects would have significant environmental impacts with mitigation. Future projects include environmental review and would include mitigation when necessary. It is not foreseeable that the proposed projects for the planning period would have a permanent effect on off-airport environmental resources.

The past and reasonably foreseeable future actions are not expected to have permanent effect on the environment and environmental resources.

The potential impacts of the alternatives would be mostly be related to biological resources, and impacts to water resources, noise, water resources, and Section 4(f) resources. The projects listed above had mainly short-term construction impacts and included limited impacts off airport property. Because the past and reasonably foreseeable future projects do not have significant impacts, is not foreseeable that they would contribute to cumulative impacts.

6.11 Sustainability

According to the FAA, "airport sustainability is a broad term that encompasses a wide variety of practices applicable to planning, design, building and operating airport facilities. There are three core principles: reduce environmental impacts; help maintain high and stable levels of economic growth; and help achieve social progress to ensure organizational goals are achieved in a way that is consistent with the needs and values of the local community." The three main cores of sustainable development are environmental, social, and economic.

This section does not intend to provide an exhaustive analysis of sustainability practices at Brownsville Airport. It provides a brief and general overview of existing sustainability best practices and initiatives to improve sustainability. Resources to get started with sustainability include the Airport Cooperative Research Program's (ACRP) Sustainability Synthesis 10 Report, Airport Sustainability Practices, as well as the Sustainability Airport Guidance Alliance (SAGA) website.

The SAGA website shares information on sustainability as well as sustainability initiatives and best practices. It includes a comprehensive database with 948 sustainability practices (as of August 2018) airports can consider to start with sustainability and improve sustainability.

The SAGA website allows sorting the practices based on airport characteristics (climate and airport types), as well as on sustainability categories such as energy & climate, ground transportation, economic performance, design & materials, engagement & leadership, water & waste, natural resources, and human well-being.

It includes a wide variety of best practices such as allow passengers to receive their boarding pass via website, install motion sensors on sink faucet, install water-efficient pre-rinse spray valves, provides safe bicycle lanes and walking paths, maintain a community resource website, donate surplus food, equipment, and other goods to charity

In addition, the FAA Voluntary Airport Low Emissions (VALE) program is designed to reduce all sources of airport ground emissions and to help airports meet their state-related air quality responsibilities. At this time, the VALE program is only available to commercial service airports located in compromised air quality areas. Although BRO is not eligible at this time, the airport should monitor the program if eligibility criterion evolves or if circumstances and conditions changes at the airport.

A more formal option for the airport to analyze sustainability in more depth would be through the completion of a dedicated Sustainability Management Plan (SMP). The SMP is an in-depth planning process focused on sustainability. Outcomes include development of a sustainability policy or mission statement, a baseline inventory of sustainability categories and measurable goals and initiatives to improve the airport's overall environmental, social, and economic footprint.

6.12 Summary of Environmental Impacts

The extent of potential environmental impacts would likely be less for Runway Alternatives 1 and 2 than Runway Alternatives 3 and 4 because physical construction with Runway Alternatives 1 and 2 would be limited to existing airport property. The Preferred Runway Alternative would require some improvements off airport property, but less off airport property improvements compared to Runway Alternatives 3 and 4. Consequently, the Preferred Runway Alternative would likely have less impacts to biological, historical, architectural, archeological, and cultural, noise-related, floodplain, and wetland resources than Alternatives 3 and 4, but greater impacts compared to Runway Alternatives 1 and 2. The Landside, On-Airport Use, General Aviation, Shadeport, and ICE Apron alternatives could generally have impacts related to biological resources, wetlands, and floodplains.

The summary table below compares the environmental impacts of the alternatives. A summary of the anticipated level of impact for each environmental resource category is shown. Green is used to represent no foreseeable environmental impact, yellow represents minimal environmental impact, and red represents environmental impacts which may require coordination, additional analysis and mitigation.

Table 6-2. Summary of Environmental Impact of Alternatives

	Runway Alternative 1	**Runway Alternative 2**	**Runway Alternative 3**	**Runway Alternative 4**	**Preferred Runway Alternative**	**FTZ Alternative**	**Airport West Side Alternative**	**Airport South Side Alternative**	**General Aviation Alternative 1A**	**General Aviation Alternative 1B**	**General Aviation Alternative 1C**	**General Aviation Alternative 2A**	**General Aviation Alternative 2B**	**General Aviation Alternative 3A**	**Shadeport Alternative 1**	**Shadeport Alternative 2a**	**Shadeport Alternative 2b**	**Shadeport Alternative 3**	**ICE Apron Alternative**
Biological Resources	🟡	🟡	🔴	🔴	🟡	🟡	🟡	🟡	🟡	🟡	🟡	🟡	🟡	🟡	🟡	🟡	🟡	🟡	🟡
Climate	🟡	🟡	🟡	🟡	🟡	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢
Department of Transportation Act, Section 4(f)	🟡	🟡	🔴	🔴	🟡	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢
Farmlands	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢
Historical, architectural, archeological, and cultural resources	🟢	🟢	🟡	🟡	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢
Noise and compatible land use	🔴	🔴	🔴	🔴	🔴	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢
Hazardous Materials	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢
Environmental justice,	🟡	🟡	🟡	🟡	🟡	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢
Floodplains	🔴	🔴	🔴	🔴	🔴	🔴	🟢	🔴	🔴	🟢	🔴	🔴	🔴	🔴	🔴	🔴	🔴	🔴	🔴
Wetlands	🟡	🟡	🔴	🔴	🟡	🟡	🟡	🟡	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟡	🟡	🟢	🟡
Cumulative impacts	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢

6.13 Coordination, Additional Analysis and Permitting

Permitting and coordination for the project will be determined based on the alternatives selected and on the results of project specific environmental analysis. For example, a USACE Section 404 permit may be required for wetland fill. If it is determined after further research that a historic building will be demolished or an archeological site may be impacted, coordination will be required with DAHP. If improvements are made within the existing floodplain, the project would need to be in compliance with local laws related to floodplain encroachment. Further, project-specific environmental study that will determine environmental permits and coordination include:

- An updated Part 150 Noise Compatibility Study to gauge the potential for impacts to noise sensitive areas and potential for "constructive use" of the Las Palomas Wildlife Management Area Voshell Unit Section 4(f) resource.
- A cultural resource study may be used to rule out the presence of historical or archeological resources for the selected alternatives.
- Given the potential for wetland impacts, field delineations of wetlands would verify the presence and extent of wetlands prior to preliminary design development.
- Investigate possible floodplain mitigation measures for incorporation into the design for Runway Alternatives 1 and 2 improvements at the Runway 13 and 18 ends, and for Runway Alternatives 3 and 4 Runway 31 and 36 ends, which are in a floodplain. A climate resiliency analysis would determine the airport's readiness to handle extreme weather events.
- Biological resource study for alternatives with the ability to directly or indirectly impact sensitive habitat located in the Las Palomas Wildlife Management Area Voshell Unit.
- As a first step towards the runway extension project, the airport may pursue a Project Definition Document (PDD) with onsite environmental surveys to further refine the preferred alternative. The PDD could include onsite wetland delineation, biological resources surveys, including listed species, as well as architectural and archeological surveys. This would help further refine the preferred alternative and better project and plan for potential environmental impacts. In addition, this may accelerate the subsequent environmental analysis as environmental impacts would be better known and environmental mitigations could be included early in the design phase.

Further project-specific environmental review may be an Environmental Impact Statement (EIS), EA, or a categorical exclusion, depending on which alternatives are implemented. FAA decides on the level of environmental review required.

The purpose of an EA is to determine whether a proposed action has the potential to significantly affect the human environment. It is a concise public document that briefly provides sufficient evidence and analysis for determining whether to prepare an EIS or a Finding of No Significant Impacts (FONSI). Under NEPA, the FAA must prepare an EIS for actions with significant impacts that cannot be mitigated to a less than significant level. The scale of potential impacts determines the level of NEPA analysis needed.

If funding is such that the selected Runway alternative may be constructed in phases, the improvements may not all require an EA and could potentially be categorically excluded. FAA Order 5050.4b, Section 702 includes the following as actions normally requiring an EA:

a) A normally categorically excluded action involving extraordinary circumstances

c) Land acquisition, when the acquisition is highly controversial

i) Waters or Wetlands, when a Section 404 Individual permit is required

Improvements, however, that have potential to have multiple types of impacts, including land acquisition, noise and compatible land use, Section 4(f), environmental justice, and wetlands, are more likely to be considered “extraordinary circumstances” and require an EA. Based on these potential impacts, Runway Alternatives 3 and 4 are more likely to require an EA than Runway Alternatives 1 and 2, although Runway Alternatives 1 and 2 could require an EA based on potential noise, compatible land use, Section 4(f) and environmental justice impacts. Ongoing coordination with the FAA EPS and additional field work will help to determine the appropriate class of NEPA document.

In addition, per FAA Order 5050.4b, paragraph 903, if a responsible FAA official reviews a proposed airport action and finds it is likely to cause significant impacts, the official may start the EIS process. It is possible that Runway Alternatives 1 and 2 may potentially have significant impacts to wetlands, biological resources, Section 4(f) resources, and floodplains that cannot be avoided, minimized or mitigated, thereby possibly requiring an EIS rather than an EA or a Categorical Exclusion.

The extent of potential environmental impacts would likely be less for Runway Alternatives 1 and 2 than Runway Alternatives 3 and 4 because physical construction with Runway Alternatives 1 and 2 would be limited to existing airport property. The Preferred Runway Alternative would have greater potential for environmental impacts than Runway Alternatives 1 and 2 but less potential for environmental impacts than Alternatives 3 and 4. According to FAA Order 1050.1F (paragraph 3-1.3), major runway extensions usually require an EIS. Given that Runway Alternatives 3 and 4 include major runway extensions and that there is the potential for significant impacts to biological resources, Section 4(f) resources, floodplains, and wetlands, the FAA may require an EIS for these alternatives rather than an EA. The Preferred Runway Alternative would avoid potential significant impacts to Section 4(f) resources and would avoid direct impacts to the Las Palomas Wildlife Management Area Voshell Unit. Therefore, the Preferred Runway Alternative could potentially require an EA. On-site surveys of the wetlands, biological resources, and Section 4(f) resources as referenced above would help better refine and anticipate the level of environmental analysis required.

If the Landside, On-Airport Use, General Aviation, Shadeports, and ICE Apron Alternatives are implemented separately from the Runway Alternatives, they would require a separate environmental documentation, potentially a Categorical Exclusion.

FINAL REPORT

Implementation/Phasing Plan and Cost Estimates

Prepared for

Brownsville South Padre Island International Airport

August 2019

9191 South Jamaica Street
Englewood, CO 80112
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Contents

Acronyms and Abbreviations

AC	Advisory Circular
ALP	Airport Layout Plan
ARFF	Aircraft Rescue and Fire Fighting
BRO	Brownsville South Padre Island International Airport
CIP	Capital Improvement Plan
FAA	Federal Aviation Administration

Implementation/Phasing Plan and Cost Estimates

The implementation/phasing plan and cost estimates section of the airport master plan provides a phasing plan of projects required to accommodate the identified demand, as well as rough order of magnitude costs associated with each project, to support the airport Capital Improvement Plan (CIP) process.

Financial feasibility, revenue projections, and funding strategy is addressed in Chapter 8.

Projects are prioritized into the following phases:

- Short-term projects, include projects within years 0-5 of the planning period (2018-2023)
- Mid-term projects, include projects within years 6-10 of the planning period (2024-2028)
- Long-term projects, include projects beyond 10 years of the planning period (2029-2038) as well as post-planning period projects (beyond 20 years)

An environmental review will be necessary prior to each project. The FAA will determine the level of environmental review, as well as projects that can be combined under one environmental document.

7.1 Phasing Plan

7.1.1 Project List

Recommended airport projects are phased over the 20-year planning period, based on the projected demand and facility needs.

Table 7-1 lists the recommended airport projects based on each phase. Additional details on funding sources is addressed in Chapter 8.

Projects have been classified into the following categories:

- Airfield
- Landside/Terminal Building
- General Aviation (GA)/Cargo
- Planning
- Design and Construction Management (CM)
- Operation
- Environment Analysis

Airport needs, aviation demand, and funding availability may change drastically over the course of the 20-year planning period. Timing and phasing of the preferred projects should be reviewed periodically and adjusted when appropriate.

Table 7-1. Project Listing

Year	Recommended Airport Projects	Category
Short-term projects (0-5 years)		
2018	Benefit Cost Analysis - Runway 18/36 Extension	Planning
2018	Terminal Project Phase 1 - Temporary Landside	Landside/Terminal Building
2018	Terminal Project Phase 2 - Temporary Terminal/Landside	Landside/Terminal Building
2018	Design Airfield Signage Project	Design and Construction Management (CM)
2019	Terminal Construction Phase 2- Demo / Airside	Airside & Landside/Terminal Building
2019	Environmental Analysis for Runway 18/36 Extension	Environmental analysis
2019	Design and Reconstruct Perimeter Road	Airfield
2019	Part 150 Noise Study	Planning
2019	Pavement Maintenance Plan (PCN Index)	Planning
2019	Shadeport	GA/Cargo
2020	Design Runway 18-36 - Rehabilitation and Extension	Design and Construction Management (CM)
2020	Design and Reconstruct North West Ramp	Airfield
2020	Design and Reconstruct North Ramp	Airfield
2020	Rehabilitate taxiway "F" and taxiway "A"	Airfield
2020	Airfield signage project	Airfield
2021	Environmental Analysis Future Projects	Environmental analysis
2021	Alternative 2B - General Aviation Area B Public Apron Phase 1	GA/Cargo
2021	Design and Installation of Perimeter Security Fence - Phase 1	Operation
2021	Land Acquisition	Land acquisition
2021	Rehabilitate Runway 18/36	Airfield
2021	Extend Runway 18	Airfield
2021	Extend Runway 36	Airfield
2021	Replace ARFF vehicle	Operation
2022	ARFF building design	Design and Construction Management (CM)
2022	Design and Installation of Perimeter Security Fence - Phase 2	Operation
2022	Benefit cost analysis - Runway 13/31 extension	Planning

Table 7-1. Project Listing

Year	Recommended Airport Projects	Category
Short-term projects (0-5 years)		
2023	Environmental analysis for Runway 13/31 extension	Environmental analysis
2023	Design and Rehabilitate Runway 13/31 lighting system and install PCS	Airfield
2023	Construct new ARFF facility	Operation
2023	Construct ICE / GA apron	GA/cargo
Mid-term projects (6-10 years)		
PAL 2	Runway 13/31 pavement maintenance	Airfield
PAL 2	Runway 13/31 extension	Airfield
PAL 2	Runway 13/31 bridge over Resaca	Airfield
PAL 2	Environmental Analysis for GA and cargo extension and taxiway pavement	Environmental analysis
PAL 2	Taxiway pavement rehabilitation and update to new design standards	Airfield
PAL 2	Taxiway pavement removal - unusable and abandoned pavement	Airfield
PAL 2	GA alternative 2A - General Aviation Area A public apron Phase 1	GA/Cargo
PAL 2	Cargo Area - public apron Phase 1	GA/Cargo
PAL 2	GA alternative 2B - General Aviation area B public apron Phase 2	GA/Cargo
PAL 2	Airport Master Plan Update	Planning
Long-term projects (11-20 years)		
PAL 3	Environmental analysis for GA and cargo extension and taxiway pavement	Environmental analysis
PAL 3	Alternative 2A - Public Apron Phase 2	GA/Cargo
PAL 3	Cargo area - Public Apron Phase 2	GA/Cargo
PAL 3	Taxiway pavement rehabilitation and update to new design standards	Airfield
PAL 3	Taxiway pavement removal - unusable and abandoned pavement	Airfield
Beyond 20 years		
Beyond PAL 3	GA Development - by ARFF station- public apron	GA/Cargo

7.2 Project Description

The following sections provide a brief description of each project, as well as graphic depictions of the projects based on each phase.

7.2.1 Short-Term

Short-term planning period projects are anticipated within the next 5 years. Airfield and landside projects represent the majority of the projects planned in the short-term. Figure 7-1 depicts the short-term projects.

7.2.1.1 Airfield

Airfield improvement projects are anticipated to occur throughout the short-term period. Most of the airfield projects consist of various existing facility rehabilitation and upgrade as well as pavement maintenance. Short-term airfield projects also include the rehabilitation and extension of Runway 18/36 and the reconstruction of taxiways A and F, as well as the North west and North ramp.

In addition, airfield projects also include improvements to the airfield signage as well as rehabilitation of runway 13/31 lighting system and installation of a Power Conditioning System (PCS).

7.2.1.2 Landside / Terminal Building

Landside projects in the short term include a variety of access road improvements and parking expansion linked to the new terminal building construction. Landside improvements are also projected throughout the planning period.

Landside and automobile parking improvements foreseeable in the short term are linked to the relocation of the terminal building, which includes relocation of automobile parking, improvements to the roads in the vicinity of the airport and expansion of the commercial curb. Short term terminal projects include the relocation and reconstruction of the terminal building.

7.2.1.3 GA/Cargo

GA improvement projects are projected to occur in 2019, 2021 and 2023, and include the construction of shadeports, a new general aviation apron to the north of the airport, as well as a shared-use apron for ICE and general aviation in the north apron area.

7.2.1.4 Planning

The short-term CIP includes a variety of planning projects such as a Benefit Cost Analysis for Runway 18/36 extension as well as for Runway 13/31 extension, a Part 150 Noise Study, and a pavement Maintenance Plan (PCN Index) analysis.

7.2.1.5 Environment

An environmental review will be necessary prior to each project and the FAA will determine the level of environmental review, as well as projects that can be combined under one environmental document. Placeholders were included in the short-term CIP for Runway 18/36 and Runway 13/31 extensions as well as for future general aviation projects.

7.2.1.6 Design and CM

Design and CM projects consist in the various steps necessary prior to or during construction projects, as well as feasibility studies. In the short term, it includes the design of Runway 18/36 rehabilitation and extension as well as design of the north west and north ramps and design of new perimeter security fence.

7.2.1.7 Operations

Operations projects consist mainly in the acquisition of new vehicles and equipment necessary to the day-to-day operations maintenance of the airport. In the short term, this includes the acquisition of new ARFF vehicles and construction of a new ARFF Facility, as well as installation and relocation of the perimeter security fence.

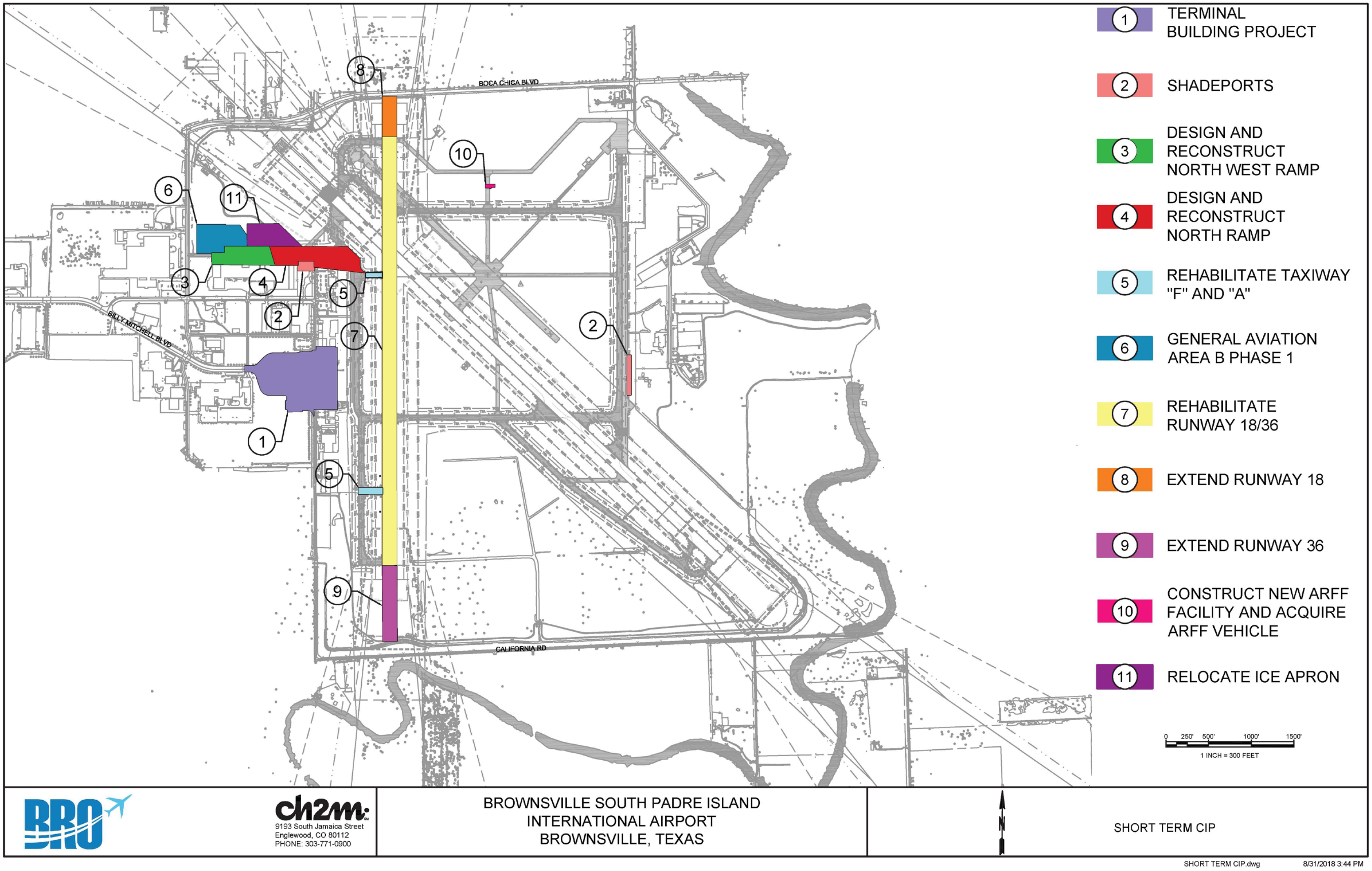

Figure 7-1. Short-Term Airport Projects

7.2.2 Mid-Term

The following section provides a brief description of each project foreseeable in the mid-term planning period. This includes the projects that are anticipated in six to ten years. Airfield projects account for approximately 90 percent of the costs foreseeable in the mid-term planning period.

Because projects planned for the mid-term planning period are less definitive than short-term projects, design and construction is not broken out from the individual project costs. Mid-term projects are contingent on demand and evolution of aeronautical and landside demand at BRO. These projects will need to be re-evaluated as necessary to account for unforeseeable activity changes and needs.

Figure 7-2 depicts the mid-term projects.

7.2.2.1 Airfield

Airfield projects in the mid-term planning period include the extension and reconstruction of Runway 13/31. As part of the project a bridge/culvert over the Resaca will also be necessary. In addition, taxiway pavement rehabilitation and reconstruction are included in the mid-term to meet FAA design standards. Pavement removal of unusable and abandoned pavement is also included.

