

CHAPTER 2: INVENTORY OF EXISTING CONDITIONS

2.1 INTRODUCTION

TIA, as shown in **Figure 2-1** is located on 8,343 acres 8 miles south of downtown Tucson and sits at an elevation of 2,643 feet above mean sea level (MSL). It provides commercial, general, and military aviation services as well as air cargo services for the Tucson metropolitan area, Pima County, and southern Arizona. TIA serves six airlines that operate to fifteen non-stop destinations nationwide, making TIA the second busiest commercial airport in Arizona.

This chapter documents the inventory of existing facilities, including infrastructure conditions and land uses. Since the last Master Plan Update, completed in 2004, the following key airport improvement projects have been undertaken and are reflected within this Master Plan Update.

- **Terminal Expansion** – A \$65 million, 80,000 sq. ft. expansion of terminal passenger and baggage processing facilities was completed in 2005. Construction of a consolidated rental car facility and parking garage and interior walkway from the main terminal building was completed in 2002.
- **Economy Parking Lot** – covered spaces installed (2005)
- **Taxiway G** – construction of Taxiway G southeast of the south run-up area (2006)
- **Million Air** – Million Air opened a new general aviation facility at TIA (2008)
- **Cell Phone Waiting Lot** – opened in 2005
- **Concourse Renovation** – \$30 million renovation of Concourses A and B to provide additional holdroom seating, restrooms, and concessions space (2008)
- **Express Parking Lot Exit Lanes and EasyPay Machines** – additional lanes and EasyPay machines installed to facilitate faster exits from airport parking lots (2008)
- **TAA Warehouse / Maintenance Complex** - \$8 million, 30,000 sq. ft. maintenance and warehouse complex north of the TAA fire station that houses terminal, fleet and field maintenance, custodial, and warehouse employees (2009)
- **400 HZ Ground Power System** – ground power system replaced (\$1.6 million) (2010)

2.2 AIRPORT HISTORY AND BACKGROUND

2.2.1 Airport History

In the 1940s a decision was made by the City of Tucson to separate its military and civilian operations at Davis Monthan Airfield. Davis Monthan Airfield would continue to be used for military operations and training and TIA, which at that time was known as Tucson Municipal Field, would be used primarily for civilian operations. In 1941, the City of Tucson purchased the land 4.5 miles southwest of Davis Monthan Airfield where TIA is situated today. In 1948, a non-profit corporation, comprised of 15 municipal leaders, was formed to operate TIA and by state charter on April 12, 1948 became the Tucson Airport Authority.

Entering the 1950s, TAA hired its first general manager, Bob Schmidt, and expanded its management responsibilities to Ryan Airfield, located 12 miles west of Tucson. Ryan Airfield is identified as the

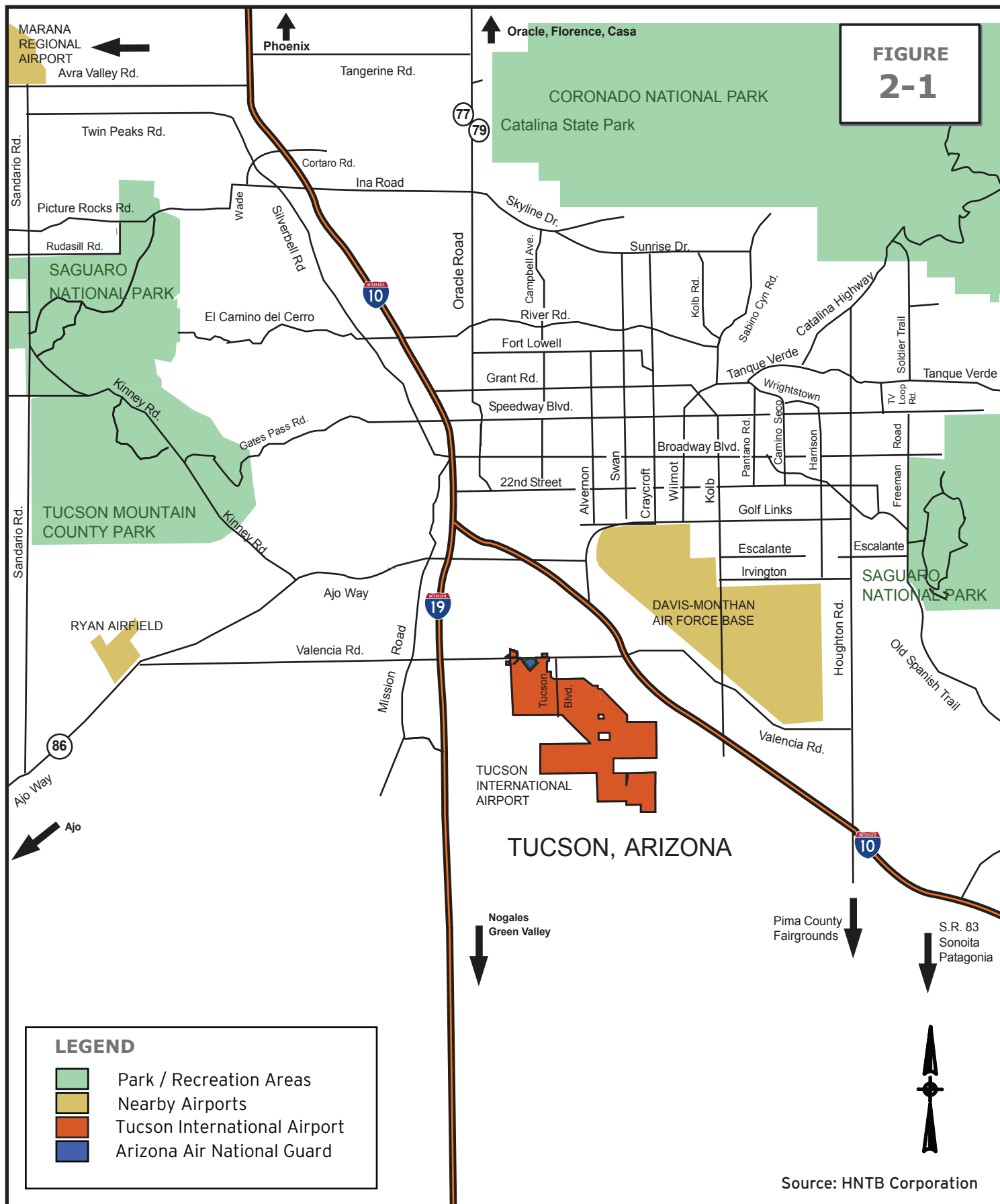
general aviation reliever airport for TIA. Military operations started at TIA in 1956 when the Arizona Air National Guard (AANG) established a base there. Shortly after, an air traffic control tower (ATCT) was built to manage the growing air traffic activity. In the 1960s as air carrier traffic continued to grow, the first passenger terminal building was built.