7.2.2.2 GA/Cargo

GA and cargo developments are included in the mid-term with the construction of a public apron near the north ramp, the Southmost Aviation facilities and in the cargo apron.

7.2.2.3 Planning

The mid-term CIP includes an update to the Airport Master Plan.

7.2.2.4 Environment

An environmental review will be necessary prior to each project and the FAA will determine the level of environmental review, as well as projects that can be combined under one environmental document. A placeholder was included for environmental analysis of the proposed GA and cargo facility as well as the taxiway pavement projects.

7.2.2.5 Landside/Terminal Building

The mid-term planning period does not include any foreseeable landside and terminal projects.

7.2.3 Long-Term

The following section briefly describes projects foreseeable in the long-term planning period. This includes projects that are anticipated beyond 10 years. In addition, long-term projects also include post-planning period projects, planned beyond the 20-year planning period**.** Long-term projects include a variety of airfield, GA, and cargo projects.

Similarly to mid-term projects, long-term projects are less definite than short-term projects; they do not separate design and construction from the individual projects. Long-term projects are highly contingent on demand and evolution of the traffic at BRO. These projects will need to be reevaluted as necessary to account for unforeseeable traffic changes and needs.

Figure 7-3 depicts the long-term projects.

7.2.3.1 Airfield

Airfield projects consists in additional taxiway pavement rehabilitation and reconstruction to meet FAA design standards as well as pavement removal of unusable and abandoned pavement.

7.2.3.2 GA/Cargo

GA and cargo developments in the long-term include the construction of a public apron near the Southmost Aviation facilities as well as new aprons in the cargo apron.

7.2.3.3 Landside/Terminal Building

The mid-term planning period does not include any foreseeable landside and terminal projects.

7.2.3.4 Post-Planning

Post-planning projects are these projects foreseeable beyond the 20-year planning period. They include a new general aviation area near the ARFF station. The purpose of carrying these concepts forward on the ALP is for land use and airspace protection planning purposes.

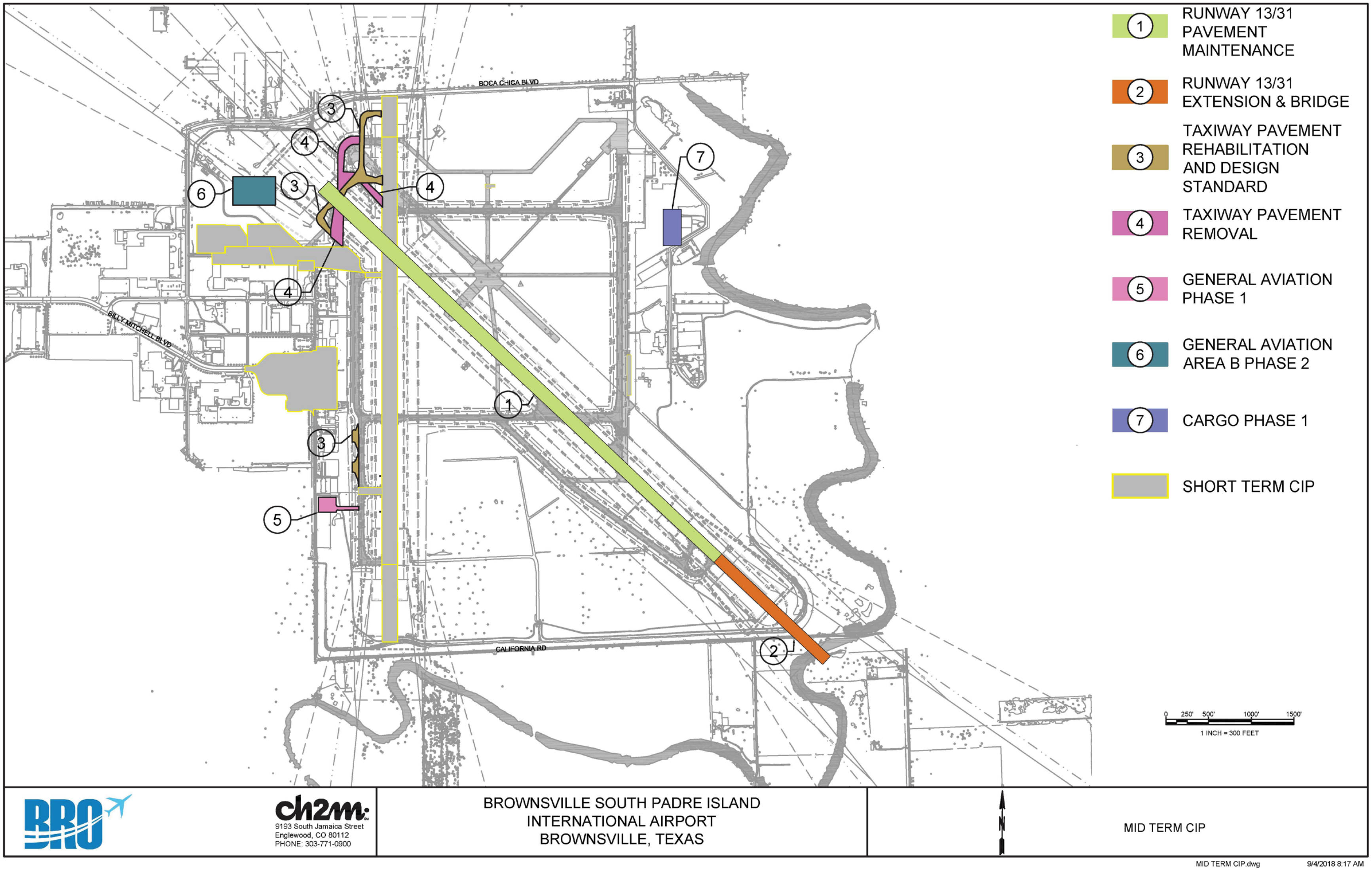

Figure 7-2. Mid-Term Airport Projects

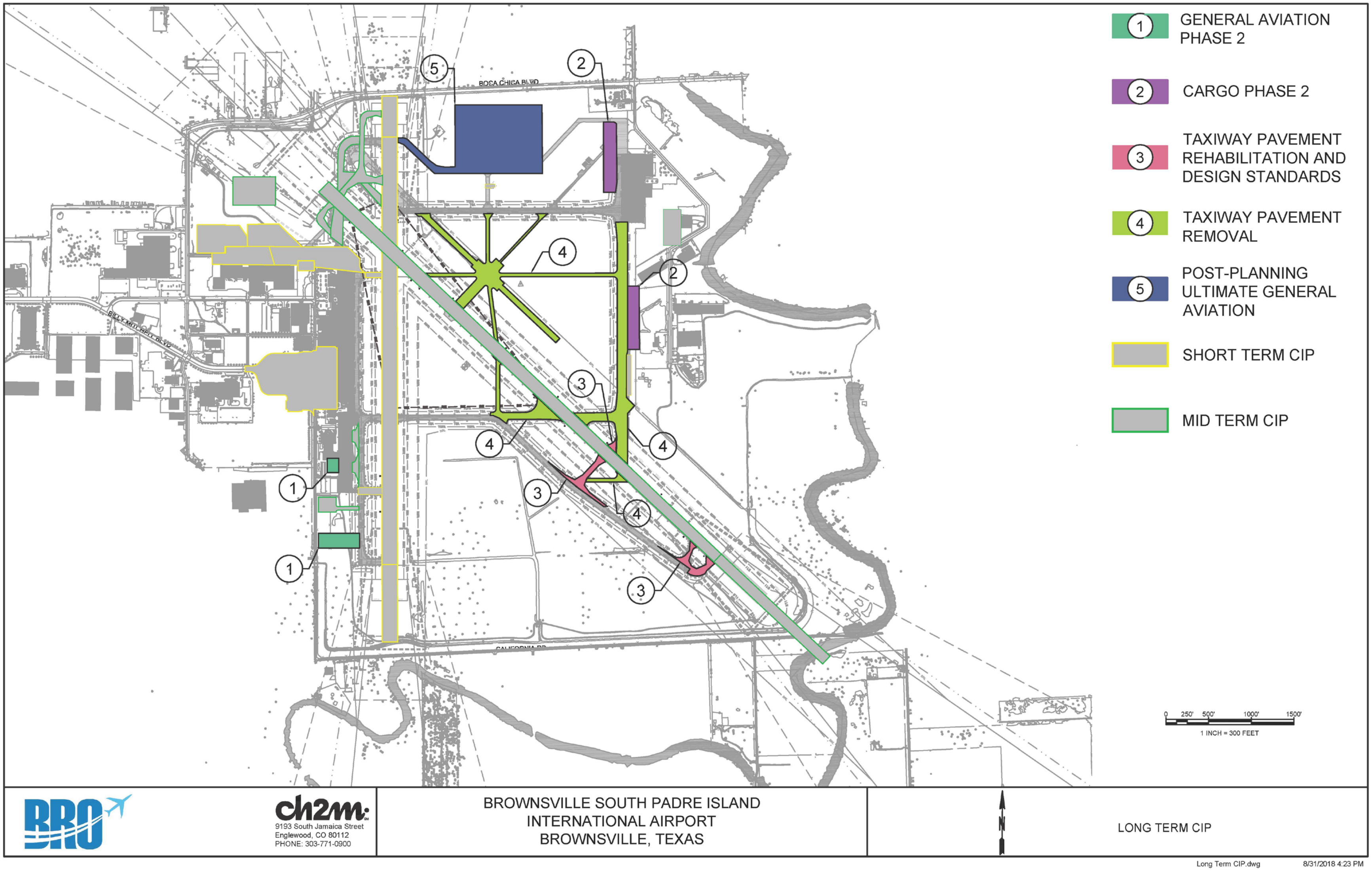

Figure 7-3. Long-Term Airport Projects

7.3 Cost Estimates

As previously described, the timing of each project has been projected in short-term, mid-term or long-term, and cost estimates were prepared for each project. Tables 7-2, 7-3, and 7-4 present the preferred short-term, mid-term, and long-term projects (respectively) with estimated project costs.

Cost estimates for mid-term and long-term projects are rough order of magnitude only. Cost estimates were prepared in 2018 and dollar amounts were escalated using a 4 percent rate and are considered appropriate for planning and budgeting purposes. Prior to every project, specific project detailed cost estimates should be prepared and evaluated.

Detailed financial feasibility, revenue projections, and funding strategies are presented in Chapter 8.

7.3.1 Short-term

Table 7-2. Short-Term CIP

Year	Recommended Airport Projects	Escalated Costs
Short-term projects (0-5 years)		
2018*	Benefit Cost Analysis - Runway 18/36 Extension	$200,000
2018*	Terminal Project Phase 1 - Temporary Landside	$1,485,524
2018*	Terminal Project Phase 2 - Temporary Terminal/Landside	$48,054,085
2018*	Design Airfield Signage Project	$120,000
2019*	Terminal Construction Phase 2- Demo / Airside	$6,100,000
2019*	Environmental Analysis for Runway 18/36 Extension	$832,000
2019*	Design and Reconstruct Perimeter Road	$2,080,000
2019*	Part 150 Noise Study	$832,000
2019*	Pavement Maintenance Plan (PCN index)	$208,000
2019	Shadeport	$370,924
2020*	Design Runway 18-36 - Rehabilitation and Extension	$3,968,353
2020*	Design and Reconstruct North West Ramp	$3,682,848
2020*	Design and Reconstruct North Ramp	$2,379,520
2020*	Rehabilitate taxiway "F" and taxiway "A"	$1,081,600
2020*	Airfield signage project	$1,081,600
2021	Environmental Analysis Future Projects	$224,973
2021	Alternative 2B - General Aviation Area B Public Apron Phase 1	$2,356,650
2021*	Design and Installation of Perimeter Security Fence - Phase 1	$1,687,296
2021*	Land Acquisition	$15,500,000
2021*	Rehabilitate Runway 18/36	$22,608,782
2021*	Extend Runway 18	$1,633,234

Table 7-2. Short-Term CIP

Year	Recommended Airport Projects	Escalated Costs
Short-term projects (0-5 years)		
2021*	Extend Runway 36	$3,271,898
2021*	Replace ARFF vehicle	$1,124,864
2022*	ARFF building design	$526,433
2022*	Design and Installation of Perimeter Security Fence - Phase 2	$1,169,852
2022*	Benefit Cost Analysis - Runway 13/31 extension	$292,463
2023*	Environmental analysis for Runway 13/31 extension	$1,216,653
2023*	Design and rehabilitate Runway 13/31 lighting system and install PCS	$1,824,979
2023*	Construct new ARFF facility	$3,649,959
2023	Construct ICE / GA apron	$5,312,735
	Total	**$134,877,225**

*Projects included in the 5-year Capital Improvement Plan for BRO (fiscal year 2018 to fiscal year 2023) submitted to the FAA.

** Includes engineering, construction management, and contingencies – Elevated costs

7.3.2 Mid-term

Table 7-3. Mid-Term CIP

Year	Recommended Airport Projects	Escalated Costs*
Mid-term projects (6-10 years)		
PAL 2	Runway 13/31 pavement maintenance	$43,007,630
PAL 2	Runway 13/31 Extension	$15,859,895
PAL 2	Runway 13/31 Bridge over Resaca	$20,521,363
PAL 2	Environmental analysis for GA and cargo extension and taxiway pavement	$148,024
PAL 2	Taxiway pavement rehabilitation and update to new design standards	$7,165,627
PAL 2	Taxiway pavement removal - unusable and abandoned pavement	$1,627,787
PAL 2	GA Alternative 2A - General Aviation Area A Public Apron Phase 1	$1,868,433
PAL 2	Cargo Area - Public Apron phase 1	$4,203,836
PAL 2	GA Alternative 2B - General Aviation Area B Public Apron Phase 2	$3,445,767
PAL 2	Airport Master Plan Update	1,000,000
	Total	**$ $98,848,363**

* Includes engineering, construction management, and contingencies – Elevated costs

7.3.3 Long-term

Table 7-4. Long-term CIP

Year	Recommended Airport Projects	Escalated Costs*
Long-term projects (11-20 years)		
PAL 3	Environmental analysis for GA and cargo extension and taxiway pavement	$219,112
PAL 3	Alternative 2A - Public Apron Phase 2	$2,105,395
PAL 3	Cargo Area - Public Apron Phase 2	$16,619,686
PAL 3	Taxiway pavement rehabilitation and update to new design standards	$7,614,621
PAL 3	Taxiway pavement removal - unusable and abandoned pavement	$9,301,810
	Total	**$35,860,625**
Beyond 20 years		
Beyond PAL 3	GA development - by ARFF station- public apron	$30,252,458
	Total	**$30,252,458**

* Includes engineering, construction management, and contingencies – Escalated costs

FINAL REPORT

Financial Analysis

Prepared for

Brownsville South Padre Island International Airport

August 2019

191 South Jamaica Street
Englewood, CO 80112
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Contents

Acronyms

AIP	Airport Improvement Program
ARFF	Aircraft Rescue and Fire Fighting
BCIC	Brownsville Community Improvement Corporation
BRO	Brownsville South Padre Island International Airport
CPE	Airline Cost per Enplanement
FAA	Federal Aviation Administration
FY	Fiscal Year
GA	General Aviation
GBIC	Greater Brownsville Incentives Corporation
O&M Expenses	Operation and Maintenance Expenses
PFC	Passenger Facility Charge
TexDOT	Texas Department of Transportation

8 Financial Analysis

8.1 Project Description

This section presents a financial analysis, including a proposed funding plan for the Master Plan capital projects, and financial projections for the planning horizon. The financial projections reflect a proposed airline rates and charges methodology designed to enhance the financial feasibility of the capital project costs included in the Master Plan. BRO currently charges the airlines pre-determined flat rates for the use of the passenger terminal and a predetermined flat landing fee rate. The current airline rates and charges are not set to recover the actual costs of operating and maintaining the Airport. The financial analysis presented in this chapter assumes that the City will establish an airline rate methodology under which the airlines are responsible for paying all costs of operating, maintaining, and improving the Airport, net of the revenues provided by non-airline tenants and users of the Airport, and net of the annual subsidy provided by the City to the Airport. It is assumed that the annual subsidy from the City will continue until such time that the Airport becomes financially self-sufficient. It is the Airport's intent to become financially self-sufficient within 5 years, based on anticipated local economic growth expected by the City to spur increased activity at the Airport.

The financial analysis includes an analysis of the Airport's historical revenues and expenses for fiscal years (FYs) 2014 through 2018, and financial projections, including the anticipated effects of the capital projects proposed in the Master Plan, FY 2019 through FY 2041.[1]

The financial projections reflect the anticipated effects of funding the Master Plan capital projects, to the extent of the availability of the identified funding sources during the forecast period. The funding plan anticipates the use of Federal Aviation Administration (FAA) Airport Improvement Program (AIP) grants; Passenger Facility Charges (PFCs); state grant funds (TexDOT Grants); private or third-party funding; local funds; and the issuance of bonds. The financial analysis uses the approved Master Plan air traffic forecast as a basis for estimating certain revenues and expenses over the planning horizon.

The City of Brownsville, Texas (the City) owns and operates the Airport. The City Commission is made up seven elected officials, two appointed officials, and four hired officials.

8.2 Proposed Airport Capital Plan

Table 8-1 presents the estimated project costs and funding sources for the recommended list of projects described earlier in this document. In Chapter 4, the proposed capital projects were grouped into the following four phases covering FY 2018 through FY 2040 and beyond:

- PAL 1 projects focus on the short-term period covering the next 5 years, through FY 2023. The PAL 1 projects include the completion of the construction of a new terminal and completing necessary airfield improvements. PAL 1 projects are estimated to cost a total of approximately $134.9 million. The largest single capital project in PAL 1 is the new passenger terminal, with an estimated cost of approximately $48.1 million, or 35.6 percent of the total estimated PAL 1 project costs.
- PAL 2 projects represent proposed capital projects for the mid-term, from FY 2024 through FY 2028. The PAL 2 projects, which will include the runway extension and pavement maintenance, are anticipated to cost a total of approximately $98.8 million.

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[1] BRO financial operations are reported based on the Fiscal Year of the City of Brownsville, which begins on October 1 of each calendar year and ends on September 30 of the subsequent calendar year. All financial data presented in this chapter are presented on the City's Fiscal Year basis.

- PAL 3 projects are the proposed capital projects for the long-term period, from FY 2029 through FY 2038. Those projects are estimated to total approximately $35.9 million and include cargo apron improvements and taxiway maintenance.
- For the time period beyond 20 years in the future, the Master Plan has identified the Beyond PAL 3 projects, which are estimated to total approximately $30.2 million. The Beyond PAL 3 projects are related to a proposed new General Aviation Development at BRO. However, Airport management will implement the proposed capital projects as warranted by demand and available funding sources. Airport management will monitor and refine, as appropriate, the Master Plan projects based on the Airport and the FAA's funding criteria and the availability of funding.

8.3 Recommended Funding Plan

The recommended funding plan includes the following sources:

- FAA AIP Grants (Entitlements and Discretionary funds)
- PFCs
- State Grants (TexDOT)
- Third-Party Financing
- Revenue Bonds

In developing the funding plan, the eligibility of each project was established to fully utilize all of the federal and state funding resources that could be available to BRO. These sources were evaluated against project eligibility to determine the best use of each funding source. The Airport's AIP entitlement grants throughout the forecast period were projected based on the enplanement forecast and matched against the anticipated AIP-eligible project costs. AIP-eligible costs in excess of projected AIP entitlement funds were considered for AIP discretionary funding, based on the nature of each project. PFC funding was identified for all projects meeting the FAA's eligibility and were subject to the projected availability of PFC revenues. State grant funding was assumed for appropriate project costs with third-party financing assumed for selected projects. Project costs not anticipated to be funded with PFCs, AIP, TexDOT grants and third party financing are assumed to be funded with revenue bonds.

Table 8-2 summarizes the Master Plan project costs and funding sources by project type for each phase. The largest categories of Master Plan project costs are terminal projects (18.6 percent of total estimated project costs), pavement maintenance projects (16.7 percent), general aviation projects (13.5 percent), and airfield projects (13.3 percent).

The largest funding source estimated for the proposed Master Plan capital projects is AIP entitlements and discretionary grants ($205.5 million, or 68.5 percent of the total estimated Master Plan project costs). Approximately $16.2 million, or 5.4 percent of the total project costs, are estimated to be eligible for PFC funding. The funding plan assumes that bonds will be issued to fund those PFC-eligible costs, and a portion of annual PFC collections will be used to pay the bond debt service. Approximately $0.7 million in project costs are assumed to be funded with TexDOT grants, $45.7 million in costs are assumed to be funded privately through third-party financings, and $31.7 million in project costs are assumed to be funded with the proceeds of revenue bond financings.