2.2.2 Tucson International Airport Today

Today, only approximately 2,000 acres of the entire TIA property, which is bordered by Valencia and Corona roads on the north, by Nogales Highway on the west, by Hughes Access and Old Vail Connection road on the south, and by Craycroft Road on the east, are currently developed for aeronautical use. For this Master Plan Update, the developed aeronautical area is referred to as the **Primary Airport Land**.

The remaining on-airport land area is vacant, undeveloped, or not currently used for aeronautical purposes. For this Master Plan Update, this land area is referred to as the **Reserve Land**. It should be noted that about a third of the Reserve Land is reserved for a future far parallel runway and other airport expansion beyond the 20-year planning horizon. Plans for future far parallel runway were further developed in the 2004 Master Plan and will not be a factor until aircraft operations exceed 314,000 and annual passengers exceed 5.8 million.

Beyond the airport property boundary, TIA is generally surrounded by residential areas to the north and west and undeveloped lands to the south. For this Master Plan Update, the land area surrounding TIA that may impact or be impacted by TIA operations is referred to as the **Urban Land Context**.



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INTERNATIONAL AIRPORT**

AIRPORT ENVIRONS

2.2.3 Airport Ownership / Management

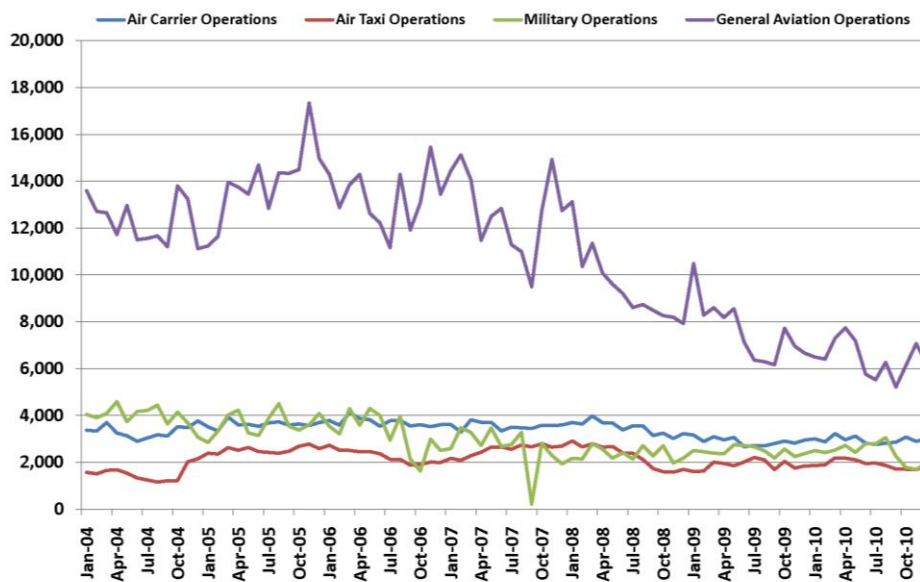
The City of Tucson owns TIA and through a long-term lease, it is operated by TAA as an essential government function under Arizona law. Governing TAA is a nine-person Board of Directors who oversees policy decisions and is elected by, and supported from, up to 115 volunteers residing in Pima County. The Board of Directors is also responsible for appointing the President / Chief Executive Officer (CEO). TAA employs approximately 270 people within three main divisions, Administration and Finance, Planning and Development, and Operations.

TAA does not receive any local tax revenue. To operate both TIA and Ryan Airfield, TAA relies on three primary sources of funding. The first are the rates and fees collected for both aeronautical and non-aeronautical activities at the airport including, but are not limited to, landing fees, space rentals, and parking. The second are federal and state grants used for eligible projects such as airport planning, airport development and noise studies. These funds are allotted to TIA by the FAA's Airport Improvement Program (AIP) and the State of Arizona and are distributed in the form of entitlements and discretionary funds. The third are Passenger Facility Charges (PFC's), a fee charged to passengers as part of their airline ticket. TAA has the authority to collect a PFC of \$4.50 per departing passenger which results in approximately \$8.0 million annually. Details pertaining to the financial structure are included in **Section 2.3**.

2.2.4 Airport Statistics

In 2010, TIA served approximately 3.7 Million Annual Passengers (MAP) and supported approximately 165,000 operations compared to 3.8 MAP and 254,000 operations in 2004 when the previous Master Plan Update was completed. Historically, the peak month for passengers is March. Of total operations, in 2004, almost 60% were general aviation (GA). The remaining operations were split nearly equally between air carrier, air taxi, and military. While GA activity still encompassed the highest share of operations in 2010, the share is slightly lower at 47% and GA aircraft operations decreased from 147,800 to 77,000 operations between 2004 and 2010. Air carrier operations have also decreased from 40,000 to 35,000 operations between 2004 and 2010. TIA had a modest volume of air cargo activity accommodating approximately 69 million pounds of freight in 2010 compared to 63 million pounds in 2004. **Figure 2-2** presents a summary of TIA aircraft operations from 2004 – 2010.

Figure 2-2: TIA Aircraft Operations (2004 – 2010)



Source: Tucson Airport Authority

2.2.5 Recent Air Service Developments

Today, six commercial air carrier airlines operate out of TIA. The six airlines and the domestic non-stop destinations provided by these airlines are shown in **Table 2-1**. TIA does not currently have any scheduled, non-stop international operations.

Table 2-1: 2012 Commercial Flights

Airline	Non-Stop Destinations	Total Daily Flights
Alaska	Seattle-Tacoma (SEA)	1
American	Chicago O'Hare (ORD)	2
	Dallas-Ft. Worth (DFW)	7
	Los Angeles (LAX)	4
Delta	Atlanta (ATL)	2
	Minneapolis-St. Paul (MSP)	1
	Salt Lake City (SLC)	3
Southwest	Albuquerque (ABQ)	2
	Chicago Midway (MDW)	2
	Denver (DEN)	2
	Las Vegas (LAS)	5
	Los Angeles (LAX)	5
	San Diego (SAN)	3
United	Denver (DEN)	4
	Houston Intercontinental (IAH)	2
	Los Angeles (LAX)	3
	San Francisco (SFO)	1
US Airways	Phoenix (PHX)	10

Source: Tucson Airport Authority

2.3 FINANCIAL DATA

This section provides an overview of TAA's financial structure.

Airline Use Agreement

The airline use agreement is the master contract executed between TAA and the signatory airlines outlining their financial, operational, and planning terms and conditions. The initial 30-year Agreement, executed in 1976, expired in 2006 and was extended on a two-year term. Through several extensions, the agreement is currently set to expire in September 2013. TAA is currently negotiating with the signatory airlines to create a new Agreement.

Capital Improvement Program

TAA annually updates a multi-year Capital Improvement Program (CIP) designed to respond rapidly and effectively to the changing patterns of the air travel industry. TAA's Board defines TIA's long-term goals through updates to its Master Plan. The CIP provides a strategy and schedule for budgeting and constructing facilities at TIA and incorporates recommendations from the Master Plan.

Cost per Enplaned Passenger

An airline's cost per enplaned passenger (CPE) is often used as a benchmark tool for comparing one airport to another. The CPE is calculated by dividing total airline costs associated with the specific airport by enplaned passengers at that airport. Costs include landing fees, airside usage charges, fuel flowage fees, terminal rents and other payments to the airport. The CPE at TIA was \$6.43 in Fiscal Year (FY) 2008, \$7.34 in FY 2009 \$7.37 in FY 2010, and \$7.12 in FY 2011. The increase from FY 2008 to FY 2009 occurred because of a large drop in passengers due to the economic downturn. TAA expects the CPE to remain flat over the near-term but has made it a goal to reduce it over time.

2.4 AIRPORT SYSTEM ROLE

2.4.1 National Airport System Role

An airport classified in the National Plan of Integrated Airport Systems (NPIAS) is considered significant to national air transportation and thus eligible to receive Federal grants under the FAA's AIP. TIA is a primary commercial service airport under NPIAS, which means it is a public airport with scheduled service and 2,500 or more enplaned passengers per year.

2.4.2 Regional Airport System Role

TIA is one of three primary commercial airports in Arizona. The largest is Phoenix Sky-Harbor (PHX), a large hub airport, which is located approximately 120 miles northwest of TIA. TIA is the only commercial airport within Pima County and is located approximately 8 miles south of downtown Tucson.

General aviation and military airports located in close proximity to TIA include Ryan Airfield and Davis Monthan Air Force Base. Ryan Airfield, the general aviation reliever airport for TIA, is located approximately 12 miles southwest of TIA on 1,804 acres of land and has three runways and an average of 435 daily operations.