Table 8-1. Estimated Capital Costs and Funding Sources – PAL 1

PAL 1 Projects (Through FY-2023)	Project Type	Total	AIP Grants	PFC Bonds	TexDOT Grants	Third Party Funding	Revenue Bonds
Benefit Cost Analysis - Runway 18/36 Extension	Airfield	$ 200,000	$ 180,000	$ -	$ 20,000	$ -	$ -
Terminal Project Phase 1 - Temporary Landside	Terminal	1,485,524	-	-	-	-	1,485,524
Terminal Project Phase 2	Terminal	48,054,085	25,600,000	8,500,000	-	-	13,954,085
Airfield Signage Project	Airfield	120,000	108,000	-	12,000	-	-
Terminal Construction Phase 2 (Demo/Airside)	Terminal	6,100,000	-	-	-	-	6,100,000
Environment Analysis for Runway 18/36 Extension	Environmental Analysis	832,000	748,800	33,200	50,000	-	-
Design and Reconstruct Perimeter Road	Airfield	2,080,000	1,872,000	208,000	-	-	-
Part 150 Noise Study	Environmental Analysis	832,000	748,800	83,200	-	-	-
Pavement Maintenance Plan (PCN Index)	Planning	208,000	187,200	20,800	-	-	-
Shadeport	General Aviation	370,924	-	-	-	370,924	-
Design RWY 18-36 - Rehabilitation and Extension	Airfield	3,968,353	3,571,518	346,835	50,000	-	-
Design and Reconstruct North West Ramp	Pavement Maintenance	3,682,848	3,314,563	368,285	-	-	-
Design and Reconstruct North Ramp	Pavement Maintenance	2,379,520	2,141,568	237,952	-	-	-
Rehabilitate Taxiway "F" and Taxiway "A"	Pavement Maintenance	1,081,600	973,440	108,160	-	-	-
Airfield Signage Project	Airfield	1,081,600	973,440	108,160	-	-	-
Enivironmental Analysis Future Projects	Environmental Analysis	224,973	202,476	22,497	-	-	-
Alternative 2B - General Aviation Area B Public Apron Phase 1	General Aviation	2,356,650	-	-	-	2,356,650	-
Design and Installation of Perimeter Security Fence - Phase 1	Airfield	1,687,296	1,518,566	118,730	50,000	-	-
Land Acquisition	Land Acquisition	15,500,000	15,500,000	-	-	-	-
Rehabilitate RWY 18/36	Airfield	22,608,782	20,347,904	2,260,878	-	-	-
Extend RWY 18	Airfield	1,633,234	1,469,911	163,323	-	-	-
Extend RWY 36	Airfield	3,271,898	2,944,708	327,190	-	-	-
Replace ARFF Vehicle	ARFF	1,124,864	1,012,378	112,486	-	-	-
ARFF Building Design	ARFF	526,433	473,790	-	50,000	-	2,643
Design and Installation of Perimeter Security Fence - Phase 1	Airfield	1,169,852	1,052,867	-	-	-	116,985
Benefit Cost Analysis - Runway 13/31 Extension	Airfield	292,463	263,217	-	-	-	29,246
Environmental Analysis for Runway 13/31 Extension	Environmental Analysis	1,216,653	1,094,988	-	50,000	-	71,665
Design and Rehabilitate RWY 13/31 Lighting System and Install PCS	Airfield	1,824,979	1,642,481	-	-	-	182,498
Construct New ARFF Facility	ARFF	3,649,959	3,284,963	-	-	-	364,996
Construct ICE / GA Apron	Apron Expansion	5,312,735	-	-	-	5,312,735	-
Total PAL 1 Projects		$ 134,877,225	$ 91,227,576	$ 13,019,697	$ 282,000	$ 8,040,309	$ 22,307,643

Table 8-1. Estimated Capital Costs and Funding Sources – PAL 2, PAL 3, and Beyond PAL 3

PAL 2 Projects (FY 2024 - FY 2028)	Project Type	Total	AIP Grants	PFC Bonds	TexDOT Grants	Third Party Funding	GARBs
Runway 13/31 Pavement Maintenance	Pavement Maintenance	$ 43,007,630	$ 38,706,867	$ -	$ 50,000	$ -	$ 4,250,763
Runway 13/31 Extension	Runway Extension	15,859,895	14,273,906	-	50,000	-	1,535,990
Runway 13/31 Bridge Over Resaca	Runway Extension	20,521,363	18,469,227	-	50,000	-	2,002,136
EA for GA / Cargo Extension / TW Pavement	Environmental Analysis	148,024	-	-	-	-	148,024
TW Pavement Rehab / Update to New Design Standards	Taxiway	7,165,627	6,449,064	-	50,000	-	666,563
TW Pavement Removal - Unusable and Abandoned Pavement	Taxiway	1,627,787	1,465,008	-	-	-	162,779
GA Alternative 2A - General Aviation Area A Public Apron Phase 1	General Aviation	1,868,433	-	-	-	1,868,433	-
Cargo Area - Public Apron Phase 1	Cargo	4,203,836	3,783,452	-	50,000	-	370,384
GA Alternative 2B - General Aviation Area B Public Apron Phase 2	General Aviation	3,445,767	-	-	-	3,445,767	-
Airport Master Plan Update	Planning	1,000,000	900,000	-	-	-	100,000
Total PAL 2 Projects		$ 98,848,362	$ 84,047,524	$ -	$ 250,000	$ 5,314,200	$ 9,236,638

PAL 3 Projects (FY 2029 - FY 2038)	Project Type	Total	AIP Grants	PFC Bonds	TexDOT Grants	Third Party Funding	GARBs
EA for GA / Cargo Extension / TW Pavement	Environmental Analysis	$ 219,112	$ -	$ -	$ 50,000	$ -	$ 169,112
Alternative 2A - Public Apron Phase 2	General Aviation	2,105,395	-	-	-	2,105,395	-
Cargo Area - Public Apron Phase 2	Cargo	16,619,686	14,957,717	1,611,969	50,000	-	-
TW Pavement Rehab / Update to New Design Standards	Taxiway	7,614,621	6,853,159	711,462	50,000	-	-
TW Pavement Removal - Unusabel and Abandoned Pavement	Taxiway	9,301,810	8,371,629	880,181	50,000	-	-
Total PAL 3 Projects		$ 35,860,624	$ 30,182,505	$ 3,203,612	$ 200,000	$ 2,105,395	$ 169,112

Beyond PAL 3 Projects (Post FY 2038)	Project Type	Total	AIP Grants	PFC Bonds	TexDOT Grants	Third Party Funding	GARBs
GA Development - BY ARFF Station - Public Apron	General Aviation	$ 30,252,458	$ -	$ -	$ -	$ 30,252,458	$ -
Total - All Masterplan projects		**$ 299,838,669**	**$ 205,457,606**	**$ 16,223,309**	**$ 732,000**	**$ 45,712,362**	**$ 31,713,393**

Table 8-2. Master Plan Project Costs and Funding Sources

Estimated Project Costs	PAL 1	PAL 2	PAL 3	Beyond PAL 3	Total
Airfield	$ 39,938,457	$ -	$ -	$ -	$ 39,938,457
Terminal	55,639,609	-	-	-	55,639,609
Environmental Analysis	3,105,626	148,024	219,112	-	3,472,762
Planning	208,000	1,000,000	-	-	1,208,000
General Aviation	2,727,574	5,314,200	2,105,395	30,252,458	40,399,627
Pavement Maintenance	7,143,968	43,007,630	-	-	50,151,598
Land Acquisition	15,500,000	-	-	-	15,500,000
ARFF	5,301,256	-	-	-	5,301,256
Taxiway	-	8,793,414	16,916,431	-	25,709,845
Apron Expansion	5,312,735	-	-	-	5,312,735
Runway Extension	-	36,381,258	-	-	36,381,258
Cargo	-	4,203,836	16,619,686	-	20,823,522
Total Uses	$134,877,225	$ 98,848,362	$ 35,860,624	$ 30,252,458	$299,838,669

Proposed Funding Sources	PAL 1	PAL 2	PAL 3	Beyond PAL 3	Total
AIP Grants	91,227,576	84,047,524	30,182,505	-	205,457,606
PFC Bonds	13,019,697	-	3,203,612	-	16,223,309
TexDOT Grants	282,000	250,000	200,000	-	732,000
Third Party Funding	8,040,309	5,314,200	2,105,395	30,252,458	45,712,362
Revenue Bonds [1]	22,307,643	9,236,638	169,112	-	31,713,393
Total Sources	$134,877,225	$ 98,848,362	$ 35,860,624	$ 30,252,458	$299,838,669

[1] The Revenue Bonds include bonds anticipated to be issued to pay for certain PFC-eligible project costs. It is assumed that PFCs will be applied to pay debt service on those bonds.

8.3.1 FAA AIP Grants

AIP grants are administered by the FAA to construct and maintain airport infrastructure projects and to mitigate the noise impacts of aircraft operations near airports. The FAA issues either entitlement or discretionary grants for projects. Entitlement grants are awarded based on a formula that considers the number of passengers using the Airport, with a minimum of $1.0 million awarded, even if the formula would produce a lower amount based on the number of passenger enplanements. BRO is projected to receive the minimum passenger entitlement of $1 million throughout the planning horizon. The funding plan assumes that a total of $23 million will be funded with AIP entitlement grants.

The FAA awards discretionary grants based on established funding priorities and FAA management's discretion.

In addition, non-hub airports such as BRO can receive AIP funds from the Small Airport Fund, which consists of passenger entitlements returned to the FAA by medium and large hub airports (those enplaning at least 0.25% of total national enplanements) that collect PFCs. Small Airport Fund grants are not awarded based on any specific formula. Rather, the FAA awards Small Airport Fund grants using the same criteria it applies to award discretionary grants. In fact, the FAA treats Small Airport Fund grants as a subset of discretionary grants.

AIP eligible projects historically are typically funded with 90 percent FAA funds for non-hub airports such as BRO. The City is responsible for funding the 10 percent match with state grants, PFCs, or local funds. It is assumed that the Authority will receive the maximum amount possible for all AIP eligible projects.

BRO has been awarded an AIP discretionary grant of approximately $25.6 million for the new terminal project.

The funding plan assumes that a total of $182.5 million will be funded with AIP discretionary grants, which includes assumed funding from the Small Airport Fund. That amount, plus the $23.0 million assumed for AIP entitlement grants, equals a total assumed AIP grant funding of approximately $205.5 million during the planning horizon.

8.3.2 PFCs

PFCs are fees imposed by an airport based on enplaned passengers and are used for specific projects approved by the FAA. According to federal regulations, PFC projects must (1) preserve or enhance safety, security or capacity of the national air transportation system; (2) reduce noise or mitigate noise impacts resulting from an airport; or (3) furnish opportunities for enhanced competition between or among air carriers. The City is currently authorized by the FAA to collect a PFC of $4.50 per enplaned passenger at the Airport; the currently mandated maximum allowable rate.

Since the inception of the PFC program, the City has received cumulative approval to collect and use approximately $8.2 million in PFCs. The City’s most recent application for PFCs at BRO, approved in August 2015, extends the City’s right to collect until February 1, 2024. It is assumed the City will continue to submit and receive approval for new PFC applications throughout the forecast period.

Table 8-3 shows the projected PFC collections and uses of PFCs during the planning horizon. Based on the enplanement forecast, PFC collections are projected to increase from approximately $500,000 in FY 2019 to approximately $561,000 in 2023, for total projected PFC collections of approximately $2.7 million during the PAL 1 phase of the capital program. The City is committing approximately $250,000 of PFCs per year to reimburse Airport funds spent on PFC-eligible construction expenses of the terminal project. The capital program funding plan assumes that the City will submit several future PFC applications for PFC-eligible project costs as needed during the planning horizon.

Table 8-3. Projected PFC Cash Flow

	Fiscal Years Ending September 30								
	2019	2020	2021	2022	2023	2028	2033	2038	2041
Enplanements	116,293	119,578	123,153	126,728	130,304	149,714	172,061	196,453	212,627
PFC Eligible Enplanements [1]	113,967	117,186	120,690	124,194	127,698	146,720	168,619	192,524	208,374
Passenger Facility Charge	$ 4.50	$ 4.50	$ 4.50	$ 4.50	$ 4.50	$ 4.50	$ 4.50	$ 4.50	$ 4.50
Administration Fee	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
PFCs Available	$ 4.39	$ 4.39	$ 4.39	$ 4.39	$ 4.39	$ 4.39	$ 4.39	$ 4.39	$ 4.39
PFC Fund Beginning Balance [2]	$ 872,384	$ 807,001	$ 757,959	$ 721,923	$ 700,143	$ 526,236	$ 411,208	$ 393,505	$ 639,943
Annual PFC Collections	500,316	514,448	529,830	545,211	560,592	644,101	740,239	845,179	914,762
PFCs Applied to Eligible Costs									
Reimburse Terminal Costs	$ (247,914)	$ (245,706)	$ (248,081)	$ (249,206)	$ (249,081)	$ (348,956)	$ (347,706)	$ (348,581)	$ (346,109)
Future Project Costs	(317,785)	(317,785)	(317,785)	(317,785)	(317,785)	(321,419)	(437,110)	(437,110)	(437,110)
PFCs Applied to Elibible Costs	(565,699)	(563,491)	(565,866)	(566,991)	(566,866)	(670,375)	(784,816)	(785,691)	(783,219)
PFC Fund Balance	$ 807,001	$ 757,959	$ 721,923	$ 700,143	$ 693,870	$ 499,963	$ 366,631	$ 452,992	$ 771,486

[1] Assumes 2% of BRO enplanements are not eligible for PFC collection, to account for frequent flyer and other non-revenue passengers.
[2] Beginning 2019 PFC Fund balance obtained from the December 31, 2018 PFC Quarterly Report.

8.3.3 TexDOT Grants

The City receives approximately $50,000 per year in grants from TexDOT for certain eligible capital projects at BRO. The funding plan assumes that the TexDOT grants may be used for a portion of the 10 percent local match for projects that are expected to receive FAA funding. The funding plan assumes approximately $730,000 in TexDOT funding throughout the planning horizon.

8.3.4 Third-Party Financing

The City anticipates securing third-party financing for certain Master Plan projects. The current estimate assumes approximately $45.3 million will be available to fund a portion of the Master Plan projects. The City intends to aggressively pursue this type of financing for general aviation type projects. It is assumed the City will pursue third-party financing for all phases of the General Aviation Area B Public Apron project, the construction of ICE/GA Apron, and the GA Development. For purposes of this financing plan, with the exception of ground rents, no operating revenues are anticipated to be generated by this effort.

8.3.5 Revenue Bonds

The City issued bonds in 2018 (Series 2018 Bonds) to fund a portion of the new terminal construction, new apron, new terminal access roads, and the demolition of the existing terminal. The Series 2018 Bonds are secured by Airport revenues and taxes levied by the City, with annual debt service of approximately $1.6 million. There is a current agreement for the Greater Brownsville Incentives Corporation (GBIC) and the Brownsville Community Improvement Corporation (BCIC) to fund approximately $1.3 million per year of the debt service through 2023. GBIC and BCIC are both nonprofit corporations established in accordance with the Texas Development Corporation Act. The City collects the sales tax specifically authorized for GBIC and BCIC. For this analysis, it is assumed that GBIC and BCIC will continue to fund an equal amount of the debt service until the maturity of the bonds in 2043.

The financial analysis assumes that the City or related entity will issue revenue bonds to fund a portion of the estimated capital costs of the Master Plan projects during the planning horizon. Future bond issues are assumed to occur in FYs 2019, 2021, 2025, and 2031. It is assumed that the corresponding portion of debt service will be paid for by GBIC and BCIC. The Series 2021, 2025, and 2031 Bonds will be used to fund the required match for the projects funded by AIP grants.

As shown in Table 8-4, debt service is projected to increase from approximately $4.9 million in 2019 to $7.0 million in FY 2021 after the projected issue of the Series 2021 bonds. Annual debt service is projected to continue to increase to approximately $7.8 million per year as a result of the expected Series 2025 bond issuance. Annual debt service is projected to reach a peak of $8.1 million per year, beginning in FY 2031 when the Series 2031 are expected to be issued.

Table 8-4. Projected Debt Service

	Fiscal Years Ending September 30								
	2019	**2020**	**2021**	**2022**	**2023**	**2028**	**2033**	**2038**	**2041**
Series 2018 Bonds	$ 1,556,914	$ 1,554,706	$ 1,557,081	$ 1,558,206	$ 1,558,081	$ 1,657,956	$ 1,656,706	$ 1,657,581	$ 1,655,109
Series 2019 Bonds (PFC)	317,785	317,785	317,785	317,785	317,785	317,785	317,785	317,785	317,785
Series 2019 Bonds	-	-	258,979	517,958	517,958	517,958	517,958	517,958	517,958
Series 2021 Bonds	-	-	-	-	206,755	413,511	413,511	413,511	413,511
Series 2025 Bonds	-	-	-	-	-	374,699	374,699	374,699	374,699
Series 2031 Bonds	-	-	-	-	-	-	232,860	232,860	232,860
Total Debt Service	$ 1,874,699	$ 1,872,491	$ 2,133,845	$ 2,393,949	$ 2,600,579	$ 3,281,908	$ 3,513,518	$ 3,514,393	$ 3,511,921
Cost Center Allocation									
Airfield	$ -	$ -	$ -	$ -	$ 203,656	$ 728,403	$ 728,403	$ 728,403	$ 728,403
Terminal	-	-	258,979	517,958	521,057	551,079	551,079	551,079	551,079
Apron	-	-	-	-	-	-	117,169	117,169	117,169
General Aviation	-	-	-	-	-	23,052	23,052	23,052	23,052
GBIC/BCIC	1,309,000	1,309,000	1,309,000	1,309,000	1,309,000	1,309,000	1,309,000	1,309,000	1,309,000
PFC	565,699	563,491	565,866	566,991	566,866	670,375	784,816	785,691	783,219
Total Debt Service	$ 1,874,699	$ 1,872,491	$ 2,133,845	$ 2,393,949	$ 2,600,579	$ 3,281,908	$ 3,513,518	$ 3,514,393	$ 3,511,921

Note: The above debt service amounts are net of capitalized interest (interest during the construction period, which is paid from bond proceeds).

8.4 Airline Rates and Charges

The City entered into the airline use and lease agreement (the Airline Agreement) with the airlines on April 1, 2013. The Airline Agreement had a 5-year term with two automatic 1-year extensions. Therefore, the Airline Agreement will expire on June 30, 2020.

The Airline Agreement sets forth the rates and charges to be paid by the airlines for their use of the terminal facilities and the airfield facilities. The Airline Agreement sets flat rates during the term of the Agreement, which have not been based on the actual costs of operating and maintaining the Airport. Therefore, the Airport has not been completely self-sufficient financially. The City transfers monies from its General Fund each year to supplement the revenues generated at BRO from the airlines and other tenants and users of the airport. In FY 2018, the City transferred approximately $1.8 million from its General Fund to the Airport Fund.

The airlines are required to pay a landing fee of $0.52 per 1,000 pounds of landed weight for use of the airfield. The airlines are also required to pay $27.23 per square foot for the airline exclusive and non-exclusive space in the passenger terminal. In addition, the airlines are required to pay for the use of the baggage claim and the sterile gate area based on each airline's percentage of enplaned passengers.

This financial analysis assumes that the City will create a cost recovery system for airline rates and charges. It is assumed that the City will establish an airline rate methodology under which the airlines are responsible for paying all costs of operating, maintaining, and improving the Airport, net of the revenues provided by non-airline tenants and users of the Airport, and net of the annual subsidy provided by the City to the Airport. The rate methodology would start with the total costs of operating, maintaining, and improving the Airport, and then subtract from that total obligation all revenues other than airline revenues and the annual subsidy from the City. The airlines would be responsible for paying the resulting "residual" amount (the amount left over after crediting all non-airline revenues and the City subsidy). It is assumed that the annual subsidy from the City will continue until such time that the Airport becomes financially self-sufficient. It is the Airport's intent to become financially self-sufficient within 5 years, based on anticipated local economic growth expected by the City to spur increased activity at the Airport.

In order to establish the rates and charges methodology described above, the operations and maintenance (O&M) expenses and debt service need to be allocated to the cost centers. Unison assumed certain cost center allocation percentages based on our experience doing similar projects at other airports. The debt service allocation percentages used in this analysis were determined based on the projects included in each bond issue and which cost centers those projects will benefit.

8.4.1 Landing Fee Revenue

To calculate the amount to be recovered through Landing Fee revenue, the following items allocated to the Airfield cost center are added together to arrive at the Total Airfield Requirement:

- O&M Expenses
- Debt Service requirements
- Amortization of capital costs funded with Airport funds

The following revenue items are subtracted from the Total Airfield Requirement to arrive at the Net Airfield Requirement:

- Fuel Flowage Fees
- FBO Revenues
- Cargo Rentals and Fees
- Land Rentals
- Cargo Building Rentals
- Any other revenues attributed to the Airfield

The Landing Fee rate per 1,000 pounds of landed aircraft weight is calculated by dividing the Net Airfield Requirement by the total airline landed weight.

8.4.2 Terminal Space Fee Revenue

To calculate the amounts to be recovered through the Terminal Space Fee revenue, the following items allocated to the Terminal cost center are added together to arrive at the Total Terminal Requirement:

- O&M Expenses
- Debt Service Requirements
- Amortization of capital costs funded with Airport funds

The following revenue items are subtracted from the Total Terminal Requirement to arrive at the Net Terminal Requirement:

- Rental Car Revenue
- Parking Fees
- Advertising revenues
- Ground Rents
- Any other revenues allocated to the Terminal

The Net Terminal Requirement is divided by the sum of the rented square footage to determine the Terminal Rental Fee per square foot.

The Airport plans to charge the airlines for the construction costs of their respective space over a 5-year period until buildout. Once the new terminal opens, the airlines will be charged an annual increase of 3 percent or the increase in the CPI, whichever is greater.

8.4.3 Loading Bridge Fee Revenue

The Loading Bridge Fee revenues is determined by dividing the allocated O&M Expenses by the number of rented loading bridges.

8.5 Operation and Maintenance Expenses

O&M Expenses represent the Airport's operating expenses excluding depreciation expense. The major categories of O&M Expenses are Personnel Services, Materials and Supplies, Maintenance of Buildings and Structures, Maintenance of Equipment, Miscellaneous Services, and Indirect Costs. The largest expense category is Personnel Services, which represented 68.6 percent of total O&M Expenses in FY 2018. The other categories of O&M Expenses are Miscellaneous Service (15.2 percent of total FY 2018 O&M Expenses), Maintenance of Equipment (5.0 percent), Maintenance of Buildings and Structures (4.9 percent), and Materials and Supplies (4.1 percent).

As shown on Table 8-5, O&M Expenses increased from approximately $4.3 million in FY 2014 to $4.8 million in FY 2018 or by an average of 2.3 percent per year. Table 8-6 shows the projected O&M expenses. O&M Expenses are projected to increase from $4.4 million in the FY 2019 Budget to $7.8 million in FY 2041, based on the increases projected in the various expense categories, as described in the following paragraphs.

- Personnel expenses are the largest category of O&M Expenses. Personnel expenses, which fluctuated during the historical period based on staffing needs, totaled approximately $2.6 million in FY 2018. Personnel expenses were budgeted at $2.9 million for FY 2019 due to staffing increases. As a result of the new FIS facility planned as part of the new terminal project, BRO plans to add two full-time equivalent positions at a total cost of $48,000 per year, beginning in FY 2020. However, the Airport anticipates that its Personnel expenses related to Aircraft Rescue and Fire Fighting (ARFF) operations will decrease. The City has committed to implementing significant reductions in ARFF expenses for the Airport. To accomplish this goal, the City plans to reduce the number of fire fighters assigned to the Airport, as part of the City's efforts to eliminate extra staffing. The Airport anticipates that its ARFF expenses will decrease by approximately 50 percent over the next few years. After accounting for the anticipated decreases in ARFF staffing, slightly offset by normal salary increases, Personnel expenses are projected to decrease from almost $2.9 million in the FY 2019 Budget to approximately $2.4 million in FY 2023. Personnel expenses are projected to increase modestly with inflation after FY 2023, to $3.4 million in FY 2041.
- Materials and Supplies expenses decreased from approximately $190,000 in FY 2014 to $179,000 in FY 2018, with fluctuations in the intervening years due to variations in operational needs in those years. The City budgeted approximately $156,000 for this expense category in FY 2019. Materials and Supplies are projected to increase at the estimated annual rate of inflation (2.1 percent) to approximately $246,000 in FY 2041.
- Building Maintenance expenses increased from approximately $126,000 in FY 2014 to $205,000 in FY 2018 or by an average of 10.2 percent per year. The increases were mainly due to plumbing, electrical, insulation, and roof repair and maintenance costs needed in the aging passenger terminal building. Building Maintenance expenses were budgeted at approximately $208,000 for FY 2019. It is anticipated that although the new terminal building will require minimal repairs in the near term, the maintenance expenses will not decrease from the current level because the new terminal will be

larger than the existing terminal building. Therefore, Building Maintenance expenses are projected increase in future years at approximately the annual inflation rate, from the FY 2019 budgeted level, to approximately $328,000 in FY 2041.