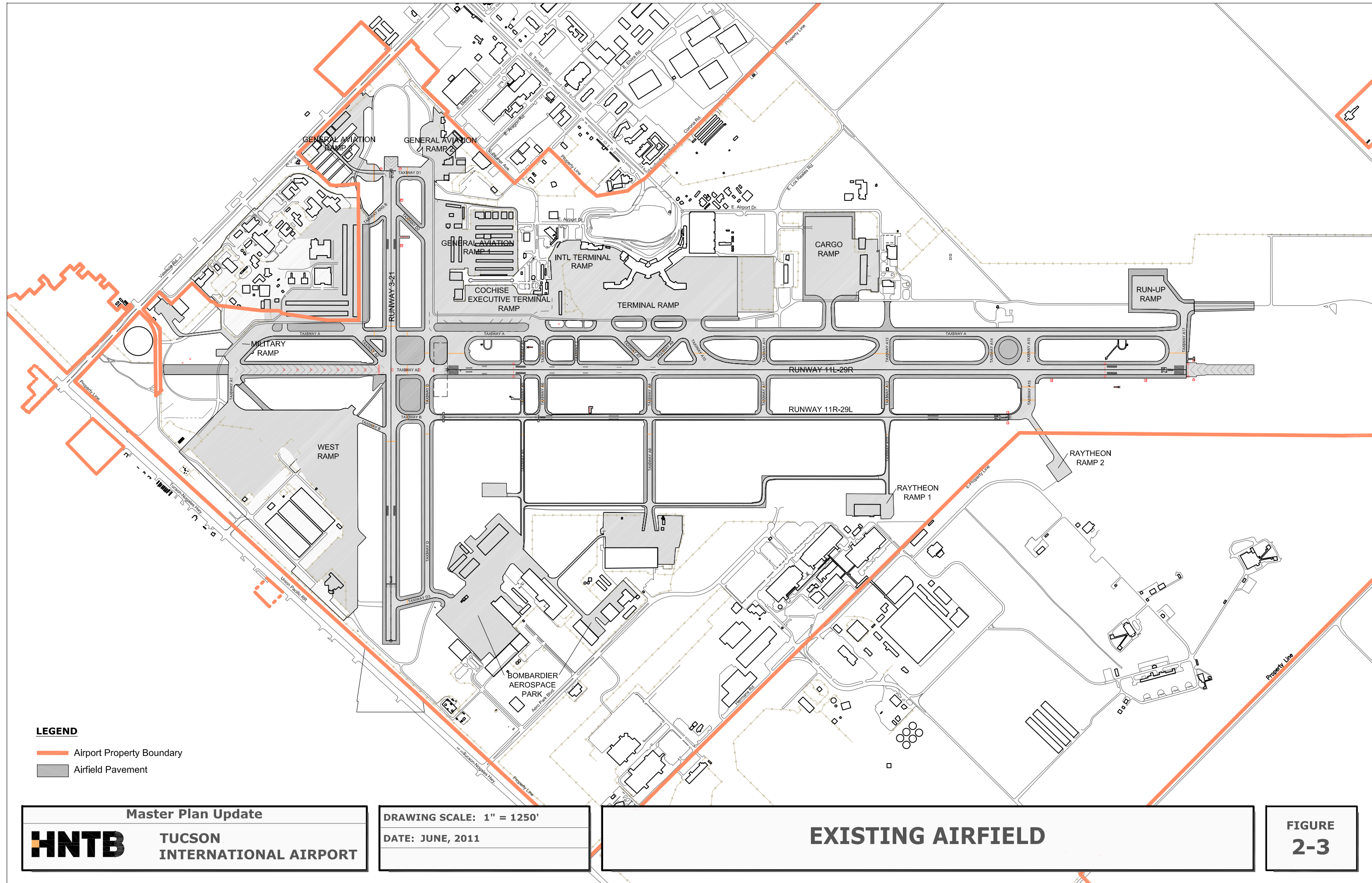
2.5 AIRFIELD

The existing airfield is depicted on **Figure 2-3** and major components are described in this section.

2.5.1 Runways

TIA operates three runways, Runways 11L-29R, 11R-29L, and 3-21. The two parallel runways measure 10,996 feet long by 150 feet wide (Runway 11L-29R) and 8,408 feet long by 75 feet wide (Runway 11R-29L). Runway 11R has a displaced arrivals threshold of 1,410 feet, resulting in an available landing length of 6,998 feet. The parallel runways are separated by a distance of 706.5 feet. Runway 11L-29R is the primary runway and generally used by commercial air-carrier service, cargo, and military operations. Runway 11R-29L is used primarily for general aviation aircraft.

A third crosswind runway runs perpendicular to, but does not intersect the two parallel runways and measures 7,000 feet long by 150 feet wide. It is used by all aircraft when wind and weather conditions dictate. The Runway 3 arrivals threshold is displaced by 840 feet resulting in an available landing length of 6,160 feet. The existing runway characteristics are summarized in **Table 2-2**.



LEGEND

— Airport Property Boundary

— Airfield Pavement

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DRAWING SCALE: 1" = 1250'

DATE: JUNE, 2011

EXISTING AIRFIELD

FIGURE
2-3

Table 2-2: Summary of Existing Runway Characteristics

	Runway 11L-29R		Runway 11R-29L		Runway 3-21	
	11L	29R	11R	29L	3	21
Airport Reference Code (ARC)	D-IV		B-II		D-IV	
Runway Pavement Length (feet)	10,996		8,408		7,000	
Displaced Arrival Threshold Length (feet)	None	None	1,410	None	840	None
Landing Distance Available (feet)	10,996		6,998		6,160	
Runway Width (feet)	150		75		150	
Effective Gradient	0.591%		0.656%		0.127%	
Approach Surface Slope	50:1	34:1	34:1	34:1	34:1	34:1
Airport Elevation (feet)	2,643					
Runway End Elevation (feet above MSL)	2,578	2,643	2,574	2,629	2,560	2,569
Runway Displaced Arrival Threshold Elevation (feet above MSL)	NA	NA	2,585	NA	2,564	NA
Runway Marking	Precision	Non-precision	Visual	Visual	Visual	Visual
Runway Instrumentation	Precision	Non-precision	Non-precision	Non-precision	Non-precision	Non-precision
Runway Edge Lighting	HIRL	HIRL	MIRL	MIRL	MIRL	MIRL
Approach Lights / Visual Aids	MALSR PAPI	REIL PAPI	PAPI	REIL	None	REIL PAPI
Navigational Aids	ILS, GPS, RNAV	GPS, RNAV	GPS, RNAV	GPS, RNAV	GPS, RNAV	GPS, RNAV
Approach Visibility Minimums (miles)	0.50 (ILS)	1.25 (RVAV-RNP)	1.00 (RNAV-GPS)	1.00 (RNAV-GPS)	1.75 (RNAV-GPS)	1.75 (RNAV-GPS)
Arresting Device (military use only)	Yes	Yes	No	No	Yes	Yes
Pavement Surface Type	Asphalt / concrete	Asphalt / concrete	Asphalt	Asphalt	Asphalt	Asphalt
Pavement Strength (lbs)	SW 160,000 DW 200,000 DTW 350,000 DDTW 585,000		SW 120,000 DW 140,000 DTW 220,000 N/A		SW 105,000 DW 137,000 DTW 230,000 DDTW 500,000	

Source: Tucson Airport Authority, FAA Airport Master Record (FAA Form 5010-1)

Notes: * The first number is the elevation at the runway end. The second number is the elevation at the displaced arrival threshold.

ARC = Airport Reference Code

HIRL = High Intensity Runway Lights

MALSR = Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights

PAPI = Precision Approach Path Indicator

REIL = Runway End Identifier Lights

GPS = Global Positioning System

RNAV-RNP = Area Navigation - Required Navigation Performance

SW = Single Wheel Aircraft

DTW = Dual Tandem Wheel Aircraft

MSL = Mean Sea Level

MIRL = Medium Intensity Runway Lights

VASI = Visual Approach Slope Indicator

ILS = Instrument Landing System

RNAV = Area Navigation

RNAV-GPS = Area Navigation - Global Positioning System

DW = Double Wheel Aircraft

DDTW = Double Dual Tandem Wheel Aircraft

Airport Reference Code (ARC)

As stated in FAA Advisory Circular 150/5300-13A, Airport Design, “the airport reference code [ARC] has two components relating to the airport design aircraft. The first component, depicted by a letter, is the aircraft approach category and relates to aircraft approach speed (operational characteristic). The second component, depicted by a Roman numeral, is the airplane design group and relates to airplane wingspan or tail height (physical characteristics), whichever is the most restrictive.”

The design aircraft is the most demanding aircraft that uses the airport with at least 500 annual operations. TIA’s design aircraft is the Airbus A300-600F which is operated by FedEx between TIA and the cargo carrier’s hub at Memphis International Airport on a near daily basis. The corresponding ARC for TIA is D-IV.

Because TIA has runways and taxiways that serve general aviation aircraft exclusively, the airport also has a secondary design aircraft, the Cessna Citation II. The corresponding ARC for the general aviation facilities at TIA is B-II. As reference, **Table 2-3** presents the aircraft approach categories for various aircraft and **Table 2-4** presents the ADG classifications for various aircraft.

Table 2-3: Aircraft Approach Speed Design Categories

Approach Category	Approach Speed Range	Example
A	< 91 knots	Cessna 172
B	91 to < 121 knots	Q400, EMB-120
C	121 to < 141 knots	CRJ-100/200/700, EMB-145, B-737, A-320, MD-88, B-757, A-300
D	141 to < 166 knots	CRJ-900, MD-11, B-747, B-777
E	> 166 knots	Certain military aircraft

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

Notes: B=Boeing; A=Airbus; EMB=Embraer; CRJ=Canadair Regional Jet (Bombardier); MD=McDonnell Douglas

Table 2-4: Aircraft Design Group (ADG) Classification

Design Group	Wingspan Range	Tail Height Range	Example
I	< 49 feet	< 20 feet	Cessna 172, Beechcraft Bonanza
II	49 to < 79 feet	20 < 30 feet	EMB-145, EMB-120, CRJ 100
III	79 to < 118 feet	30 < 45 feet	B-737, MD-80, A-320
IV	118 to < 171 feet	45 < 60 feet	B-757, B-767, A-300
V	171 to < 214 feet	60 < 66 feet	B-747, MD-11, B-787
VI	> 214 feet	> 66 feet	A-380, B-747-8

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

Notes: B=Boeing; A=Airbus; EMB=Embraer; CRJ=Canadair Regional Jet (Bombardier); MD=McDonnell Douglas

Runway Pavement Strengths

Runway pavement bearing strengths define the weight limits at or below which an aircraft may operate on the runways without causing undue stress on the pavement. **Table 2-5** summarizes the runway pavement bearing strengths for each runway.

Table 2-5: Runway Pavement Bearing Strengths

Landing Gear System	Runway 11R-29L	Runway 11L-29R	Runway 3-21
Single Wheel (SW)	160,000 lbs	120,000 lbs	105,000 lbs
Dual Wheel (DW)	200,000 lbs	140,000 lbs	137,000 lbs
Dual Tandem (DTW)	350,000 lbs	220,000 lbs	230,000 lbs
Double Dual Tandem (DDTW)	585,000 lbs	N/A	500,000 lbs

Source: FAA U.S. Airport / Facility Directory, June 30, 2011 – August 25, 2011

The operating pavement bearing strength requirements of selected aircraft are presented in **Table 2-6** for comparative purposes.