- Equipment Maintenance expenses decreased by an average of 3.3 percent per year, from approximately $284,000 in FY 2014 to $240,000 in FY 2018. Additional decreases were budgeted for FY 2019, with an estimated cost of approximately $218,000 for the FY 2019 budget. The City has developed a plan to further reduce maintenance costs for all City departments, including the Airport. The City recently conducted an inventory of all City-owned assets and vehicle fleets, and it has established an asset and fleet replacement plan, culminating in a City Fleet Management Policies manual. It is anticipated that this plan will enable all City departments to implement a cost-effective life-cycle replacement strategy, thereby replacing old, outdated assets and vehicles with new, lower-maintenance assets and vehicles. The Fleet Management Policies manual includes clear guidelines on preventative maintenance for all City vehicles, which are anticipated to reduce vehicle replacement costs for all City departments. Equipment Maintenance expenses, which reflect the anticipated savings in vehicle maintenance costs, are projected to decrease to approximately $201,000 in FY 2021. Thereafter, Equipment Maintenance expenses are projected to increase at the rate of inflation, to approximately $289,000 in FY 2041.
- Miscellaneous Services expenses include communications, insurance, professional services, advertising, travel expenses, training expenses, banking fees, and utilities expenses. Miscellaneous Services remained relatively flat at approximately $800,000 from FY 2014 through FY 2018. Miscellaneous Service expenses were budgeted at approximately $825,000 for FY 2019. For future years, this category of expenses is conservatively projected to increase by an average of 3.0 percent per year, to account for anticipated increases in insurance costs, professional services, and other services estimated to be incurred in relation to the planned new facilities, to approximately $1.6 million in FY 2041.
- Indirect Cost expenses are common City costs that related to functions performed by City personnel that benefit the Airport and other City departments. These costs are allocated to the Airport and the other City departments based on the City's cost allocation formula. Indirect Costs allocated to the Airport increased from approximately $112,000 in FY 2014 to $124,000 in FY 2018. The costs allocated to the Airport were budgeted at approximately $115,000 for FY 2019. Beginning in FY 2020, Indirect Costs allocated to the Airport are projected to increase at the rate of inflation, to approximately $181,000 in FY 2041.
- General Services expenses increased significantly from approximately $112,000 in FY 2014 to over $600,000 in FY 2017 and FY 2018. The majority of the increase was due to the recognition of pension costs required by the implementation of Government Accountant Standard Board accounting rules. Although these costs were not included in the Airport's FY 2019 Budget, the financial projections assume that BRO will recognize approximately $650,000 in annual pension costs in FY 2020 and subsequent years.

Table 8-5. Historical O&M Expenses

Expense Categories	Fiscal Years Ended September 30 2014	2015	2016	2017	2018	2014 - 2018
Personnel Services	$ 2,654,694	$ 2,366,678	$ 2,270,863	$ 2,351,614	$ 2,656,344	0.0%
Materials and Supplies	190,283	175,803	144,913	171,251	178,719	-1.2%
Building Maintenance	126,347	166,183	169,925	181,277	210,049	10.7%
Equipment Maintenance	283,801	151,457	224,626	195,550	239,502	-3.3%
Miscellaneous Services	835,158	867,872	839,350	825,174	798,228	-0.9%
Indirect Costs	112,515	111,400	105,034	108,632	124,183	2.0%
General Services	111,970	421,538	568,612	687,068	616,987	40.7%
Total O&M Expenses	$ 4,314,767	$ 4,260,930	$ 4,323,323	$ 4,520,567	$ 4,824,012	2.3%

Table 8-6. Projected O&M Expenses

	Budget	Projected							
Expense Categories	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2028**	**FY 2033**	**FY 2038**	**FY 2041**
Personnel Services	$ 2,877,177	$ 2,834,721	$ 2,641,415	$ 2,419,243	$ 2,392,628	$ 2,641,655	$ 2,916,600	$ 3,220,162	$ 3,417,262
Materials and Supplies	155,769	159,040	162,380	165,790	169,272	187,807	208,373	231,191	246,064
Building Maintenance	207,608	211,968	216,419	220,964	225,604	250,309	277,718	308,129	327,952
Equipment Maintenance	217,546	222,114	200,822	205,039	198,522	220,261	244,380	271,140	288,584
Miscellaneous Services	825,617	850,386	875,897	902,174	929,239	1,077,243	1,248,820	1,447,724	1,581,968
Indirect Costs	114,500	116,905	119,359	121,866	124,425	138,050	153,167	169,940	180,872
General Services	-	650,000	650,000	650,000	650,000	650,000	650,000	650,000	650,000
Total Expenses	$ 4,398,217	$ 5,045,133	$ 4,866,293	$ 4,685,076	$ 4,689,690	$ 5,165,325	$ 5,699,059	$ 6,298,287	$ 6,692,701

8.6 Revenues

The City receives revenues related to BRO from landing fees, space fees in the passenger terminal, loading bridge fees, land rentals, rental car fees, parking fees, advertising, ground rents, cargo building rents, and other non-airline revenues such as hangar rentals, building rentals, advertising, and other miscellaneous non-aeronautical revenues. The recent 5-year historical trend for the various revenue sources is discussed below, followed by the projections of revenue sources for 2019 and subsequent years.

Table 8-7 summarizes the historical revenues from FY 2014 to FY 2018. Revenues remained fairly stable at approximately $2.6 million from FY 2014 through FY 2018. The paragraphs below present brief explanations of the historical trends for the various non-airline and airline revenue categories, and the projections for each revenue category, for the planning horizon.

Table 8-7. Historical Revenues

	Fiscal years Ended September 30					CAGR
Revenue Categories	**2014**	**2015**	**2016**	**2017**	**2018**	**2014 - 2018**
Non-Airline Revenue						
Fuel Flowage Fees	$ 182,579	$ 130,829	$ 161,847	$ 149,744	$ 136,236	-5.7%
FBO Revenue	142,091	139,619	149,101	124,581	108,853	-5.2%
Cargo Rentals and Fees	217,071	225,087	208,629	187,125	209,731	-0.7%
Ground Rent	945,263	929,903	875,013	877,388	922,338	-0.5%
Rental Car Revenue	420,927	440,361	467,735	469,433	466,521	2.1%
Parking Fees	189,309	228,886	218,042	225,536	221,575	3.2%
Advertising	28,723	31,119	23,369	28,334	16,789	-10.2%
Other	16,732	41,104	39,635	27,183	16,695	0.0%
Interest Revenue	2,078	2,562	5,665	10,278	1,546	-5.7%
Subtotal Non-Airline Revenues	$ 2,144,773	$ 2,169,471	$ 2,149,037	$ 2,099,603	$ 2,100,282	-0.4%
Airline Revenue						
Landing Fees [1]	$ 132,467	$ 91,623	$ 93,518	$ 84,439	$ 128,826	-0.6%
Terminal Space Fees	322,260	324,278	311,621	333,210	349,085	1.6%
Loading Bridge Fees	22,986	22,671	17,073	18,693	20,457	-2.3%
Subtotal Airline Revenues	$ 477,714	$ 438,571	$ 422,212	$ 436,341	$ 498,368	0.9%
Total Revenue	$ 2,622,487	$ 2,608,042	$ 2,571,249	$ 2,535,944	$ 2,598,651	-0.2%

[1] Landing fees include landing fee revenue received from passenger and cargo airlines.

8.6.1 Non-Airline Revenues

Non-airline revenues include all revenues from Airport operations not paid by commercial service or cargo airlines. Non-airline revenues include fuel flowage fees, FBO revenues, cargo rentals and fees, land rents, rental car revenues, parking fees, advertising revenues, ground rent, cargo building rent, other non-aeronautical revenues, and interest revenues. As seen in Table 8-7, non-airline revenues remained fairly stable from FY 2014 through FY 2018, ranging between approximately $2.1 and $2.2 million. The historical trends in non-airline revenues and future projections for the various categories of non-airline revenues are briefly described below. Table 8-8 summarizes the projections of non-airline revenues.

- Fuel Flowage Fees decreased from approximately $183,000 in FY 2014 to $136.000 in FY 2018, and are budgeted to total $148,000 in FY 2019. Fuel Flowage Fees are projected to increase approximately in accordance with the forecast growth in aircraft operations at the Airport, or an average annual rate of 0.6 percent. Fuel Flowage Fees are projected to increase to approximately $169,000 in 2041.
- FBO revenue decreased from $142,000 in FY 2014 to approximately $115,000 in FY 2018, and it was budgeted to increase to $120,000 in FY 2019. FBO revenue is projected to increase at the estimated annual inflation rate (2.1 percent), to approximately $190,000 in FY 2041.
- Cargo Rentals and Fee revenues decreased by approximately 0.7 percent per year during the historical period, from approximately $217,000 in FY 2014 to $210,000 in FY 2018. The City is expected to begin leasing a newly constructed cargo building in April 2019, with the first full year of cargo building rent anticipated in FY 2020. The projections for this revenue category reflect the anticipated rent from the new cargo building, in addition to anticipated increases with the rate of inflation. Cargo Rentals and Fee revenues are projected to increase to approximately $500,000 by FY 2041.
- Ground Rent fluctuated during the historical period, and total approximately $922,000 in FY 2018. The City anticipates receiving ground rent from two new tenants beginning in 2020, totaling approximately $129,000. Thereafter, Ground Rent is projected to grow at the rate of inflation, to approximately $1.6 million in BY 2041.
- Rental car revenues increased by an average of 2.1 percent from approximately $421,000 in 2014 to $466,000 in 2018. Rental car revenues are projected to grow at the rate of enplanement growth plus half the rate of inflation. Rental car revenues are projected to grow by an average of 3.8 percent per year from $450,000 in the FY 2019 budget to slightly more than $1.0 million in FY 2041.
- The Airport has three parking lots for passengers. Parking is free for the first 30 minutes and then $5 per day. There is also a monthly parking pass available for $60 per month. Parking fees increased by an average of 3.3 percent per year from $189,000 in FY 2014 to $222,000 in FY 2018. Parking fees are projected to grow at a rate equal to the forecast growth in enplanements (an average of 2.8 percent per year). Parking fees are projected to increase from $243,000 in the FY 2019 budget to approximately $445,000 in FY 2041.
- Advertising revenue decreased during the historical period and totaled approximately $16,000 in FY 2018. The Airport's FY 2019 budget included $29,000 for this revenue category. For future years, Advertising revenues are projected to increase with the estimated annual inflation rate to approximately $46,000 in FY 2041.
- The "Other" non-airline revenue category includes concession revenues, revenue from auction sales, and miscellaneous revenues from any other sales or services. This revenue category fluctuated during the historical period, and totaled approximately $17,000 in FY 2018. Other non-airline revenues were budgeted at approximately $59,000 for FY 2019. This revenue category is projected to increase to approximately $105,000 in FY 2041.

Table 8-8. Projected Non-Airline Revenues

	Budget	Projected							
Revenue Categories	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2028**	**FY 2033**	**FY 2038**	**FY 2041**
Fuel Flowage Fees	$ 148,000	$ 151,779	$ 152,876	$ 153,974	$ 155,071	$ 159,496	$ 163,214	$ 166,953	$ 169,235
FBO Revenue	120,000	122,520	125,093	127,720	130,402	144,681	160,525	178,103	189,560
Cargo Rentals and Fees	199,000	323,179	329,966	336,895	343,970	381,636	423,426	469,793	500,016
Ground Rent	910,000	1,058,110	1,080,330	1,103,017	1,126,181	1,249,501	1,386,326	1,538,134	1,637,086
Rental Car Revenue	450,000	467,436	486,320	505,545	525,115	634,783	767,548	922,089	1,028,938
Parking Fees	243,237	250,108	257,586	265,064	272,541	313,141	359,880	410,898	444,727
Advertising	29,000	29,609	30,231	30,866	31,514	34,965	38,793	43,041	45,810
Other	59,100	60,858	62,681	64,513	66,354	75,760	86,086	97,384	104,841
Total Non-Airline Revenu	$ 2,158,337	$ 2,463,599	$ 2,525,083	$ 2,587,592	$ 2,651,148	$ 2,993,963	$ 3,385,798	$3,826,395	$ 4,120,213

8.6.2 Airline Revenues

Airline revenues include Landing Fees, Terminal Space Fees, and Loading Bridge Fees. Airline revenues remained relatively flat during the historical period and were approximately $477,000 in 2018.
As discussed previously in this chapter, the current Airline Agreement sets flat rates during the term of the Agreement, which have not been based on the actual costs of operating and maintaining the Airport. The financial analysis presented in this chapter assumes that the City will establish an airline rate methodology under which the airlines are responsible for paying all costs of operating, maintaining, and improving the Airport, net of the revenues provided by non-airline tenants and users of the Airport, and net of the annual subsidy provided by the City to the Airport. It is assumed that the annual subsidy from the City will continue until such time that the Airport becomes financially self-sufficient. It is the Airport's intent to become financially self-sufficient within 5 years, based on anticipated local economic growth expected by the City to spur increased activity at the Airport.

The following bullets describe the projected Landing Fee, Terminal Space Fee, and Loading Bridge Fee revenues under the base case airline rates and charges projections.

- Landing Fee revenues decreased by an average of 3.0 percent per year from $132,000 in FY 2014 to $114,000 in FY 2018. Landing Fee revenues are budgeted to decrease slightly in FY 2019 to approximately $111,000. The landing fee remained at $0.52 per thousand pounds during the historical period and in the FY 2019 Budget.

  The financial projections assume that beginning in FY 2020, the Landing Fee rate will be charged based on the residual rate methodology described above. The Net Airfield Requirement is projected to be established at approximately $1.2 million in FY 2020, and it is projected to decrease in FY 2021 and FY 2022, mainly due to the anticipated City cost savings described above. The Net Airfield Requirement is projected to equal approximately $1.2 million in FY 2023 with the start of the projected debt service for new Revenue Bonds assumed to fund certain Airfield capital projects. The Net Airfield Requirement is projected to increase to approximately $1.8 million in FY 2028 (the last year in the PAL 2 time frame), and then to $2.3 million by FY 2041 (the end of the planning horizon).

- Terminal Space Fee revenues increased from $322,000 in FY 2014 to approximately $346,000 in FY 2018 or by an average of 1.4 percent per year. The rental fee revenue decreased slightly, to approximately $327,000 in the FY 2019 Budget. The Terminal Rental Fee remained at $27.23 per square foot during the historical period and in the FY 2019 Budget.

  This analysis assumes that beginning in 2020, the terminal rents will be charged based on the residual rate methodology described above. The Net Terminal Requirement is calculated as the total of O&M Expenses and debt service allocated to the Terminal cost center minus the non-airline revenues associated with the Terminal. The Net Terminal Requirement is projected to be established at approximately $1.2 million in FY 2020, and it is projected to increase in subsequent years with projected increases in the debt service allocated to the Terminal cost center. The Net Terminal Requirement is projected to increase to approximately $1.4 million in 2021 and $1.5 million in FY 2022, mainly due to the projected debt service from a new revenue bond issue to fund the estimated costs of Phase 2 of the Terminal development. The Net Terminal Requirement is projected to increase to $1.6 million by 2041.

- Loading Bridge Fee revenues decreased from approximately $23,000 in FY 2014 to $17,000 in FY 2018, and they are budgeted at approximately $23,000 in FY 2019. The airlines will continue to pay their current fees for loading bridges.

Table 8-9. Airfield Net Requirement

	FY 2020	FY 2021	FY 2022	FY 2023	FY 2028	FY 2033	FY 2038	FY 2041
O&M Expenses:								
Airfield	$ 1,765,797	$ 1,703,202	$ 1,639,777	$ 1,641,392	$ 1,807,864	$ 1,994,671	$ 2,204,400	$ 2,342,445
Apron	252,257	243,315	234,254	234,485	258,266	284,953	314,914	334,635
GA	756,770	729,944	702,761	703,454	774,799	854,859	944,743	1,003,905
Debt Service								
Airfield	-	-	-	203,656	728,403	728,403	728,403	728,403
Apron	-	-	-	-	-	117,169	117,169	117,169
GA	-	-	-	-	23,052	23,052	23,052	23,052
Amortization	-	-	-	-	-	-	-	-
Total Requirement	$ 2,774,823	$ 2,676,461	$ 2,576,792	$ 2,782,986	$ 3,592,383	$ 4,003,105	$ 4,332,681	$ 4,549,609
Minus Revenue Credits:								
Fuel Flowage Fees	$ 151,779	$ 152,876	$ 153,974	$ 155,071	$ 159,496	$ 163,214	$ 166,953	$ 169,235
FBO Revenues	122,520	125,093	127,720	130,402	144,681	160,525	178,103	189,560
Cargo Rentals and Fees	323,179	329,966	336,895	343,970	381,636	423,426	469,793	500,016
Land Rents	929,110	948,621	968,542	988,882	1,097,168	1,217,312	1,350,612	1,437,500
Total Credits	$ 1,526,588	$ 1,556,556	$ 1,587,131	$ 1,618,324	$ 1,782,981	$ 1,964,477	$ 2,165,460	$ 2,296,311
Net Requirement	$ 1,248,235	$ 1,119,905	$ 989,661	$ 1,164,661	$ 1,809,402	$ 2,038,628	$ 2,167,221	$ 2,253,298

Table 8-10. Terminal Space Requirement

	FY 2020	FY 2021	FY 2022	FY 2023	FY 2028	FY 2033	FY 2038	FY 2041
O&M Expenses	$ 2,144,181	$ 2,068,174	$ 1,991,158	$ 1,993,118	$ 2,195,263	$ 2,422,100	$ 2,676,772	$ 2,844,398
Debt Service	-	258,979	517,958	521,057	551,079	551,079	551,079	551,079
Amortization	-	-	-	-	-	-	-	-
Total Requirement	$ 2,144,181	$ 2,327,154	$ 2,509,116	$ 2,514,176	$ 2,746,342	$ 2,973,179	$ 3,227,851	$ 3,395,477
Minus Revenue Credits:								
Rental Car Revenue	$ 467,436	$ 486,320	$ 505,545	$ 525,115	$ 634,783	$ 767,548	$ 922,089	$ 1,028,938
Parking Fees	250,108	257,586	265,064	272,541	313,141	359,880	410,898	444,727
Advertising	29,609	30,231	30,866	31,514	34,965	38,793	43,041	45,810
Ground Rent	129,000	131,709	134,475	137,299	152,334	169,015	187,522	199,586
Other	60,858	62,681	64,513	66,354	75,760	86,086	97,384	104,841
Total Revenue Credits	$ 937,011	$ 968,526	$ 1,000,462	$ 1,032,823	$ 1,210,981	$ 1,421,321	$ 1,660,935	$ 1,823,902
Net Requirement	$ 1,207,171	$ 1,358,627	$ 1,508,654	$ 1,481,352	$ 1,535,360	$ 1,551,857	$ 1,566,916	$ 1,571,574

Based on the calculations shown above, airline revenues are presented to increase from approximately $462,000 in 2019 to $4.0 million in 2041 (Table 8-11).

Table 8-11. Projected Airline Revenues

Revenue Categories	Budget FY 2019	Projected FY 2020	FY 2021	FY 2022	FY 2023	FY 2028	FY 2033	FY 2038	FY 2041
Landing Fees [1]	$ 111,500	$ 1,248,235	$ 1,119,905	$ 989,661	$ 1,164,661	$ 1,809,402	$ 2,038,628	$2,167,221	$ 2,253,298
Terminal Space Fees	327,400	1,207,171	1,358,627	1,508,654	1,481,352	1,535,360	1,551,857	1,566,916	1,571,574
Loading Bridge Fees	23,300	126,128	121,657	117,127	117,242	129,133	142,476	157,457	167,318
Total Airline Revenues	$ 462,200	$ 2,581,534	$ 2,600,189	$ 2,615,442	$ 2,763,256	$ 3,473,895	$ 3,732,962	$3,891,593	$ 3,992,190

[1] Landing fees include landing fee revenue received from passenger and cargo airlines.

Based on the projections of the various non-airline and airline revenue categories described above, the projections of total Revenues are summarized in Table 8-12.

Table 8-12. Projected Revenues

Revenue Categproes	Budget 2019	Projected FY 2020	FY 2021	FY 2022	FY 2023	FY 2028	FY 2033	FY 2038	FY 2041
Non-Airline Revenue									
Fuel Flowage Fees	$ 148,000	$ 151,779	$ 152,876	$ 153,974	$ 155,071	$ 159,496	$ 163,214	$ 166,953	$ 169,235
FBO Revenue	120,000	122,520	125,093	127,720	130,402	144,681	160,525	178,103	189,560
Cargo Rentals and Fees	199,000	323,179	329,966	336,895	343,970	381,636	423,426	469,793	500,016
Ground Rent	910,000	1,058,110	1,080,330	1,103,017	1,126,181	1,249,501	1,386,326	1,538,134	1,637,086
Rental Car Revenue	450,000	467,436	486,320	505,545	525,115	634,783	767,548	922,089	1,028,938
Parking Fees	243,237	250,108	257,586	265,064	272,541	313,141	359,880	410,898	444,727
Advertising	29,000	29,609	30,231	30,866	31,514	34,965	38,793	43,041	45,810
Other Non-Airline Reven	59,100	60,858	62,681	64,513	66,354	75,760	86,086	97,384	104,841
Subtotal Non-Airline Rever	$ 2,158,337	$ 2,463,599	$ 2,525,083	$ 2,587,592	$ 2,651,148	$ 2,993,963	$ 3,385,798	$3,826,395	$ 4,120,213
Airline Revenue									
Landing Fees[1]	$ 111,500	$ 1,248,235	$ 1,119,905	$ 989,662	$ 1,164,661	$ 1,809,402	$ 2,038,628	$2,167,220	$ 2,253,298
Terminal Space Fees	327,400	1,207,171	1,358,627	1,508,654	1,481,352	1,535,360	1,551,857	1,566,916	1,571,574
Loading Bridge Fees	23,300	126,128	121,657	117,127	117,242	129,133	142,476	157,457	167,318
Subtotal Airline Revenues	$ 462,200	$ 2,581,534	$ 2,600,189	$ 2,615,443	$ 2,763,256	$ 3,473,895	$ 3,732,962	$3,891,593	$ 3,992,189
Total Revenue	$ 2,620,537	$ 5,045,133	$ 5,125,272	$ 5,203,035	$ 5,414,403	$ 6,467,858	$ 7,118,760	$7,717,988	$ 8,112,402

[1] Landing fees include landing fee revenue received from passenger and cargo airlines.

8.7 Airline Cost per Enplaned Passenger

Airline cost per enplaned passenger (CPE) is an important metric that airports and airlines use to assess the cost of operating at a particular airport. Included in Table 8-13, CPE is calculated by dividing the passenger airline revenues (passenger landing fee revenues, terminal space fee revenues, and loading bridge fees) by the total enplanements. The projections of CPE assume that the City will continue to subsidize the Airport at the current rate of approximately $1.8 million per year, until such time that the Airport is financially self-sufficient. It is the Airport's intent to become financially self-sufficient within 5 years, based on anticipated local economic growth expected by the City to spur increased activity at the Airport. The CPE is projected to increase in FY 2020 with the implementation of the cost-recovery rate methodology and the increased debt service requirements resulting from the funding of the capital program. The CPE for the FY 2019 Budget is calculated as $3.71. The CPE is projected to increase to $4.19 in FY 2020, $4.39 in FY 2022, and $4.93 in FY 2023.

Table 8-13. Projected Airline Cost Per Enplanement

		FY 2020	FY 2021	FY 2022	FY 2023
O&M Expenses		$5,045,133	$4,866,293	$4,685,076	$4,689,690
Debt Service		0	258,979	517,958	724,714
Total Requirement		$5,045,133	$5,125,272	$5,203,035	$5,414,404
Less: Nonairline Revenues		(2,463,599)	(2,525,083)	(2,587,592)	(2,651,148)
Less: City Subsidy		(1,800,000)	(1,800,000)	(1,800,000)	(1,800,000)
To be Recovered from Airlines		$781,534	$800,189	$815,442	$963,256
Cargo Landing Fees	39%	(267,746)	(228,081)	(191,150)	(233,467)
Net Requirement for PAX airlines		$513,787	$572,108	$624,293	$729,789
Enplanements		130,678	136,473	142,268	148,064
Airline Cost per Enplanement		$3.93	$4.19	$4.39	$4.93

[1] For calculating the airline cost per enplanement, landing fees from cargo airlines are excluded.

8.8 Summary and Conclusions

The recommended funding plan for the Master Plan capital projects includes the following sources: FAA AIP Grants (Entitlements and Discretionary funds), PFCs, State Grants (TexDOT), third-party financing, and revenue bonds. In developing the funding plan, the eligibility of each project was established to fully utilize all of the federal and state funding resources that could be available to BRO. These sources were evaluated against project eligibility to determine the best use of each funding source. The Airport’s AIP entitlement grants throughout the forecast period were projected based on the enplanement forecast and matched against the anticipated AIP-eligible project costs. AIP-eligible costs in excess of projected AIP entitlement funds were considered for AIP discretionary funding, based on the nature of each project. PFC funding was identified for all projects meeting the FAA’s eligibility and were subject to the projected availability of PFC revenues. State grant funding was assumed for appropriate project costs with third Party financing assumed for selected projects. Project costs not anticipated to be funded with PFCs, AIP, TexDOT grants, and third-party financing are assumed to be funded with revenue bonds.

The largest funding source estimated for the proposed Master Plan capital projects is AIP entitlements and discretionary grants ($205.5 million, or 68.5 percent of the total estimated Master plan project costs). Approximately $16.2 million, or 5.4 percent of the total project costs, are estimated to be eligible for PFC funding. The funding plan assumes that bonds will be issued to fund those PFC-eligible costs, and a portion of annual PFC collections will be used to pay the bond debt service. Approximately $0.7 million in project costs are assumed to be funded with TexDOT grants, $45.7 million in costs are assumed to be funded privately through third-party financings, and $31.7 million in project costs are assumed to be funded with the proceeds of revenue bond financings.

The financial analysis presented in this chapter assumes that the City will create a cost recovery system for airline rates and charges. Specifically, the analysis assumes that the City will establish an airline rate methodology under which the airlines are responsible for paying all costs of operating, maintaining, and improving the Airport, net of the revenues provided by non-airline tenants and users of the Airport, and net of the annual City subsidy to the Airport. The analysis assumes that the City will continue to provide an annual subsidy of $1.8 million. The rate methodology is assumed to start with the total costs of operating, maintaining, and improving the Airport, and then all revenues other than airline revenues would be subtracted from the total costs. Also netted against total costs would be the City’s annual subsidy of $1.8 million. The airlines would be responsible for paying the resulting “residual” amount (the amount left over after crediting all non-airline revenues and the City subsidy).

CPE is an important metric that airports and airlines use to assess the cost of operating at a particular airport. CPE is calculated by dividing the passenger airline revenues (passenger landing fee revenues, terminal space fee revenues, and loading bridge fees) by the total enplanements. The CPE is projected to increase in FY 2020 with the implementation of the cost-recovery rate methodology and the increased debt service requirements resulting from the funding of the capital program. The CPE for the FY 2019 Budget is calculated as $3.71. The CPE is projected to increase to $4.19 in FY 2020, $4.39 in FY 2022, and $4.93 in FY 2023. This level of CPE would be in line with airports of a similar size to BRO, which reported 2017 CPE levels between $1.85 and $9.09. With a CPE below $5.00, BRO would continue to be very cost competitive on a national and regional basis.

FINAL REPORT

Airport Layout Plan Drawing Set Description

Prepared for

Brownsville South Padre Island International Airport

August 2019

9191 South Jamaica Street
Englewood, CO 80112
(303) 771-0900

Contents

Acronyms and Abbreviations

AC	Advisory Circular
AIP	Airport Improvement Program
ALP	Airport Layout Plan
CFR	Code of Federal Regulations
FAA	Federal Aviation Administration
GA	general aviation
RPZ	Runway Protection Zone
SOP	standard operating procedure

Airport Layout Plan Drawing Set Description

An Airport Layout Plan (ALP) drawing set was prepared as part of this Master Plan to reflect the airport master plan findings. An ALP is a set of drawings that depicts the existing and proposed facilities over the next 20 years. In addition, an ALP also includes an airspace obstruction analysis, land use, and airport property information. A brief description of each drawing and its content is included below.

An approved ALP is required by the Federal Aviation Administration (FAA) prior to implementing airport development projects and to receive financial assistance. This ALP drawing set was developed in compliance with various FAA and other federal guidance, including:

- Current FAA standard operating procedures (SOP Nos. 2.00 and 3.00) checklists dated October 1, 2013
- FAA Advisory Circular (AC) 150/5070-6B, *Master Plans*, Change 2
- FAA AC 150/5300-13A, *Airport Design*, Change 1 (or as amended)
- FAA AC 150/5060-5, *Airport Capacity and Delay*
- FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*
- FAA Engineering Brief 75, *Incorporation of Runway Incursion Prevention into Taxiway and Apron Design*
- FAA *Interim Guidance Memorandum on Land Uses within the Runway Protection Zone*
- 14 Code of Federal Regulations (CFR) Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace*
- FAA Order 5100.38C/5100.38D, *Airport Improvement Program (AIP) Handbook*
- FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems*
- Other applicable ACs and changes, FAA Orders, and Federal Aviation Regulations

9.1 Airport Layout Plan Sheet

9.1.1 Sheet 1: Cover Sheet

The cover sheet identifies the airport's general information such as airport name and general location and vicinity maps, as well as revision blocks, signature letter and stamp for FAA approval, and grant number if applicable. The cover sheet also includes an index of the sheets of the ALP set.

9.1.2 Sheet 2: Data Sheet

The data sheet presents basic airport and runway data in a tabular format. Main elements include wind rose data, runway and taxiway data tables, as well as modifications to airport design standards and general notes.

9.1.3 Sheets 3 and 4: Airport Layout Plan

The ALP sheet presents existing and future airport features, such as runways, taxiways, aprons, elevations and details, imaginary surfaces, Runway Protection Zone (RPZ) details, Runway and Taxiway Safety Areas and Obstacle Free Areas, approach details, visual approach aids, and building restriction lines buildings. For clarity purposes, the sheets have been split into Existing Airport Layout Plan (Sheet 3) and Future Airport Layout Plan (Sheet 4).

9.1.4 Sheet 5: Terminal Area Plan

This plan is a close-up of the ALP sheet and it identifies future development plans for the terminal area, including terminal building footprint, apron and aircraft parking position, hangars, taxilanes, access road, and automobile parking areas.

9.1.5 Sheet 6, 7 and 8: General Aviation Plan

This plan is a large-scale depiction of general aviation (GA) areas. It identifies existing and future GA facilities including hangars, aprons, taxilanes, fueling areas, access road, and automobile parking areas. For clarity purposes, this plan has been split into three sheets depicting various areas of the airport planned for GA use.

9.1.6 Sheet 9: Cargo Area Plan

This plan is similar to the terminal area and GA plans. It is a close-up of the ALP sheet and identifies future development plans for the cargo area including cargo facilities, cargo terminal building footprint, apron and aircraft parking position, hangars, taxilanes, access road, and automobile parking areas.

9.1.7 Sheets 10 and 11: Airspace Plan

The airspace plan shows all areas under the imaginary surfaces as defined in 14 CFR Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace*. This plan depicts the approach surface using 50-foot contour intervals and includes airspace obstructions for the portions of the imaginary surfaces not visible on the inner approach plans.

9.1.8 Sheet 12: Airspace Data

The airspace data sheet identifies airspace obstruction data in a tabular format. It identifies all significant objects within the approach surface including top elevations and short descriptions.

9.1.9 Sheets 13: Airspace Profile

The airspace profile sheet depicts the ground profile along the extended runway centerline for the portions of the imaginary surfaces not visible on the inner approach plans and represents the composite profile, based on the highest terrain across the width and along the length of the approach surface.

9.1.10 Sheets 14 through 17: Inner Approach Plans

The inner approach plans depict plan and profile view of the inner portion of the approach surface and RPZ for each runway.

9.1.11 Sheets 18 through 21: Runway Departure Surface

The runway departure surface drawings depict plan and profile view of the 40:1 departure surface for each runway.

9.1.12 Sheet 22: Obstruction Data Tables

The obstruction data sheet identifies inner approach and departure surface obstructions data in a tabular format. It identifies all significant objects within the approach and departure surfaces including top elevations and short descriptions.

9.1.13 Sheet 23: Land Use Plan

The land use plan depicts the existing and recommended uses of land within the airport property boundary and near the airport. It includes aeronautical and non-aeronautical land uses within the ultimate airport property and airport vicinity.

9.1.14 Sheets 24: Airport Property Map/Exhibit A

The Exhibit A/Airport Property Map is a drawing depicting current and future airport boundary, including easements beyond the airport boundary. A data table and/or notes show an inventory of all parcels by number, including acreage, prior owner, recording information (book and page), data of recording, federal funding project number, and type of interest.

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Appendix A
Brownsville South Padre Island International Airport
Solid Waste and Recycling Plan
Technical Memorandum

TECHNICAL MEMORANDUM

Brownsville South Padre Island International Airport Solid Waste and Recycling Plan

PREPARED FOR:	City of Brownsville, Texas
COPY TO:	
PREPARED BY:	CH2M HILL, Inc
DATE:	January 2, 2018
PROJECT NUMBER:	423356
REVISION NO.:	

Brownsville South Padre Island International Airport (BRO) is located at the southern tip of Texas, approximately 280 miles south of San Antonio in the county of Cameron. BRO is situated within the city limits of Brownsville, Texas, four miles east of downtown Brownsville.

The airport acts as a gateway to South Padre Island, which is a popular summer vacation area. In addition, BRO is the closest state commercial-service airport to the Matamoros region of Mexico, hence serving as the front door to the U.S. from Mexico. It is a key airport facilitating trade between the U.S. and Mexico, supporting the North American Free Trade Agreement (NAFTA); a Free Trade Zone (FTZ) is located at BRO.

The Federal Aviation Administration (FAA) defines BRO as a nonhub primary airport in the 2017-2021 National Plan of Integrated Airport Systems (NPIAS). The NPIAS defines nonhub primary airports as those with commercial services that enplane less than 0.05 percent of all commercial passenger enplanements, but have more than 10,000 annual enplanements. American Airlines and United Airlines currently provide year-round service at BRO. In addition to the year-round service, flight schedules are impacted by short-term seasonal variations (e.g. during spring break).

The estimated population growth for the region, including Brownsville, Harlingen, and Raymondville, has been projected to reach 670,763 in 2035, up from 451,001 in 2015 (Woods & Poole, 2017). This is based on an average annual growth rate of 2 percent.

BRO is currently in the process of updating its airport master plan. The purpose of the airport master planning process is to plan for future aviation demand at the airport over a 20-year planning horizon. The last airport master plan at BRO was completed in 1997.

CH2M has prepared this Solid Waste and Recycling Plan in requirement with Public Law 112-95, the Federal Aviation Administration (FAA) Modernization and Reform Act of 2012, which requires airport sponsors complete a Solid Waste and Recycling Plan as part of the master planning process. Public Law 112-95 includes specific recycling, reuse, and waste reduction planning requirements:

- Section 132 (b) requires airport planning projects to include, “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 requires the plan to include six components:
  - Waste audit
    - Sources of airport waste

    - Fate of airport waste
  - Feasibility of solid waste recycling
  - Minimizing generation of solid waste
  - Operations and maintenance requirements
  - Waste management contract review
  - Potential for cost savings or generation of revenue

Three references were used to guide the discussion on each of the Section 133 plan elements:

- Public Law 112-95, FAA Modernization and Reform Act of 2012.
- *Recycling, Reuse, and Waste Reduction at Airports: A Synthesis Document*. Prepared by the Office of Airports Federal Aviation Administration. April 24, 2013. https://www.faa.gov/airports/resources/publications/reports/environmental/media/recyclingsynthesis2013.pdf.
- Guidance on Airport Recycling, Reuse, and Waste Reduction Plans. September 30, 2014. https://www.faa.gov/airports/environmental/media/airport-recycling-reuse-waste-reduction-plans-guidance.pdf.

Each of the required plan elements are discussed in this technical memorandum as they pertain to BRO, in addition to recommendations for improving the current waste reduction efforts at BRO.

Waste Audit

The purpose of this section of the plan is to identify and characterize the sources and fate of solid waste at BRO. According to the FAA *Synthesis Document* (2013), eight main types of waste are typically found at airports:

- Municipal solid waste (MSW)
- Construction and demolition waste
- Green waste
- Food waste
- Waste from aircraft flights (deplaned waste)
- Lavatory waste
- Spill cleanup and remediation wastes
- Hazardous waste

Using guidance from the *Synthesis Document* (FAA, 2013), a review of seven potential sources of waste was completed:

- Terminals
- Airfields
- Aircraft maintenance hangars
- Cargo hangars
- Flight kitchens
- Administrative offices
- Construction projects

Potential sources of waste at BRO include the passenger terminal building, airfield, and two fixed based operators (FBOs). There may be additional sources from tenants in buildings on airport property, though these tenants are not directly associated with airport operations.

Several interviews were conducted with various airport staff and airport tenants to obtain information on the current sources and fate of airport waste. Table 1 summarizes the airport tenant contacts and FBOs that were interviewed.

Table 1. Airport Contacts, FBOs, and Tenants Interviewed
BRO Solid Waste and Recycling Plan

Location/Tenant	Contact
Hunt Pan Am Aviation (FBO)	Danny Perez Director of Maintenance T: (956) 542-9111 E: danny.huntpanam@gmail.com
Southmost Aviation (FBO)	Benton Douglas General Manager T: (956) 542-5852 E: flyboytx@yahoo.com
Airport Terminal Services	Denise Mathers Station Manager T: (956) 982-6942 E: dmathers@atsstl.com
Air Traffic Control Tower	Billy Whiting T: (956) 546-4936 E: bro@rvainc.com
Transportation Security Administration (TSA)	Kevin Crossley Transportation Security Manager T: (956) 547-3794 E: kevin.crossley@tsa.dhs.gov
Envoy Air	Robert Silguero Lead Agent T: (956) 550-0737 E: robert.silguero@aa.com
Cameron County Court Residential Treatment Center	Gene Loya Assistant Director T: (956) 243-9800 E: gene.loya@cameroncscd.org
International Dielectric Products	Matthew Wyatt President T: (956) 541-8890 E: idpi@sbcglobal.net
Allied Skills	Thomas Solano T: (956) 548-2100 E: alliedskills@yahoo.com
Little Farm Frozen Foods	Eduardo Lash T: (956) 554-5402 E: eduardo.lash@lahuerta.com.mx
Airport Enterprises (Private Hangar)	Marsletta Knapp T: (956) 592-5711 E: mknapp@tipotexchevrolet.com
Grant Products International	Douglas Sloane Operations Manager T: (956) 542-2620 E: dsloane@grantproducts.com
MVP Plastics	Felix Garcia General Manager

Table 1. Airport Contacts, FBOs, and Tenants Interviewed
BRO Solid Waste and Recycling Plan

Location/Tenant	Contact
	T: (469) 221-3797 E: felixg@mvpplastics.com
Portage Plastics 80	Tony Cappella Director T: (956) 504-6102 E: tcappella@portageplastics.com
Trico Products	George Rigney Manager Aftermarket T: (956) 544-2722, Ext. 4536 E: george.rigney@tricoproducts.com

Each interviewee was asked a series of questions to assess the sources and fate of waste and the feasibility of recycling. A summary of these interviews is discussed below, full interview records and email correspondence are included in Attachment 1.

Airport Operations and Passenger Enplanements Summary

BRO is utilized by both civilian and military aircraft. As discussed above, current airline service at BRO is provided by American Airlines and United Airlines; Immigrations and Customs Enforcement (ICE) also has flight activity at BRO. General Aviation (GA) activity consists of use by single-engine, multi-engine, and turbo prop aircraft, jets, and helicopters and approximately 80 percent of GA operations are itinerant. There are other major tenants on airport property, such as Airport Enterprises, Commemorative Air Force Museum (lease ending in January 2018), Little Farm Frozen Foods, and Mirage Aviation, which have based aircraft at the airport. ICE has used BRO since 2013 as a transfer point for undocumented immigrants to be deported out of the country. These operations are categorized under airport commercial operations, along with air cargo and air taxi services. Representative aircraft for the existing and forecast fleet at BRO include the Embraer 145, Embraer 135, Embraer 140, Embraer 175, Canadair RJ-200ER, CRJ-700, CRJ-900, MD80, and Boeing 737-400. Table 2 provides a brief summary of activity over the planning period.

Table 2. Airport Activity Summary
BRO Solid Waste and Recycling Plan

Operations	Quantity/Percentage of Total 2015	Quantity 2035
Commercial Operations	10,259/32	14,068
General Aviation Operations	13,882/43	13,510
Military Operations	8,143/25	8,200
Passenger Enplanements	**Total 2015**	**Total 2035**
Annual Enplanements	108,473	181,509

Source: BRO statistics, 2017; USDOT T-100 Data.

Supporting aircraft operations and passenger enplanements include a passenger terminal, two FBOs, airport maintenance facilities, and various other tenant-leased or tenant-operated facilities such as hangars, manufacturing facilities, and administrative offices. Following are brief descriptions of the various facilities.

Fixed Base Operators

BRO has two FBOs: Hunt Pan Am Aviation and Southmost Aviation. Both FBOs provide typical FBO services for private and corporate aviation, as well as for airlines, such as fueling, catering, lavatory service, rental car services, ground support, tie-down space, and hangar space.

Hunt Pan Am Aviation

Hunt Pan Am Aviation is one of two FBOs at BRO. Hunt Pan Am Aviation has operated since 1975 and is the largest full-service FBO in Brownsville (Hunt Pan Am Aviation, 2017). There are 24 employees that work over a facility size spanning 121,740 square feet. Hunt Pan Am Aviation contracts directly with the waste removal company selected by the City of Brownsville (City)/Brownsville Public Utilities Board (BPUB), receiving service once a week. The facility's waste stream consists primarily of MSW (300 pounds per month), cardboard (50 pounds per month), plastic bottles/containers (40 pounds per month), shop rags (20 pounds per month), and aluminum (10 pounds per month). There are currently no recycling practices in place at Hunt Pan Am Aviation, although there is interest in doing so.

Southmost Aviation

Southmost Aviation is the second of two FBOs at BRO. Southmost Aviation has provided BRO with FBO services for nearly 60 years. Hours of operation are from 7:00 AM to 10:00 PM, seven days a week. There are nine employees that work over a facility size spanning 28,000 square feet, including a food service area/break room. Southmost Aviation contracts directly with the waste removal company selected by the City/BPUB and employees spend approximately 20 minutes per day emptying trash. The facility's waste stream consists primarily of MSW (95 percent), cardboard (2 percent), plastic bottles/containers (1 percent), tires (1 percent), batteries (1 percent), and used fluids (1,240 gallons of oil and fuel). Southmost Aviation reports that they do not currently recycle since their recyclables volume is very limited. However, upper management and staff are supportive of a recycling program and indicate that plastic bottles would be a good starting material.

Airfield and Passenger Terminal Building

BRO has one passenger terminal building with two gates. There are several tenants within the main terminal building as well as on the airfield that are essential to airport operations. These tenants provide services such as air traffic control, passenger screening and security, airline flights, food service, and passenger services and ramp handling.

BRO contracts directly with the waste removal company selected by the City/BPUB and has a 3-yard and an 8-yard waste bin that are serviced two to three times per week. The airport has approximately 25 to 30 16-gallon waste bins scattered throughout common areas in the passenger terminal building. It is primarily airport employees that empty these bins, twice daily on average and as needed. Waste generated in the common areas of the airport consist mainly of plastic bottles and paper products. The airport is open to incorporating recycling programs, but would need to perform the necessary evaluations on staff and costs to determine feasibility (Schroeder, 2017a).

The airport utilizes Centerra to perform fleet maintenance and subsequent waste disposal coordination. H&H Oil Company picks up used oil/fluids, used oil filters, used oil absorbent, and oily rags once every four weeks. The average quantity of used oil/fluids that is disposed of annually is 3,200 gallons. Centerra hauls used tires to the City of Brownsville MSW Landfill, where they are shredded. Used batteries are picked up by the vendor when new batteries are purchased (Torres, 2017).

Air Traffic Control Tower

The Air Traffic Control Tower has five employees and operates 365 days per year. There are one or more employee breakrooms at the tower. Waste removal is contracted through the airport, with an airport janitor servicing the tower five days a week. The waste stream from the tower consists of food scraps, cardboard, and plastic bottles/containers.

Envoy Air

Envoy Air is a subsidiary of the American Airlines Group and provides regional service at BRO. Hours of operation for Envoy Air are from 3:30 AM to 6:00 PM, seven days a week. There are 15 employees at BRO where American Airlines also holds office space and a break room. Envoy Air's waste contract is set up through the airport although American Airlines employees remove trash nightly. The waste stream for this portion of the airport consists primarily of MSW (32 percent), plastic bottles/containers (18 percent), glass (16 percent), aluminum (13 percent), cardboard (11 percent), food waste (7 percent), and fats/oils/grease (3 percent). Scrap metal, tires, batteries, and used fluids are taken to Dallas-Fort Worth for disposal. Envoy Air reports that although they have a corporate recycling program called "Anything That Tears" (which allows almost all office paper to be recycled), they do not recycle at BRO. However, Envoy Air noted that it would be feasible to add recycling bins to their areas and that upper management and staff are very supportive of recycling initiatives if the airport implemented a program.

Airport Terminal Services

Airport Terminal Services provides passenger services and ramp handling at BRO. Hours of operation for Airport Terminal Services are from 4:00 AM to 12:30 AM, seven days a week. There are 27 employees that service the ticket counter, ramp, and office space, including one break room. Air Terminal Services employees spend 20 minutes at the end of each day consolidating trash. The waste stream consists primarily of cardboard, aluminum, and food waste.

Transportation Security Administration (TSA)

TSA provides security services at the security checkpoint and baggage check. Hours of operation for TSA are from 3:30 AM to 7:30 PM, seven days a week. Their facilities span 400 square feet and include a break room for employees. TSA's waste contract is set up through the airport and airport staff remove trash twice a day. Recycling practices are not employed in TSA areas except for what is recycled through their contract with Lone Star Shredding. There are no recycling receptacles in TSA's area of operations and the TSA contact relayed that he would be hesitant to implement a recycling program since he would have to assign an employee to the task.