Table 2-6: Selected Aircraft Pavement Bearing Strength Requirements

Aircraft	Max Gross Takeoff Weight	Landing Gear Type
Boeing 737-400	150,000 lbs	Dual Wheel
Boeing 737-700	154,500 lbs	Dual Wheel
Boeing 737-800	174,200 lbs	Dual Wheel
Airbus A320-200	170,000 lbs	Dual Wheel
Boeing 757-200	255,500 lbs	Dual Tandem
Boeing 747-400	870,000 lbs	Double Dual-Tandem
McDonald Douglas MD-11	602,500 lbs	Dual Tandem

Source: Boeing and Airbus Product Specifications

2.5.2 Runway Protected Areas

Various runway protected areas are required by the FAA to ensure the safety of airfield operations and are described below. A summary of the specific runway protected area dimensions provided on the TIA runways are provided in **Table 2-7** and shown on **Figure 2-4**. The protected areas are generally based on the size of the aircraft utilizing the runway and approach visibility minimums (shown in **Table 2-2** for TIA). Generally, larger aircraft and lower approach visibility minimums result in larger required protected areas.

Runway Safety Area (RSA): A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of undershooting, overshooting or veering off of the runway. All existing runway safety areas currently meet design standard dimensions with the exception of Runway 3. An existing service road passes within approximately 200 feet of the Runway 3 end. However, the Runway 3 threshold is displaced 840 feet providing an effective Runway Safety Area length of 965 feet beyond the end of Runway 3. The RSA must be graded, free of surface variations, and capable of supporting aircraft or rescue equipment on an emergency basis.

Runway Object Free Area (ROFA): An area centered on the runway provided to enhance the safety of aircraft operations by being free of objects, except for those required for air navigation or aircraft ground maneuvering purposes.

Runway Protection Zone (RPZ): A trapezoidal area off the runway end to enhance the protection of people and property on the ground. The RPZ begins 200 feet beyond the end of the runway threshold.

Obstacle Free Zone (OFZ): The OFZ is the airspace below the surface 150 feet above the runway that is required to be clear of all objects, with the exception of frangible visual navigation aids that are required to provide clearance protection for aircraft landing or taking off and missed approaches.

Runway Blast Pad: The surface adjacent to the ends of runways provided to reduce the erosive effect of jet blast and propeller wash.

Extended Clear Zone: The Extended Clear Zone is defined as the area extending beyond the RPZ in a line parallel to the existing runway centerline continuing to either the TIA property boundary or major roadway, whichever is met first. This applies to all runways at TIA. TAA has maintained Extended Clear Zones since 1979 and have recommended that structures and other development not be located substantially within Extended Clear Zones with the permissible exception of roadways and navigational aids.

Table 2-7: Runway Protected Areas

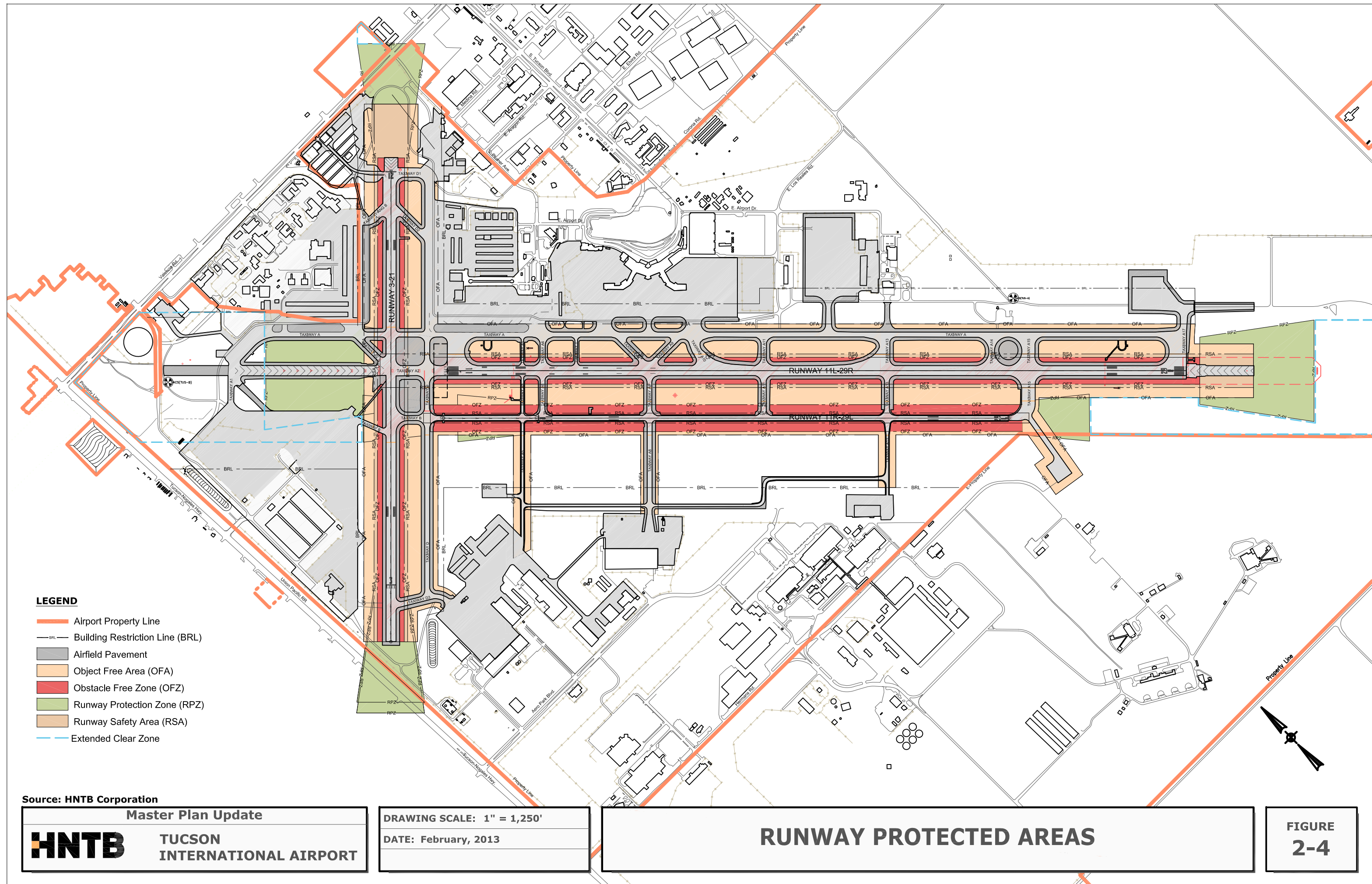
	Runway 11L-29R		Runway 11R-29L		Runway 3-21	
	11L	29R	11R	29L	3	21
Runway Safety Area (RSA)						
Width (feet)	500		150		500	
Length Beyond Runway End (feet)	1,000	1,000	300	300	0 ¹	1,000
Runway Object Free Area (OFA)						
Width (feet)	800		500		800	
Length Beyond Runway End (feet)	1,000		300		1,000	
Arrival Runway Protection Zone (RPZ)						
Inner Width (feet)	1,000	500	500	500	500	500
Outer Width (feet)	1,750	1,010	700	700	1,010	1,010
Length (feet)	2,500	1,700	1,000	1,000	1,700	1,700
Departure Runway Protection Zone (RPZ)						
Inner Width (feet)	NA	NA	500	NA	NA	NA
Outer Width (feet)	NA	NA	700	NA	NA	NA
Length (feet)	NA	NA	1,000	NA	NA	NA
Runway Obstacle Free Zone (OFZ)						
Width (feet)	400	400	250	250	400	400
Length Beyond Runway End (feet)	200	200	200	200	200	200
Blast Pad						
Width (feet)	NA	Varies	NA	NA	None	200
Length (feet)	NA	850 ²	NA	NA	None	200