Amelia's Café

Amelia's Café is the sole restaurant at the airport. The restaurant does not have a recycling program in place and waste is estimated to consist mainly of plastic bottles, paper products, and some food waste. The restaurant also generates grease waste in their grease traps, which are emptied at least once every six months, depending on the volume as well as the local company servicing the tank (Schroeder, 2017b).

Other Tenants Not Related to Airport Operations

There are over 50 tenants that reside on BRO property with the majority being non-essential and completely separate from airport operations. These tenants do business in a range of industries from manufacturing to office administration. Following are descriptions of a sampling of the tenant's businesses and key information from the waste audit.

Cameron County Court Residential Treatment Center

The Cameron County Court Residential Treatment Center assists probationers with job skills, job placement, behavioral modifications, and counseling to help them comply with conditions set forth for their probation. Located at 531 South Iowa Avenue and spanning approximately 11,000 square feet, the facility staffs 26 employees. The facility is open 24 hours a day, seven days a week and includes a full kitchen and dining area. The Cameron County Court Residential Treatment Center contracts directly with the waste removal company selected by the City/BPUB and has a 4-yard waste bin that is serviced twice a week. Twice daily, employees consolidate the facility's trash which primarily consists of food waste, fats/oils/grease, and MSW. Recycling efforts at the facility consist of plastics collection which is taken to the Port of Brownsville Recycling Center. The facility indicated that it would be feasible to add more recycling bins to the premises, that upper management would support recycling, but that modifications to the recycling policy would need to come from Cameron County.

International Dielectric Products
International Dielectric Products manufactures tubing products that are used in industrial and electrical applications (IDP, 2015). Located at 2025 Billy Mitchell Boulevard and spanning approximately 8,000 square feet, the facility staffs six employees. The facility is open Monday through Friday from 8:00 AM to 4:30 PM and includes one or more food break rooms. International Dielectric Products contracts directly with the waste removal company selected by the City/BPUB and has 3-yard waste bin that is serviced once a week. Every day, employees consolidate the facility's trash which primarily consists of MSW (85 percent of which is plastic film), cardboard (10 percent of waste stream), plastic bottles, and food waste. The facility does not currently have recycling procedures in place and does not think that it would be feasible to add recycling bins onsite.

Allied Skills
Allied Skills is training center for welding careers (Allied Skills, 2012). Located at 2045 Les Mauldin Road and spanning approximately 4,600 square feet, the facility staffs three employees. The facility is open Monday through Friday from 7:30 AM to 6:00 PM and does not include any food service areas or break rooms. Allied Skills currently performs their own recycling and collects cardboard, newspaper, plastic, and aluminum cans. Scrap metal comprises 70 percent of their waste stream with other materials comprising five percent or less (MSW, cardboard, aluminum, and plastic bottles/containers). The facility indicated that it would not be feasible to add more recycling bins, but that upper management is supportive of recycling.

Little Farm Frozen Foods
Little Farm Frozen Foods grows and distributes frozen organic vegetables from a local farm (Little Farm, 2017). Located at 1919 Billy Mitchell Boulevard and spanning approximately 22,500 square feet, the facility staffs ten employees. The facility is open Monday through Friday from 9:00 AM to 6:00 PM and includes one break room. Little Farm Foods contracts directly with the waste removal company selected by the City/BPUB and has an 8-yard waste bin that is serviced once per week. The staff take ten minutes per day to empty trash which primarily consists of a minimal amount of food and cardboard. The facility currently contracts with RedFish Recycling for collection of metal, paper, plastic, and glass and has indicated that it may be possible to add more recycling initiatives to their program.

Airport Enterprises
Airport Enterprises has owned a private hangar on airport property for almost 50 years. Several private airplanes are housed in the hangar. Located at 585 Amelia Earhart Drive, the facility spans approximately 4,000 square feet and is used for storage more so than operations. The tenant contact reported that there may be people at the hangar for up to eight hours in a given week. There are no food service areas and trash is collected in a single 32-gallon can. The tenant collects the trash once a month and takes it offsite for disposal, thus no waste removal company services this building. The tenant indicated that RedFish Recycling collects recyclables at her workplace but that, in general, recycling practices are very poor in Brownsville. She relayed that the public is very supportive about recycling and hopes that BRO airport will implement recycling procedures.

Grant Products International
Grant Products International manufactures motor vehicle parts and accessories. The facility is located at 615 Elca Lane and spans approximately 20,000 square feet. Business hours are Monday through Friday

from 8:00 AM to 5:00 PM. Grant Products International contracts directly with the waste removal company selected by the City/BPUB and has a 3-yard waste bin that is serviced once per week. Every day, employees consolidate the facility's trash which consists primarily of MSW, food waste, cardboard, aluminum, and plastic bottles/containers. The facility currently contracts with RedFish Recycling and indicates that upper management is supportive of recycling.

MVP Plastics

MVP Plastics manufactures plastics and molding. Located at 615 Elca Lane and spanning approximately 20,000 square feet, the facility staffs ten employees and is open five days a week for 10 to 16 hours each day. There is a break room, but no vending machines. MVP Plastics contracts directly with the waste removal company selected by the City/BPUB and has a 4-yard waste bin that is serviced once per week. Employees spend one hour per day consolidating trash which consists primarily of cardboard, plastic bottles, and food scraps. The facility does not currently recycle and states that in order to implement recycling, there would need to be a higher volume of recyclables to make it a worthwhile decision.

Portage Plastics

Portage Plastics manufactures plastic packaging. Located at 1900 Billy Mitchell Boulevard and spanning approximately 70,000 square feet, the facility staffs 40 employees and is open 24 hours a day for either five or seven days a week. There is one or more break rooms for employees. Portage Plastics contracts directly with the waste removal company selected by the City/BPUB. Employees spend 1.5 hours a day consolidating trash that consists primarily of MSW (97 percent) and minimal amount of food, fats/oils/grease, cardboard, aluminum, plastic bottles/containers, scrap metal, and batteries. Portage Plastics reports that 99 percent of their manufacturing material is recycled in the manufacturing process. Outside of this, the facility sends oils/grease, cardboard, aluminum, and scrap metal to local recyclers. Spent batteries are returned to the fork lift vendors. Recycling practices are ingrained in this facility, however, the facility contact noted that recycling is very poor in Brownsville culture.

Trico Products

Trico Products manufactures windshield wipers. Located at 1995 Billy Mitchell Boulevard and spanning approximately 325,000 square feet, the facility staffs 55 employees and is open 13 hours per day, five days per week. There is one employee breakroom. Trico Products contracts directly with the waste removal company selected by the City/BPUB. Every day, employees consolidate trash that consists primarily of cardboard, small amounts of food waste, small amounts of scrap metal, soda cans, and soda bottles. The facility currently contracts with RedFish Recycling for cardboard, paper, stretch wrap, and plastic.

Fate of Airport Waste

GMS Waste Disposal, under contract by the City with billing handled through BPUB, currently provides solid waste hauling services to BRO and many airport tenants. The collected MSW is taken to the City of Brownsville MSW Landfill, an MSW facility located approximately five miles northeast of the airport. The waste and recycling collection and hauling system at the airport falls into the decentralized model (FAA, 2013) where some tenants contract directly with the City/BPUB (GMS Waste Disposal) for solid waste collection and others are covered under BRO's monthly collection by GMS Waste Disposal.

The City is evaluating proposals for a new commercial and industrial solid waste collection contract to start in 2018. The bid solicitation period closed on November 8, 2017 and the City is in the process of bid evaluation. The request for proposal documents do not include scope to extend services to recyclables other than assistance operating the City's existing recycling centers.

Feasibility of Solid Waste Recycling

As discussed in the FAA Synthesis document (FAA, 2013) and the FAA Memo (SanMartin, 2014), there are multiple factors that influence the feasibility and effectiveness of an airport solid waste and recycling program. These factors include:

- Local markets for recyclable commodities
- Cost for transport and processing recyclables
- Local recycling infrastructure
- Willingness of an airport and its tenants to implement recycling programs
- The nature of an airport's waste stream
- Competition between recycling and landfilling firms
- Airport layout and logistics

The City is "the largest city in the Rio Grande Valley" and "covers nearly 150 square miles" (City of Brownsville, 2017). Table 4 summarizes the recycling opportunities available within the city. For commercial customers, there are three options for commercial recycling collection: RedFish Recycling, Alandro Resources, and Brownsville Scrap Paper. Each entity offers recycling of varying materials, but all three accept cardboard, plastic, and aluminum cans. In addition to the three that offer collection services, there are also additional locations that accept drop-off of materials.

Additionally, in 2014 a six-month pilot recycling program was implemented at 1,200 homes (approximately 2 percent of homes) in the City of Brownsville (United Brownsville, 2014a). Allied Waste (now Republic Services) supported this grassroots pilot program, which consisted of each household placing commingled recyclables (plastic bottles, aluminum cans, and newspapers) in a single bin for curbside pick-up (United Brownsville, 2014b). Although Republic Services currently only provides residential service to the City of Brownsville, the waste company may be a possible resource for future recycling efforts at the airport.

Table 4. Recycling Options in the City of Brownsville
BRO Solid Waste and Recycling Plan

Material	Port of Brownsville Recycling	Wilkinson Jim Iron & Metal Inc	Brownsville Scrap Paper[a]	Alandro Resources[a]	All Star Shredding	RedFish Recycling[ab]	Brownsville City Recycling Center
Paper			X			X	X
Newspaper			X			X	X
Cardboard			X	X		X	X
Plastic			X	X		X	X
Glass							
Aluminum	X	X	X	X	X	X	
Steel		X	X		X		
Other Metals	X	X	X	X	X		
Used Oil							X
Electronic Devices				X			

Table 4. Recycling Options in the City of Brownsville
BRO Solid Waste and Recycling Plan

Material	Port of Brownsville Recycling	Wilkinson Jim Iron & Metal Inc	Brownsville Scrap Paper[a]	Alandro Resources[a]	All Star Shredding	RedFish Recycling[ab]	Brownsville City Recycling Center

Notes:

[a] These vendors offer pick-up/hauling services. Frequency and level of service would need to be negotiated.
[b] RedFish Recycling is a popular choice for tenants who currently recycle.

There are opportunities to expand recycling at the airport, especially with regards to paper, plastic bottles, and aluminum cans. RedFish Recycling is already contracted to collect these materials by multiple airport tenants whose operations are unrelated to the airport. RedFish Recycling advertises that commingled recyclables can be thrown into a single bin that they provide, to be sorted at their facility. Alandro Resources and Brownsville Scrap Paper also advertise pick-up services for various materials (cardboard, plastic, aluminum, and other metals for both companies, with Brownsville Scrap Paper further accepting paper and newspaper). Of the surveyed tenants, nearly all expressed that upper management would be supportive of recycling initiatives. Though BRO is a relatively small airport and may not produce recyclable quantities to justify the financial investment, a concerted effort by the airport to centralize recycling across its property could increase participation and subsequently incur worthwhile recyclable volumes.

Minimizing Generation of Solid Waste

U.S. Environmental Protection Agency's (EPA) Waste Management Hierarchy illustrates the range of options available to handle BRO's solid waste with the most preferred option being source reduction and reuse, then recycling and composting, then energy recovery options, and lastly treatment and disposal.

There are several regulatory efforts within the State of Texas that promote minimization of solid waste generation, as well as recycling. The Solid Waste Disposal Act (Title 5, Subtitle B, Chapter 361 of the Health and Safety Code) states that it is Texas' goal "to eliminate the generation of municipal solid waste… to the maximum extent that is technologically and economically feasible" and that the Texas commission will work to develop markets for recycled materials (Texas Legislature, 2017).

Figure 1. USEPA's Waste Management Hierarchy
BRO Solid Waste and Recycling Plan
Source: EPA, 2017

Additionally, the Waste Reduction Policy Act of 1991 was adopted under Texas Administrative Code, Title 20, Chapter 335 Subchapter Q, with the intention of preventing pollution in Texas. Under this act, facilities that generate hazardous waste are required to prepare a five-year Pollution Prevention Plan.

BRO's waste management currently falls primarily in the lower portion of the hierarchy, with the majority of airport waste being sent to the City of Brownsville MSW Landfill.

There is not an official waste minimization or recycling program at the airport. However, a number of tenants with operations non-essential to the airport are recycling some waste including paper, cardboard, and plastic bottles. Having centralized collection locations for recycling may increase the overall amount recycled at the airport. Many interviewees noted that there is support to develop a recycling program and add recycling bins, if barriers to recycling could be overcome, as shown in Table 5.

There does not appear to be any widespread source reduction or reuse policies or programs in place at the airport. If BRO chooses to develop a waste minimization and recycling program, source reduction (for example, green procurement) and reuse should be a significant component.

Table 5. FBO and Tenants Feedback on Recycling Feasibility
BRO Solid Waste and Recycling Plan

FBO or Tenant	Official Recycling Program or Disposal Procedures	Feasible to Add Recycling Bins	Recycling Supported by Upper Management
Hunt Pan Am Aviation (FBO)	None	Unknown	Yes
Southmost Aviation (FBO)	None	Yes, for plastic drink bottles	Yes
Airport Terminal Services	Unknown	Unknown	Unknown
Air Traffic Control Tower	Yes	Yes	No
TSA	Lone Star Shredding for paper; plastics recycling	No	Yes, but hesitant to assign employee to this
Envoy Air	None	Yes	Yes
Cameron County Court Residential Treatment Center	None	Yes	Yes
International Dielectric Products	None	No	If viable
Allied Skills	Cardboard, newspaper, plastic, and aluminum cans go into one bin	No	Yes
Little Farm Frozen Foods	RedFish Recycling for metal, paper, plastic, and glass	Yes, perhaps for plastic or cardboard	Maybe
Airport Enterprises (Private Hangar)	Takes trash and recyclables offsite to dispose of/recycle (offsite waste management through City/BPUB and RedFish Recycling)	Yes	Yes
Grant Products International	RedFish Recycling	Yes	Yes
MVP Plastics	None	N/A	Yes

Table 5. FBO and Tenants Feedback on Recycling Feasibility
BRO Solid Waste and Recycling Plan

FBO or Tenant	Official Recycling Program or Disposal Procedures	Feasible to Add Recycling Bins	Recycling Supported by Upper Management
Portage Plastics	Three bins for cardboard and plastic bottles	Yes	Yes
Trico Products	RedFish Recycling for soda bottles and cans; cardboard and a small amount of scrap metal is sold to recycler; paper, stretch wrap, and plastic also recycled	No	Yes

Operations and Maintenance

Due to the decentralized collection model, solid waste and recycling is handled by various parties throughout the airport. Each of the entities that contract separately with the City /BPUB have their own mechanism for emptying trash and recycling bins. In most cases it is each entity's own staff who are responsible for this task. Information about the staff and frequency of this task for tenants is summarized in Table 6.

Table 6. FBO and Tenants Solid Waste and Recycling Operations and Maintenance
BRO Solid Waste and Recycling Plan

FBO or Tenant	Who Empties Trash and Recycling Bins	Frequency/Time Spent Emptying Bins	Solid Waste Collection Contracted Directly with City of Brownsville/BPUB or with Airport	Recycling Collection
Hunt Pan Am Aviation (FBO)	FBO personnel	Unknown	City/BPUB	None
Southmost Aviation (FBO)	FBO personnel	20 minutes per day	City/BPUB	None
Airport Terminal Services	Tenant personnel	20 minutes per day	Airport	Unknown
Air Traffic Control Tower	Janitor hired by Airport	5 days per week	Airport	None
TSA	City of Brownsville	Twice per day	Airport	Yes
Envoy Air	Tenant personnel	Nightly	Airport	None
Cameron County Court Residential Treatment Center	Tenant personnel	Twice per day	Cameron County	Yes
International Dielectric Products	Tenant personnel	Daily	City/BPUB	None
Allied Skills	Tenant personnel	1 hour	Unknown	Yes
Little Farm Frozen Foods	Tenant personnel	10 minutes per day	City/BPUB	Yes

Table 6. FBO and Tenants Solid Waste and Recycling Operations and Maintenance
BRO Solid Waste and Recycling Plan

FBO or Tenant	Who Empties Trash and Recycling Bins	Frequency/Time Spent Emptying Bins	Solid Waste Collection Contracted Directly with City of Brownsville/BPUB or with Airport	Recycling Collection
Airport Enterprises (Private Hangar)	Tenant personnel	Once per month	None, tenant takes trash/recyclables offsite	None
Grant Products International	Tenant personnel	Daily	City/BPUB	Yes
MVP Plastics	Tenant personnel	1 hour per day	City/BPUB	None
Portage Plastics	Tenant personnel	1.5 hours per day	City/BPUB	Yes
Trico Products	Tenant personnel	Daily	City/BPUB	Yes

In the current setup, if BRO implemented an official waste minimization and recycling program, each of the tenants that contract directly with City of Brownsville/BPUB, RedFish Recycling, etc. would need to coordinate with that service provider regarding any changes. As a result, operations and maintenance time spent by employees handling solid waste and recycling would likely increase. However, if the FBOs and tenants were open to changing the contracting mechanism, there may be some economies of scale and opportunities for increasing collection efficiency and reducing time spent by employees of each portion of the airport managing MSW and recycling.

Waste Management Contract Review

As shown in Table 6, many of the airport tenants and FBOs contract directly with the City of Brownsville/BPUB for MSW collection. In addition to these individual agreements, the airport is responsible for paying for the remaining MSW (for example, the Air Traffic Control Tower). This results in multiple separate solid waste collection agreements and multiple visits to various locations of the airport during the course of a week.

Some entities that contract directly for solid waste collection also arrange for recycling, but with different providers; some perform collection and delivery on their own. A number of tenants, such as Little Farm Frozen Foods, Grant Products International, and Trico Products, contract with RedFish Recycling for paper and plastics recycling.

The multiple individual arrangements for MSW and recyclables across the airport represents a decentralized collection model. The FAA Synthesis Document reports that centralized collection and hauling systems can simplify collection and provide added efficiency (FAA, 2013). If BRO, its tenants, and FBOs contracted as a group for MSW and recycling collection, there would likely be some economies of scale and operational efficiency that could be realized – BRO may want to consider exploring this more.

Applicable Texas State Laws

Recycling plans must be consistent with applicable state law and local recycling laws. The State of Texas does not implement disposal bans. In addition, the State of Texas does not require mandatory recycling by state law or regulation. However, as previously mentioned, there are various regulatory provisions, such as the Solid Waste Disposal Act and the Waste Reduction Policy Act, that support the minimization of generated waste, as well as an increase of recycling practices.

The waste audit conducted at BRO indicates that the existing waste disposal process is not in conflict with applicable State of Texas laws.

Potential for Cost Savings or Revenue Generation

Since BRO is a relatively small airport with one terminal (including two gates) possibly yielding limited quantities of recyclables, there are currently limited financial incentives to adding additional recycling at BRO. On November 8, 2017, the City closed a bid solicitation period for a new commercial and industrial solid waste collection contract, which does not extend to recyclables other than assistance operating the City's existing recycling centers. Unless the selected waste hauler is willing to add commercial recycling collection, the addition of recycling services would likely lead to additional expenses to transfer materials to recycling facilities. However, since there are waste removal companies that offer or could offer recycling services in the Brownsville area (RedFish Recycling, Alandro Resources, and Brownsville Scrap Paper), additional services for BRO could be investigated. The feasibility of expanded recycling could increase if BRO, FBOs, and its tenants switched to a group contract and collectively had a significant quantity of accepted recyclable materials. Additionally, having an official contract with the selected commercial and industrial solid waste removal company may result in added savings or even revenue sharing.

In additional to recycling and waste minimization, source reduction efforts have the potential to provide BRO with cost savings. There are many case studies and examples of this in the FAA Synthesis document (FAA, 2013). Examples of source reduction techniques include:

- Green procurement – Buying products and services that cause less detrimental environmental impacts
- LeanPath – Preventing food waste
- Education and outreach – Signage to encourage passengers, BRO employees, and private pilots to minimize their waste and use recyclable and compostable items
- Xeriscaping, grasscycling, and mulching green waste
- Contracts requirements to reduce packaging and encourage the use of recyclable and compostable items
- Reuse of materials and salvage and donation of materials for construction projects

Recommendations

Upon review of the current solid waste and recycling activities at BRO, CH2M has four recommendations for improving current waste reduction efforts:

- Investigate various group contracting options for solid waste collection (currently there are separate agreements with each tenant outside of the airport's operational areas). Determine if each tenant can save money by contracting as one large group or in other smaller geographic groupings, as appropriate.
- Investigate options for contracting recycling. Currently, the following materials are being recycled by one or more airport property tenants: paper, cardboard, aluminum, plastics, and limited quantities of other materials.
  - Based on information obtained in the interviews and through additional research, RedFish Recycling, Alandro Resources, and Brownsville Scrap Paper offer collection of commercial recycling. Determine if any of these recyclers are willing to provide the airport or remainder of airport properties (RedFish Recycling already contracted with several tenants) with collection services.
  - If savings can be achieved by using group contracting, set up centralized locations for recycling collection and storage.

  - Set up centralized location for collection and storage or other recyclables that must be brought offsite to recycling facilities (for example, batteries or used oil). Develop rotation or plan for bringing those collection materials to vendors on a monthly basis or as needed (sharing required labor).
- Consider developing a waste minimization and recycling program that guides waste minimization and recycling activities throughout the airport and uses commons resources to share information about the policies and procedures included.
- Investigate other ways to improve source reduction, reuse, and recycling.

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Attachment 1
Interview Records and Email Correspondence

Email Correspondence

From: Shawn Schroeder <shawn.schroeder@cob.us>
Sent: Friday, December 1, 2017 7:50 AM
To: Lopez, Lyndsey/PDX; McRae, Jennifer/SJC
Subject: FW: [External]Airport [EXTERNAL]

Good morning,

As we discussed yesterday, the City utilizes a third party contractor to perform fleet maintenance; therefore, we do not dispose of oils/fluids, batteries or other types of material. Yesterday, I submitted additional questions, for Centeerra (Fleet Maintenance Contractor for the City), and he responded below. Hope this helps. I also sent a note to the restaurant as well. No answer yet.

Have a good weekend.

Shawn Schroeder, AAE
Assistant Airport Director

City of Brownsville | Office of the Aviation Department
700 Amelia Earhart Drive | Brownsville, TX 78521
Tel: 956-542-4373 | Fax: 956-542-4374
Shawn.schroeder@cob.us | www.cob.us | www.flybrownsville.com

From: Joe Torres [mailto:Joe.Torres@centerragroup.com]
Sent: Friday, December 01, 2017 9:47 AM
To: Shawn Schroeder <shawn.schroeder@cob.us>
Subject: RE: [External]Airport

Shawn,

The used oil/fluid is picked up by H&H Oil Co. and is scheduled to be picked up every four weeks, beside used oil/fluid they pick up used oil filters, used oil absorbent and oily rags. Average quantity of used oil/fluids picked annually is 3,200 gallons. We dispose of used tires at the Landfill where they are shredded, we transport them as well. Used batteries are picked up by the vendor (as cores) when new batteries are purchased.

Please do not hesitate to contact me if you have any questions.

Thank you,

JOE TORRES
Service Manager - Brownsville City Fleet
6035 Jaime J. Zapata Ave. I Brownsville, TX 78521
Office: 956.548.6172 I Fax: 956.548.6179 I Cell: 956.204.9747
Centerra – A Constellis Company

Constellis.com I facebook I twitter I linkedin

From: Shawn Schroeder [mailto:shawn.schroeder@cob.us]
Sent: Thursday, November 30, 2017 4:44 PM
To: Joe Torres <Joe.Torres@centerragroup.com>
Subject: [External]Airport

Joe,

We are developing an airport master plan and one of the sections in the program is regarding recycling/waste programs, and the consultants has asked me the following questions;

1. Who are you contracted with to pick-up the old tires, oils/fluids, and batteries.
2. Do you have an estimate on how much used oils/fluids is picked up in a calendar year; and
3. How often is the oils/fluids picked-up.

Shawn Schroeder

From: Danny Perez
To: McRae, Jennifer/SJC
Subject: Info for FAA Document: [EXTERNAL]
Date: Thursday, November 16, 2017 8:36:55 AM

11/16/2017

Ms. McRae,

1. We have 24 employees at Hunt Pan Am Aviation

2. We have a total of 121,740 sq. ft.

3. Waste removal company and they do it once a week

4. Waste is removed by the waste removal company contracted by Hunt Pan Am

5. We do not recycle through any company

6. Yes we would be interested

7. Quantities estimated lbs.
   a. food 0 lbs
   b. Fats/oils/Grease 0 lbs.
   c. Municipal solid waste (normal trash) 300 lbs. a month
   d. Cardboard 50 lbs. a month
   e. Glass 0 lbs
   f. Aluminum 10 lbs. a month
   g. Plastic bottles/containers 40 lbs. a month
   h. Scrap metal 0 lbs. a month
   j, Batteries 0 month
   l. Other Shop rags 20 lbs. a month

Thank You,

Danny Perez,
Director of Maintenance

One per Tenant/FBO

Recycling / Solid Waste Information Brownsville - South Padre Island International Airport			
Source and Fate of Waste			Comments
Areas overseen by tenant, activities taking place	Southmost Avn. FBO Services		
How many employees in these areas	9		
How large are your facilities	28000 sq. ft.		
What hours/days are these open	7am to 10pm 7 days a week		
Are there any food service areas (breakrooms, etc.)	yes		
Who is responsible for emptying trash and recycling receptacles your areas?	different individuals		
How much time is spent emptying trash and recycling receptacles from these areas (frequency)	20 minutes		
How is the contract set up (through the airport/directly with the waste removal company)	public trash service		
Copy of Waste Management Contract	N/A		
Do you know if your service is contracted separately or with other portions of the airport and are there any volume discounts received?	seperately		
Do you know if this is how solid waste services have been contracted in previous years? If not, any thoughts on why it changed?	yes		
Estimates of waste type, percentage and quantities			
	Yes/No	Estimates % of Waste Stream and Annual Quantity Generated	
Food	no		
Fats/Oil/Grease	no		
Municipal Solid Waste	yes	95%	
Cardboard	yes	2%	
Glass	no		
Aluminum	no		
Plastic Bottles/containers	yes	1%	
Scrap Metal	no		
Tires	yes	1%	
Batteries	yes	1%	
Used Fluids	yes	1240 gals combination oil, fuel	
Grass	no		
Other (List)	n/a		
Feasibility of Recycling			Comments

What sorts of recycling or composting programs do you know about within the Brownsville and/or nearby?	City of Brownsville and Redfish Recycling	
Is there a formal recycling program in your area of operations (i.e. a contractor collects recyclables from your facility (if so, please describe the program and what it includes)?)	We do not generate enough recyclable waste to to have a recycling program.	
Do you have a corporate recycling policy or guidelines that could be used to start or revisit a program?	no	
Where are recycling receptacles located?	none in place	
What items are recycled and how many bins?	N/A	
Are there any contract terms that preclude staff from adding a new recycling or composting program or increasing the level of recycling or composting performed (could be increasing types of materials recycled, separating trash and recyclables, segregating food waste etc. etc.)?	No	
Do you think it would be feasible to add recycle bins to any of these areas and for what materials?	Yes, plastic drink bottles	
Is there support for recycling or composting from upper management? Do you think staff would be supportive?	Yes and Yes	
Would modifications to your specific recycling/solid waste policies need to come from corporate or elsewhere (who is in control of making these decisions?)?	No	
Are there any procedures currently in place to determine how something should be disposed or recycled?	No	
What do you see as the barriers to implementing recycling or composting in your area?	None	
Are there any incentives or other things that could be done to make this easier?	None needed	
Do you have any other comments that are relevant to solid waste or recycling?	None	
Contact Info	Benton Douglas Southmost Avitation, Inc. 956-542-5852 flyboytx@yahoo.com	

One per Tenant/FBO

Recycling / Solid Waste Information Brownsville - South Padre Island International Airport			
Source and Fate of Waste			Comments
Areas overseen by tenant, activities taking place	TIcket counter, office space and ramp		
How many employees in these areas	27		
How large are your facilities			
What hours/days are these open	0400-2430		
Are there any food service areas (breakrooms, etc.)	Yes 1		
Who is responsible for emptying trash and recycling receptacles your areas?	Employees		
How much time is spent emptying trash and recycling receptacles from these areas (frequency)	End of day 20 mins		
How is the contract set up (through the airport/directly with the waste removal company)			
Copy of Waste Management Contract			
Do you know if your service is contracted separately or with other portions of the airport and are there any volume discounts received?			
Do you know if this is how solid waste services have been contracted in previous years? If not, any thoughts on why it changed?			
Estimates of waste type, percentage and quantities			
	Yes/No	Estimates % of Waste Stream and Annual Quantity Generated	
Food	yes		
Fats/Oil/Grease	no		
Municipal Solid Waste	no		
Cardboard	yes		
Glass	no		
Aluminum	yes		
Plastic Bottles/containers	no		
Scrap Metal	no		
Tires	no		
Batteries	no		
Used Fluids	no		
Grass	no		
Other (List)	no		
Feasibility of Recycling			Comments

What sorts of recycling or composting programs do you know about within the Brownsville and/or nearby?		
Is there a formal recycling program in your area of operations (i.e. a contractor collects recyclables from your facility (if so, please describe the program and what it includes)?)		
Do you have a corporate recycling policy or guidelines that could be used to start or revisit a program?		
Where are recycling receptacles located?		
What items are recycled and how many bins?		
Are there any contract terms that preclude staff from adding a new recycling or composting program or increasing the level of recycling or composting performed (could be increasing types of materials recycled, separating trash and recyclables, segregating food waste etc. etc.)?		
Do you think it would be feasible to add recycle bins to any of these areas and for what materials?		
Is there support for recycling or composting from upper management? Do you think staff would be supportive?		
Would modifications to your specific recycling/solid waste policies need to come from corporate or elsewhere (who is in control of making these decisions?)?		
Are there any procedures currently in place to determine how something should be disposed or recycled?		
What do you see as the barriers to implementing recycling or composting in your area?		
Are there any incentives or other things that could be done to make this easier?		
Do you have any other comments that are relevant to solid waste or recycling?		
Contact Info		

One per Tenant/FBO

Recycling / Solid Waste Information Brownsville - South Padre Island International Airport		
Source and Fate of Waste		**Comments**
Areas overseen by tenant, activities taking place	TOWER Building	
How many employees in these areas	5	
How large are your facilities		
What hours/days are these open	365 DAYS A YEAR	
Are there any food service areas (breakrooms, etc.)	YES	
Who is responsible for emptying trash and recycling receptacles your areas?	JANITOR LINED by AIRWAY Facilities	
How much time is spent emptying trash and recycling receptacles from these areas (frequency)	5 DAYS A WEEK	
How is the contract set up (through the airport/directly with the waste removal company)	Through the FAA AIRWAY facilities	
Copy of Waste Management Contract	N/A	
Do you know if your service is contracted separately or with other portions of the airport and are there any volume discounts received?	UNKNOWN	
Do you know if this is how solid waste services have been contracted in previous years? If not, any thoughts on why it changed?	UNKNOWN	

Estimates of waste type, percentage and quantities			
	Yes/No	Estimates % of Waste Stream and Annual Quantity Generated	
Food	YES	N/A	
Fats/Oil/Grease	NO		
Municipal Solid Waste	NO		
Cardboard	YES		
Glass	NO		
Aluminum	NO		
Plastic Bottles/containers	YES		
Scrap Metal	NO		
Tires	NO		
Batteries	NO		
Used Fluids	NO		
Grass	YES		
Other (List)			
Feasibility of Recycling			**Comments**

What sorts of recycling or composting programs do you know about within the Brownsville and/or nearby?	NONE	
Is there a formal recycling program in your area of operations (i.e. a contractor collects recyclables from your facility (if so, please describe the program and what it includes)?)	YES	
Do you have a corporate recycling policy or guidelines that could be used to start or revisit a program?	NO	
Where are recycling receptacles located?	NONE	
What items are recycled and how many bins?	NONE	
Are there any contract terms that preclude staff from adding a new recycling or composting program or increasing the level of recycling or composting performed (could be increasing types of materials recycled, separating trash and recyclables, segregating food waste etc. etc.)?	NO	
Do you think it would be feasible to add recycle bins to any of these areas and for what materials?	YES	
Is there support for recycling or composting from upper management? Do you think staff would be supportive?	NO	
Would modifications to your specific recycling/solid waste policies need to come from corporate or elsewhere (who is in control of making these decisions?)?	NO	
Are there any procedures currently in place to determine how something should be disposed or recycled?	NO	
What do you see as the barriers to implementing recycling or composting in your area?	NONE	
Are there any incentives or other things that could be done to make this easier?	NO	
Do you have any other comments that are relevant to solid waste or recycling?	NO	
Contact Info	BROWNSVILLE TOWER BRO@RVAINC.COM	

One per Tenant/FBO

Recycling / Solid Waste Information Brownsville - South Padre Island International Airport			
Source and Fate of Waste			Comments
Areas overseen by tenant, activities taking place	Checkpoint, TSA Break Room (FIS) Area and Check Baggage		
How many employees in these areas	22		
How large are your facilities	400		
What hours/days are these open	Sunday-Saturday, 0330-1930		
Are there any food service areas (breakrooms, etc.)	Yes		
Who is responsible for emptying trash and recycling receptacles your areas?	City of Brownsville		
How much time is spent emptying trash and recycling receptacles from these areas (frequency)	2 x Day/7 Days a Week		
How is the contract set up (through the airport/directly with the waste removal company)	This is set up through the GSA Lease Agreement with the City of Brownsville.		
Copy of Waste Management Contract	This is set up through the GSA Lease Agreement with the City of Brownsville.		
Do you know if your service is contracted separately or with other portions of the airport and are there any volume discounts received?	This is set up through the GSA Lease Agreement with the City of Brownsville.		
Do you know if this is how solid waste services have been contracted in previous years? If not, any thoughts on why it changed?	This is set up through the GSA Lease Agreement with the City of Brownsville.		
Estimates of waste type, percentage and quantities			
	Yes/No	Estimates % of Waste Stream and Annual Quantity Generated	
Food	No		
Fats/Oil/Grease	No		
Municipal Solid Waste	No		
Cardboard	No		
Glass	No		
Aluminum	No		
Plastic Bottles/containers	No		
Scrap Metal	No		
Tires	No		
Batteries	No		
Used Fluids	No		
Grass	No		
Other (List)	No		

Recycling & Solid Waste

Feasibility of Recycling		Comments
What sorts of recycling or composting programs do you know about within the Brownsville and/or nearby?	None	
Is there a formal recycling program in your area of operations (i.e. a contractor collects recyclables from your facility (if so, please describe the program and what it includes)?)	Yes-Lone Star Shredding	
Do you have a corporate recycling policy or guidelines that could be used to start or revisit a program?	Yes	
Where are recycling receptacles located?	TSA does not have recycling receptacles.	
What items are recycled and how many bins?	N/A	
Are there any contract terms that preclude staff from adding a new recycling or composting program or increasing the level of recycling or composting performed (could be increasing types of materials recycled, separating trash and recyclables, segregating food waste etc. etc.)?	N/A	
Do you think it would be feasible to add recycle bins to any of these areas and for what materials?	No	
Is there support for recycling or composting from upper management? Do you think staff would be supportive?	The only issue I have with the program is that I will have to assign an employee to complete this task.	
Would modifications to your specific recycling/solid waste policies need to come from corporate or elsewhere (who is in control of making these decisions?)?	N/A	
Are there any procedures currently in place to determine how something should be disposed or recycled?	Yes-Paper/Plastic Products.	
What do you see as the barriers to implementing recycling or composting in your area?	The only issue I have with the program is that I will have to assign an employee to complete this task.	
Are there any incentives or other things that could be done to make this easier?	N/A	
Do you have any other comments that are relevant to solid waste or recycling?	No	
Contact Info	Kevin Crossley, 956-547-3794	

One per Tenant/FBO

Recycling / Solid Waste Information Brownsville - South Padre Island International Airport			
Source and Fate of Waste			Comments
Areas overseen by tenant, activities taking place	American Airlines offices and breakroom		
How many employees in these areas	15 Employees		
How large are your facilities			
What hours/days are these open	0330 - 1800 Everyday		
Are there any food service areas (breakrooms, etc.)	Breakroom		
Who is responsible for emptying trash and recycling receptacles your areas?	American Airline employees		
How much time is spent emptying trash and recycling receptacles from these areas (frequency)	Every night at end of day trash is taken out.		
How is the contract set up (through the airport/directly with the waste removal company)	Contract is set up through the airport.		
Copy of Waste Management Contract	Unavailable		
Do you know if your service is contracted separately or with other portions of the airport and are there any volume discounts received?	This is handled by airport.		
Do you know if this is how solid waste services have been contracted in previous years? If not, any thoughts on why it changed?	This has been implemented since we have been tenants.		
Estimates of waste type, percentage and quantities			
	Yes/No	Estimates % of Waste Stream and Annual Quantity Generated	
Food	yes	7%	
Fats/Oil/Grease	yes	3%	
Municipal Solid Waste	yes	32%	
Cardboard	yes	11%	
Glass	yes	16%	
Aluminum	yes	13%	
Plastic Bottles/containers	yes	18%	
Scrap Metal	no		Taken to DFW for disposal
Tires	no		Taken to DFW for disposal
Batteries	no		Taken to DFW for disposal
Used Fluids	no		Taken to DFW for disposal
Grass	no		
Other (List)	no		
Feasibility of Recycling			Comments

What sorts of recycling or composting programs do you know about within the Brownsville and/or nearby?	City of Brownsville has their own recycling program. As well as contracted vendors.	
Is there a formal recycling program in your area of operations (i.e. a contractor collects recyclables from your facility (if so, please describe the program and what it includes)?)	None at this time.	
Do you have a corporate recycling policy or guidelines that could be used to start or revisit a program?	Anything That Tears , ATT will allow almost all office paper to be recycled.	
Where are recycling receptacles located?	None at this time	
What items are recycled and how many bins?	None at this time.	
Are there any contract terms that preclude staff from adding a new recycling or composting program or increasing the level of recycling or composting performed (could be increasing types of materials recycled, separating trash and recyclables, segregating food waste etc. etc.)?	There are no contract terms in place to prevent us from implementing a new recycling program for Envoy Air Inc.	
Do you think it would be feasible to add recycle bins to any of these areas and for what materials?	Absolutely	
Is there support for recycling or composting from upper management? Do you think staff would be supportive?	Yes, upper management approves. Staff is very supportive.	
Would modifications to your specific recycling/solid waste policies need to come from corporate or elsewhere (who is in control of making these decisions?)?	There are no restrictions to modifications. The station will make these decisions.	
Are there any procedures currently in place to determine how something should be disposed or recycled?	None at this time.	
What do you see as the barriers to implementing recycling or composting in your area?	None.	
Are there any incentives or other things that could be done to make this easier?	No.	
Do you have any other comments that are relevant to solid waste or recycling?	None.	
Contact Info	Robert Silguero Office: 956-550-0737 Cell: 956-266-2804	

McRae, Jennifer/SJC

From: Lopez, Lyndsey/PDX
Sent: Tuesday, December 12, 2017 1:35 PM
To: Shawn Schroeder; Valencik, Julie/BOI
Cc: McRae, Jennifer/SJC
Subject: RE: BRO Restaurant [EXTERNAL]

Thanks Shawn. We will work on getting this incorporated into our report.

Lyndsey

From: Shawn Schroeder [mailto:shawn.schroeder@cob.us]
Sent: Tuesday, December 12, 2017 12:59 PM
To: Lopez, Lyndsey/PDX <Lyndsey.Lopez@ch2m.com>; Valencik, Julie/BOI <Julie.Valencik@ch2m.com>
Subject: BRO Restaurant [EXTERNAL]

Lyndsey,

The Manager indicated today that they empty their grease trap at least once every 6-months, but it also depends on the volume, and it varies on the local company that empties the tank.
They also do not have any local recycling program.

Shawn Schroeder, AAE
Assistant Airport Director

City of Brownsville | Office of the Aviation Department
700 Amelia Earhart Drive | Brownsville, TX 78521
Tel: 956-542-4373 | Fax: 956-542-4374
Shawn.schroeder@cob.us | www.cob.us | www.flybrownsville.com

One per Tenant/FBO

Recycling / Solid Waste Information Brownsville - South Padre Island International Airport			
Source and Fate of Waste			Comments
Areas overseen by tenant, activities taking place	residential treatment center		
How many employees in these areas	about 26 in facility		
How large are your facilities	11,000 sq feet		
What hours/days are these open	24/7		
Are there any food service areas (breakrooms, etc.)	full kitchen/dining		
Who is responsible for emptying trash and recycling receptacles your areas?	facility personnel		
How much time is spent emptying trash and recycling receptacles from these areas (frequency)	twice a day		
How is the contract set up (through the airport/directly with the waste removal company)	waste company		
Copy of Waste Management Contract	with Cameron County		
Do you know if your service is contracted separately or with other portions of the airport and are there any volume discounts received?	separately/no		
Do you know if this is how solid waste services have been contracted in previous years? If not, any thoughts on why it changed?	yes		
Estimates of waste type, percentage and quantities			
	Yes/No	Estimates % of Waste Stream and Annual Quantity Generated	
Food	yes	about 5% annualy	
Fats/Oil/Grease	yes	about 5% Annualy	
Municipal Solid Waste	yes	about 10% Annualy	
Cardboard	No		
Glass	No		
Aluminum	No		
Plastic Bottles/containers	NO		
Scrap Metal	NO		
Tires	No		
Batteries	NO		
Used Fluids	NO		
Grass	NO		
Other (List)	—		
Feasibility of Recycling			Comments

What sorts of recycling or composting programs do you know about within the Brownsville and/or nearby?	bins for plastic	
Is there a formal recycling program in your area of operations (i.e. a contractor collects recyclables from your facility (if so, please describe the program and what it includes)?)	Port of Brownsville Recycling	
Do you have a corporate recycling policy or guidelines that could be used to start or revisit a program?	No	
Where are recycling receptacles located?	on premises	
What items are recycled and how many bins?	none	
Are there any contract terms that preclude staff from adding a new recycling or composting program or increasing the level of recycling or composting performed (could be increasing types of materials recycled, separating trash and recyclables, segregating food waste etc. etc.)?	no	
Do you think it would be feasible to add recycle bins to any of these areas and for what materials?	Yes	
Is there support for recycling or composting from upper management? Do you think staff would be supportive?	Yes	
Would modifications to your specific recycling/solid waste policies need to come from corporate or elsewhere (who is in control of making these decisions?)?	County policy	
Are there any procedures currently in place to determine how something should be disposed or recycled?	yes	
What do you see as the barriers to implementing recycling or composting in your area?	none	
Are there any incentives or other things that could be done to make this easier?	Yes	
Do you have any other comments that are relevant to solid waste or recycling?	no	
Contact Info		

One per Tenant/FBO

Recycling / Solid Waste Information Brownsville - South Padre Island International Airport		
Source and Fate of Waste		Comments
Areas overseen by tenant, activities taking place	Building / Parking Lot Tubing Convertor	
How many employees in these areas	6	
How large are your facilities	8,000 Sq/Ft	
What hours/days are these open	M-F 8:00-4:30	
Are there any food service areas (breakrooms, etc.)	Yes	
Who is responsible for emptying trash and recycling receptacles your areas?	Shop Foreman	
How much time is spent emptying trash and recycling receptacles from these areas (frequency)	Daily	
How is the contract set up (through the airport/directly with the waste removal company)	Direct w/ PUB /City.	
Copy of Waste Management Contract	Not Available	
Do you know if your service is contracted separately or with other portions of the airport and are there any volume discounts received?	Unknown	
Do you know if this is how solid waste services have been contracted in previous years? If not, any thoughts on why it changed?	Yes / 10 Years	

Estimates of waste type, percentage and quantities			
	Yes/No	Estimates % of Waste Stream and Annual Quantity Generated	
Food	✓	< 1%	
Fats/Oil/Grease			
Municipal Solid Waste	✓	85% Plastic Film	
Cardboard	✓	10%	
Glass			
Aluminum			
Plastic Bottles/containers	✓	2%	
Scrap Metal			
Tires			
Batteries			
Used Fluids			
Grass			
Other (List) Misc.		2%	
Feasibility of Recycling			Comments

What sorts of recycling or composting programs do you know about within the Brownsville and/or nearby?	NONE	
Is there a formal recycling program in your area of operations (i.e. a contractor collects recyclables from your facility (if so, please describe the program and what it includes)?)	UNKNOWN	
Do you have a corporate recycling policy or guidelines that could be used to start or revisit a program?	NO	
Where are recycling receptacles located?	N/A	
What items are recycled and how many bins?	N/A	
Are there any contract terms that preclude staff from adding a new recycling or composting program or increasing the level of recycling or composting performed (could be increasing types of materials recycled, separating trash and recyclables, segregating food waste etc. etc.)?	NO	
Do you think it would be feasible to add recycle bins to any of these areas and for what materials?	NO	
Is there support for recycling or composting from upper management? Do you think staff would be supportive?	IF VIABLE	
Would modifications to your specific recycling/solid waste policies need to come from corporate or elsewhere (who is in control of making these decisions?)?	LOCAL CONTROL	
Are there any procedures currently in place to determine how something should be disposed or recycled?	YES	
What do you see as the barriers to implementing recycling or composting in your area?	NO	
Are there any incentives or other things that could be done to make this easier?	UNKNOWN	
Do you have any other comments that are relevant to solid waste or recycling?	NO	
Contact Info	MATTHEW WYATT, PRESIDENT INTERNATIONAL DIELECTRIC PRDT'S	