Source: Tucson Airport Authority, FAA Airport Master Record (FAA Form 5010-1)

Notes:

1 – The length beyond the runway end is zero feet due to a standard RSA that is accommodated via declared distances.

2 – The blast pad on the Runway 29R end consists of two sections. The first section starting from the runway end is 150' long and 200' wide. The second section for military operations which begins at the end of the first section is 700' long and 150' wide.



- LEGEND**
- Airport Property Line
 - BRL — Building Restriction Line (BRL)
 - Airfield Pavement
 - Object Free Area (OFA)
 - Obstacle Free Zone (OFZ)
 - Runway Protection Zone (RPZ)
 - Runway Safety Area (RSA)
 - Extended Clear Zone

Source: HNTB Corporation

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HNTB

TUCSON
INTERNATIONAL AIRPORT

DRAWING SCALE: 1" = 1,250'

DATE: February, 2013

RUNWAY PROTECTED AREAS

FIGURE
2-4

2.5.3 Runway Use Configuration

The most important consideration in determining runway use configuration is the speed and direction of the wind which affect both takeoff and landing distances. Operationally it is preferable for aircraft to take off and land into the wind. This headwind reduces the amount of groundspeed required by an aircraft to take off and reduces the groundspeed upon touchdown. It is also desirable for aircraft to operate with a minimal cross-wind component. Each aircraft has a different maximum cross-wind velocity limit and, generally, smaller aircraft are more affected by cross-wind components.

When a new runway is being planned, historical wind data are used to create a wind coverage diagram or wind rose which aids in determining the optimal runway direction. The wind rose reflects wind velocity, direction, and frequency of occurrences within a given time frame. **Figure 2-5** shows TIA's wind coverage diagram based on approximately 142,000 observations from the National Oceanographic and Atmospheric Administration's (NOAA) National Climatic Data Center (NCDC) between 1994 and April 1st 2011.

For an existing runway network the wind coverage indicates the percentage of time cross-wind components are within an acceptable velocity which, per FAA guidelines, must be a minimum of 95% regardless of weather conditions. The weather conditions are a reflection of the cloud ceiling and visibility and dictate which flight rules are used. In visual meteorological conditions (VMC), the cloud ceiling is at least 1,000 feet, the horizontal visibility is at least three statute miles and Visual Flight Rules (VFR) are in effect. In restricted visibility or instrument meteorological conditions (IMC), the cloud ceiling is less than 1,000 feet, the horizontal visibility is less than three (3) statute miles, and Instrument Flight Rules (IFR) are in effect.

Wind coverage data are shown in **Table 2-8**. Under VFR, TIA runways cover 99.99% of historical wind observations, and under IFR, the runways cover 99.09% of historical wind observations. Under both VFR and IFR, the runways cover 99.98% of historical wind observations. As shown, the existing runway network is oriented to best maximize prevailing wind coverage and minimize cross-wind components.

Calm wind coverage allows for a runway operating condition that enables maximum flexibility and operating capacity. During all weather conditions, calm winds occur at TIA approximately 76% of the time.