2025 BILLY MITCHELL BLVD
BROWNSVILLE, TX 78521
956-541-8890

One per Tenant/FBO

Recycling / Solid Waste Information Brownsville - South Padre Island International Airport			
Source and Fate of Waste			Comments
Areas overseen by tenant, activities taking place	Yes ,I over see everything		
How many employees in these areas	3		
How large are your facilities	4600 sq. ft.		
What hours/days are these open	Monday - Friday from 7:30am -- 6:00pm		
Are there any food service areas (breakrooms, etc.)	No		
Who is responsible for emptying trash and recycling receptacles your areas?	Myself		
How much time is spent emptying trash and recycling receptacles from these areas (frequency)	About an hour or so		
How is the contract set up (through the airport/directly with the waste removal company)	N/A		
Copy of Waste Management Contract	N/A		
Do you know if your service is contracted separately or with other portions of the airport and are there any volume discounts received?	N/A		
Do you know if this is how solid waste services have been contracted in previous years? If not, any thoughts on why it changed?	N/A		
Estimates of waste type, percentage and quantities			
	Yes/No	Estimates % of Waste Stream and Annual Quantity Generated	
Food	NO		
Fats/Oil/Grease	NO		
Municipal Solid Waste	YES	5%	
Cardboard	YES	1%	
Glass	NO		
Aluminum	YES	1%	
Plastic Bottles/containers	YES	1%	
Scrap Metal	YES	70%	
Tires	NO		
Batteries	NO		
Used Fluids	NO		
Grass	NO		
Other (List)	NO		
Feasibility of Recycling			Comments

What sorts of recycling or composting programs do you know about within the Brownsville and/or nearby?	We do our own	
Is there a formal recycling program in your area of operations (i.e. a contractor collects recyclables from your facility (if so, please describe the program and what it includes)?)	Yes	
Do you have a corporate recycling policy or guidelines that could be used to start or revisit a program?	In place yes	
Where are recycling receptacles located?	in work area	
What items are recycled and how many bins?	cardboard,newspaper,plastic, aluminum cans =1bin	
Are there any contract terms that preclude staff from adding a new recycling or composting program or increasing the level of recycling or composting performed (could be increasing types of materials recycled, separating trash and recyclables, segregating food waste etc. etc.)?	no	
Do you think it would be feasible to add recycle bins to any of these areas and for what materials?	no	
Is there support for recycling or composting from upper management? Do you think staff would be supportive?	yes	
Would modifications to your specific recycling/solid waste policies need to come from corporate or elsewhere (who is in control of making these decisions?)?	no	
Are there any procedures currently in place to determine how something should be disposed or recycled?	no	
What do you see as the barriers to implementing recycling or composting in your area?	none	
Are there any incentives or other things that could be done to make this easier?	no	
Do you have any other comments that are relevant to solid waste or recycling?	no	
Contact Info	Thomas Solano 956-548-2100/alliedskills@yahoo.com 2045 Les Mauldin Rd. Ste. B Brownsville,TX 78521	

Recycling & Solid Waste

Little Farm Frozen Foods, INC.
1919 Billy Mitchell Blvd., Brownsville, TX 78521

One per Tenant/FBO

Recycling / Solid Waste Information
Brownsville - South Padre Island International Airport

Source and Fate of Waste		Comments
Areas overseen by tenant, activities taking place	BREAKROOM for employees	water is used to wash plates, cups, etc. (No disposal)
How many employees in these areas	10	
How large are your facilities	Small operation	
What hours/days are these open	9 am - 6pm MON - FRI	
Are there any food service areas (breakrooms, etc.)	YES (1)	
Who is responsible for emptying trash and recycling receptacles your areas?	own employees	
How much time is spent emptying trash and recycling receptacles from these areas (frequency)	10 min / day	
How is the contract set up (through the airport/directly with the waste removal company)	Directly with utilities company. (P.U.B. Bro)	
Copy of Waste Management Contract	City utilities Company (P.U.B)	
Do you know if your service is contracted separately or with other portions of the airport and are there any volume discounts received?	Service is direct with local utilities company.	
Do you know if this is how solid waste services have been contracted in previous years? If not, any thoughts on why it changed?	We've never had a contract with anyone other than local utilities company (P.U.B)	

Estimates of waste type, percentage and quantities	Yes/No	Estimates % of Waste Stream and Annual Quantity Generated	
Food	Yes	MINIMUM	
Fats/Oil/Grease	NO		
Municipal Solid Waste	NO		
Cardboard	YES	MINIMUM	
Glass	NO		
Aluminum	NO		
Plastic Bottles/containers	NO		
Scrap Metal	NO		
Tires	NO		
Batteries	NO		
Used Fluids	NO		
Grass	NO		
Other (List)			

Feasibility of Recycling	Comments

What sorts of recycling or composting programs do you know about within the Brownsville and/or nearby?	METAL / PAPER / PLASTIC / GLASS	
Is there a formal recycling program in your area of operations (i.e. a contractor collects recyclables from your facility (if so, please describe the program and what it includes)?)	YES (RED FISH)	
Do you have a corporate recycling policy or guidelines that could be used to start or revisit a program?	NO	
Where are recycling receptacles located?	NONE	
What items are recycled and how many bins?	NONE	
Are there any contract terms that preclude staff from adding a new recycling or composting program or increasing the level of recycling or composting performed (could be increasing types of materials recycled, separating trash and recyclables, segregating food waste etc. etc.)?	NO	
Do you think it would be feasible to add recycle bins to any of these areas and for what materials?	MAYBE, PLASTIC / CARDBOARD	
Is there support for recycling or composting from upper management? Do you think staff would be supportive?	Maybe	
Would modifications to your specific recycling/solid waste policies need to come from corporate or elsewhere (who is in control of making these decisions?)?	NO	
Are there any procedures currently in place to determine how something should be disposed or recycled?	NO	
What do you see as the barriers to implementing recycling or composting in your area?	Training employees on recycling practices	
Are there any incentives or other things that could be done to make this easier?	Getting some type of credit or payment for recycled products	
Do you have any other comments that are relevant to solid waste or recycling?		
Contact Info	Eduardo Cash 956-554-5402	

Recycling / Solid Waste Information
Brownsville – South Padre Island International Airport

Source and Fate of Waste	
Describe the areas you/company oversee(s), what activities take place, and how areas fit into operations at airport?	Private hangar. Private airplanes. Located on airport grounds, have been there for probably 40-50 years
How many employees are in these areas?	No employees, probably 4-5 people around there but not paid
How large are your facilities?	585 Amelia Earhart Drive, Brownsville, TX Approximately 3,500 to 4,500 square feet per Google Earth estimate
What hours/days are these open?	Not a business. Not there too often, maybe 8 hours a week
Are there any food service areas (breakrooms, etc)?	No food areas
Who is responsible for emptying trash and recycling receptacles in your areas?	Black 32 gallon trash can, doesn't generate a lot of trash at all. Marsletta is good about recycling so she brings it to her office to dispose of and recycle (car dealership, Tipotex Chevrolet, not associated with private hangar).
How much time is spent emptying trash and recycling receptacles from these areas (frequency)?	Fills up about once a month – paper, napkins, empty water bottles.
How is the waste contract set up (through airport or directly with waste removal company)?	Does not dispose of trash at airport. Takes it offsite to where she works.
Can you provide a copy of your waste management contract? (If so, please do)	N/A
Do you know if your service is contracted separately or with other portions of the airport and are there any volume discounts received?	Does not dispose of trash at airport. Takes it offsite to where she works.
Do you know if solid waste services have been contracted similarly in previous years? If they have changed, do you have any thoughts on why?	N/A

Estimates on Waste Types, Percentages, and Quantities			
	Yes/No	Estimated % of Waste Stream and Annual Quantity Generated	Comments
Food		N/A – All waste taken offsite and disposed.	
Fats/Oils/Grease			
Municipal Solid Waste			
Cardboard			
Glass			
Aluminum			
Plastic Bottles/Containers			
Scrap Metal			
Tires			
Batteries			
Used Fluids			

Grass			
Other			

Feasibility of Recycling	
What sorts of recycling or composting programs do you know about within Brownsville and/or nearby?	Says no one recycles in Brownsville. No curbside recycling. Doesn't think airport has recycling bins. Marsletta works at Tipotex (but hangar is private and not associated with Tipotex). Tipotex recycles with RedFish (big blue dumpster) they pay to have dumpster there and for RedFish to haul away.
Is there a formal recycling program in your area of operations (i.e. a contractor collects recyclables from your facility)? If so, please describe the program and what it includes.	Does not dispose of trash/recyclables at airport. Takes it offsite to where she works.
Do you have a corporate recycling policy or guidelines that could be used to start or improve the recycling program at the airport?	N/A
Where are recycling receptacles located?	Does not dispose of trash/recyclables at airport. Takes it offsite to where she works.
What items are recycled and how many bins?	Does not dispose of trash/recyclables at airport. Takes it offsite to where she works.
Are there any contract terms that preclude staff from adding a new recycling or composting program or increasing the level of recycling/composting performed? (This could be increasing the types of materials recycled, separating trash and recyclables, segregating food waste, etc.)	Unsure.
Do you think it would be feasible to add recycling bins to any of these areas, and for what materials?	Yes, plastic bottles for sure. Lots of plastic bottles and bottles with fluids – recycling these would be great.
Is there support for recycling or composting from upper management? Do you think staff would be supportive?	Hopes airport would be receptive to recycling, know a lot of the public would be open to it and want it.
Would modifications to your specific recycling/solid waste policies need to come from corporate or elsewhere (who is in control of making these decisions)?	Airport needs to lay out a plan for everyone.
Are there any procedures currently in place to determine how something should be disposed of or recycled?	No.
What do you see as barriers to implementing recycling or composting in your area?	Doesn't know why Airport doesn't recycle. Thinks City has been slow to implement recycling procedures. Thinks whole City is behind in recycling and that's why it hasn't been implemented.
Are there any incentives or other things that could be done to make this easier?	Airport/City needs to take the initiative to implement.
Do you have any other comments that are relevant to solid waste or recycling?	Very passionate and excited that we are working on recycling plan. Would really love to see recycling implemented at the Airport and throughout the City.

Contact Information	Area of Operation/Company Name: Private Hangar (for planes) Name: Marsletta Knapp Title: Phone: 956-592-5711 Email: mknapp@tipotexchevrolet.com Best time to contact:

We sincerely thank you for your time and insight!

Method of Data Collection	Method: Phone interview Date and Time: 10/12/2017 at 9:50 AM PDT Interviewer: Jennifer McRae/ CH2M

Recycling / Solid Waste Information Brownsville – South Padre Island International Airport

Source and Fate of Waste	
Describe the areas you/company oversee(s), what activities take place, and how areas fit into operations at airport?	N.A.
How many employees are in these areas?	N.A
How large are your facilities?	20,000 Sq. Feet
What hours/days are these open?	8 to 5 / Monday – Friday
Are there any food service areas (breakrooms, etc)?	Yes
Who is responsible for emptying trash and recycling receptacles in your areas?	All employees
How much time is spent emptying trash and recycling receptacles from these areas (frequency)?	Daily
How is the waste contract set up (through airport or directly with waste removal company)?	Directly with waste removal
Can you provide a copy of your waste management contract? (If so, please do)	Providing bills
Do you know if your service is contracted separately or with other portions of the airport and are there any volume discounts received?	N.A.
Do you know if solid waste services have been contracted similarly in previous years? If they have changed, do you have any thoughts on why?	N.A.

Estimates on Waste Types, Percentages, and Quantities			
	Yes/No	Estimated % of Waste Stream and Annual Quantity Generated	Comments
Food	Yes	N.A	
Fats/Oils/Grease	No		
Municipal Solid Waste	Yes	N.A.	
Cardboard	Yes	N.A.	
Glass	No		
Aluminum	Yes	N.A.	
Plastic Bottles/Containers	Yes	N.A.	
Scrap Metal	No		
Tires	No		
Batteries	No		
Used Fluids	No		
Grass	No		
Other	—		

Feasibility of Recycling	
What sorts of recycling or composting programs do you know about within Brownsville and/or nearby?	Red Fish
Is there a formal recycling program in your area of operations (i.e. a contractor collects recyclables from your facility)? If so, please describe the program and what it includes.	Red Fish
Do you have a corporate recycling policy or guidelines that could be used to start or improve the recycling program at the airport?	No
Where are recycling receptacles located?	
What items are recycled and how many bins?	All recyclebels. One bin
Are there any contract terms that preclude staff from adding a new recycling or composting program or increasing the level of recycling/composting performed? (This could be increasing the types of materials recycled, separating trash and recyclables, segregating food waste, etc.)	NO.
Do you think it would be feasible to add recycling bins to any of these areas, and for what materials?	Yes. Recycables
Is there support for recycling or composting from upper management? Do you think staff would be supportive?	Yes.
Would modifications to your specific recycling/solid waste policies need to come from corporate or elsewhere (who is in control of making these decisions)?	No
Are there any procedures currently in place to determine how something should be disposed of or recycled?	Yes
What do you see as barriers to implementing recycling or composting in your area?	None
Are there any incentives or other things that could be done to make this easier?	NO
Do you have any other comments that are relevant to solid waste or recycling?	NO

Contact Information	Area of Operation/Company Name: Grant Products Int. Name: Douglas Sloane Title: Operations Manager Phone: 956 542 2620 Email: dsloane@grantproducts.com Best time to contact: Afternoon

We sincerely thank you for your time and insight!

Recycling / Solid Waste Information
Brownsville – South Padre Island International Airport

Source and Fate of Waste	
Describe the areas you/company oversee(s), what activities take place, and how areas fit into operations at airport?	Adjacent facility about a half mile from the airport terminal
How many employees are in these areas?	10
How large are your facilities?	20,000
What hours/days are these open?	5 days a week 10-16 hours a day
Are there any food service areas (breakrooms, etc)?	Yes there is a break room but no vending
Who is responsible for emptying trash and recycling receptacles in your areas?	Employees are on a rotation schedule
How much time is spent emptying trash and recycling receptacles from these areas (frequency)?	1 hour a day
How is the waste contract set up (through airport or directly with waste removal company)?	An outside dumpster is supplied by a 3rd party contractor. Also we periodically dispose of water in our compressor system.
Can you provide a copy of your waste management contract? (If so, please do)	No
Do you know if your service is contracted separately or with other portions of the airport and are there any volume discounts received?	Separate
Do you know if solid waste services have been contracted similarly in previous years? If they have changed, do you have any thoughts on why?	Don't know

Estimates on Waste Types, Percentages, and Quantities

	Yes/No	Estimated % of Waste Stream and Annual Quantity Generated	Comments
Food	Yes		Employee lunch scraps
Fats/Oils/Grease	No		
Municipal Solid Waste	No		
Cardboard	Yes		Used boxes for production
Glass	No		
Aluminum	No		
Plastic Bottles/Containers	Yes		Personal water bottles
Scrap Metal	No		
Tires	No		
Batteries	No		
Used Fluids	Yes		Water from air compressor
Grass	No		
Other			

Feasibility of Recycling	
What sorts of recycling or composting programs do you know about within Brownsville and/or nearby?	Not familiar
Is there a formal recycling program in your area of operations (i.e. a contractor collects recyclables from your facility)? If so, please describe the program and what it includes.	No
Do you have a corporate recycling policy or guidelines that could be used to start or improve the recycling program at the airport?	No
Where are recycling receptacles located?	NA
What items are recycled and how many bins?	NA
Are there any contract terms that preclude staff from adding a new recycling or composting program or increasing the level of recycling/composting performed? (This could be increasing the types of materials recycled, separating trash and recyclables, segregating food waste, etc.)	No
Do you think it would be feasible to add recycling bins to any of these areas, and for what materials?	NA
Is there support for recycling or composting from upper management? Do you think staff would be supportive?	Yes when it becomes applicable
Would modifications to your specific recycling/solid waste policies need to come from corporate or elsewhere (who is in control of making these decisions)?	NA
Are there any procedures currently in place to determine how something should be disposed of or recycled?	NA
What do you see as barriers to implementing recycling or composting in your area?	There needs to be additional volume to warrant implementing a program
Are there any incentives or other things that could be done to make this easier?	NA
Do you have any other comments that are relevant to solid waste or recycling?	

Contact Information	Area of Operation/Company Name: Name: Felix Garcia Lopez Title: General Manager Phone: 469-221-3797 Email: felixg@mvpplastics.com Best time to contact: 9am – 5pm

We sincerely thank you for your time and insight!

Recycling / Solid Waste Information
Brownsville – South Padre Island International Airport

Source and Fate of Waste	
Describe the areas you/company oversee(s), what activities take place, and how areas fit into operations at airport?	Plastic Packaging, Manufacturing/thermoforming of Plastic Packages. No link to airport operations
How many employees are in these areas?	40
How large are your facilities?	70K square feet
What hours/days are these open?	24/5 and 24/7
Are there any food service areas (breakrooms, etc.)?	Yes
Who is responsible for emptying trash and recycling receptacles in your areas?	Operators, Material Handlers, Maintenance personnel and Cleaning Employees
How much time is spent emptying trash and recycling receptacles from these areas (frequency)?	1-1/2 hours per day emptying trash. More than 99% of manufacturing material is recycled in the manufacturing process.
How is the waste contract set up (through airport or directly with waste removal company)?	Directly with waste removal company
Can you provide a copy of your waste management contract? (If so, please do)	Yes. Company information is removed.
Do you know if your service is contracted separately or with other portions of the airport and are there any volume discounts received?	What service?
Do you know if solid waste services have been contracted similarly in previous years? If they have changed, do you have any thoughts on why?	No changes

Estimates on Waste Types, Percentages, and Quantities			
	Yes/No	Estimated % of Waste Stream and Annual Quantity Generated	Comments
Food	Yes	.5%	
Fats/Oils/Grease	Yes	.2%	Send out for recycling
Municipal Solid Waste	Yes	97.56%	
Cardboard	Yes	1%	Sold to local recyclers
Glass	No		
Aluminum	Yes	.02%	Sold to local recyclers
Plastic Bottles/Containers	Yes	.2%	Recycling bins
Scrap Metal	Yes	.5%	Sold to local recyclers
Tires	No		
Batteries	Yes	.02%	Returned to fork lift vendors
Used Fluids	No		
Grass	No		
Other			

Feasibility of Recycling	
What sorts of recycling or composting programs do you know about within Brownsville and/or nearby?	Cardboard, plastic bottles. Most main manufacturing plastic material is recycled internally in the manufacturing process.
Is there a formal recycling program in your area of operations (i.e. a contractor collects recyclables from your facility)? If so, please describe the program and what it includes.	No
Do you have a corporate recycling policy or guidelines that could be used to start or improve the recycling program at the airport?	Only verbally communicated, not in written form.
Where are recycling receptacles located?	By the breakroom at the employee entrance. Cardboard is disposed with local recyclers
What items are recycled and how many bins?	Cardboard. Plastic Bottles. 3 bins. Several pallets of cardboard; quantity changes depending upon manufacturing process needs.
Are there any contract terms that preclude staff from adding a new recycling or composting program or increasing the level of recycling/composting performed? (This could be increasing the types of materials recycled, separating trash and recyclables, segregating food waste, etc.)	Not necessarily, but it cannot affect the efficiency of the operation
Do you think it would be feasible to add recycling bins to any of these areas, and for what materials?	What areas?
Is there support for recycling or composting from upper management? Do you think staff would be supportive?	Yes. Recycling is in place.
Would modifications to your specific recycling/solid waste policies need to come from corporate or elsewhere (who is in control of making these decisions)?	Local Management
Are there any procedures currently in place to determine how something should be disposed of or recycled?	Yes.
What do you see as barriers to implementing recycling or composting in your area?	None, other than operations being detrimentally affected by recycling program.
Are there any incentives or other things that could be done to make this easier?	Yes. Employee fund is created by recycling.
Do you have any other comments that are relevant to solid waste or recycling?	Very poor in Brownsville culture

Contact Information	Area of Operation/Company Name: Portage Plastics Corp Name: Tony Cappella Title: Director Phone:(956) 504-6102 Email: tcappella@portageplastics.com Best time to contact: Any time during working hours

We sincerely thank you for your time and insight!

Recycling / Solid Waste Information
Brownsville – South Padre Island International Airport

Source and Fate of Waste	
Describe the areas you/company oversee(s), what activities take place, and how areas fit into operations at airport?	Customer Service, Storage and Distribution
How many employees are in these areas?	55
How large are your facilities?	325,000 sq. ft.
What hours/days are these open?	13 hrs./day, 5 days/week
Are there any food service areas (breakrooms, etc)?	Employee breakroom
Who is responsible for emptying trash and recycling receptacles in your areas?	Employees and Janitorial Services
How much time is spent emptying trash and recycling receptacles from these areas (frequency)?	Daily
How is the waste contract set up (through airport or directly with waste removal company)?	Direct with waste removal company and recycling company.
Can you provide a copy of your waste management contract? (If so, please do)	No
Do you know if your service is contracted separately or with other portions of the airport and are there any volume discounts received?	Separately
Do you know if solid waste services have been contracted similarly in previous years? If they have changed, do you have any thoughts on why?	Has been contracted similarly in previous years.

Estimates on Waste Types, Percentages, and Quantities			
	Yes/No	Estimated % of Waste Stream and Annual Quantity Generated	Comments
Food	Yes	No estimate but very small amount.	
Fats/Oils/Grease	No		
Municipal Solid Waste	No		
Cardboard	Yes	No records of the amount.	Sold to recycler.
Glass	No		
Aluminum	Yes	Only employee soda cans.	Sold to recycler.
Plastic Bottles/Containers	Yes	Only employee soda bottles	Sold to recycler.
Scrap Metal	Yes	No estimate but very small amount.	Sold to recycler.
Tires	No		
Batteries	No		
Used Fluids	No		
Grass	No		
Other	N/A		

Feasibility of Recycling	
What sorts of recycling or composting programs do you know about within Brownsville and/or nearby?	None
Is there a formal recycling program in your area of operations (i.e. a contractor collects recyclables from your facility)? If so, please describe the program and what it includes.	Recycling program with Red Fish in Brownsville for all recyclables in our operation.
Do you have a corporate recycling policy or guidelines that could be used to start or improve the recycling program at the airport?	No,
Where are recycling receptacles located?	Dumpsters outside and containers inside.
What items are recycled and how many bins?	Cardboard, paper, stretch wrap and plastic. Do not know the number of bins inside our facilities.
Are there any contract terms that preclude staff from adding a new recycling or composting program or increasing the level of recycling/composting performed? (This could be increasing the types of materials recycled, separating trash and recyclables, segregating food waste, etc.)	No
Do you think it would be feasible to add recycling bins to any of these areas, and for what materials?	No
Is there support for recycling or composting from upper management? Do you think staff would be supportive?	We are already recycling.
Would modifications to your specific recycling/solid waste policies need to come from corporate or elsewhere (who is in control of making these decisions)?	Decisions are made locally.
Are there any procedures currently in place to determine how something should be disposed of or recycled?	Yes
What do you see as barriers to implementing recycling or composting in your area?	We have recycling program now.
Are there any incentives or other things that could be done to make this easier?	No
Do you have any other comments that are relevant to solid waste or recycling?	No

Contact Information	Area of Operation/Company Name: Trico Products Name: George Rigney Title: Manager Aftermarket Phone: 956-544-2722 ext. 4536 Email: george.rigney@tricoproducts.com Best time to contact: During normal business hours.

We sincerely thank you for your time and insight!