Table 2-8: TIA Runway System Wind Coverage Percentages

Coverage	10.5 Knots	13 Knots	16 Knots	20 Knots
VFR	98.53%	99.59%	99.91%	99.99%
IFR	92.50%	96.02%	97.84%	99.09%
Combined VFR and IFR	98.48%	99.57%	99.90%	99.98%

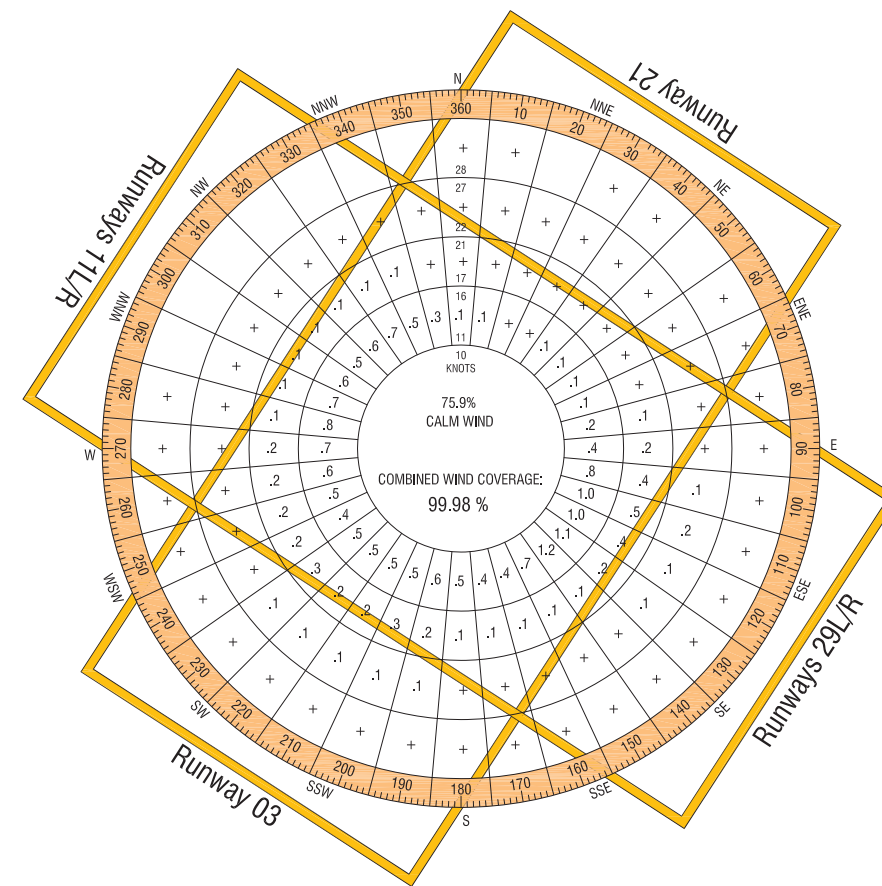
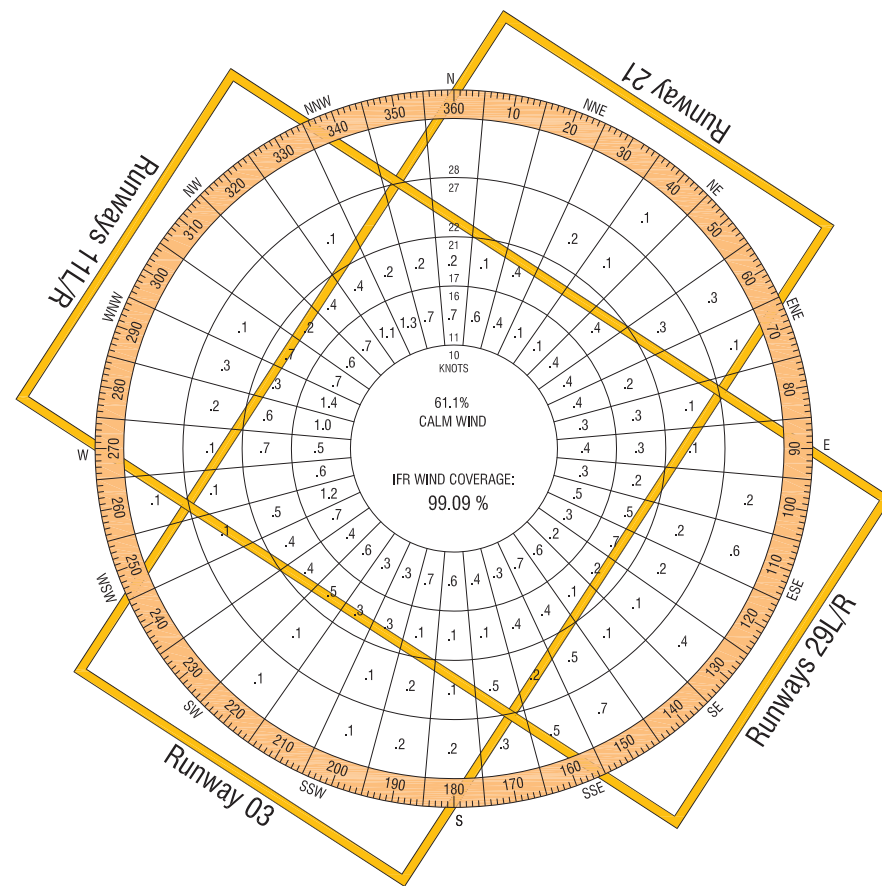
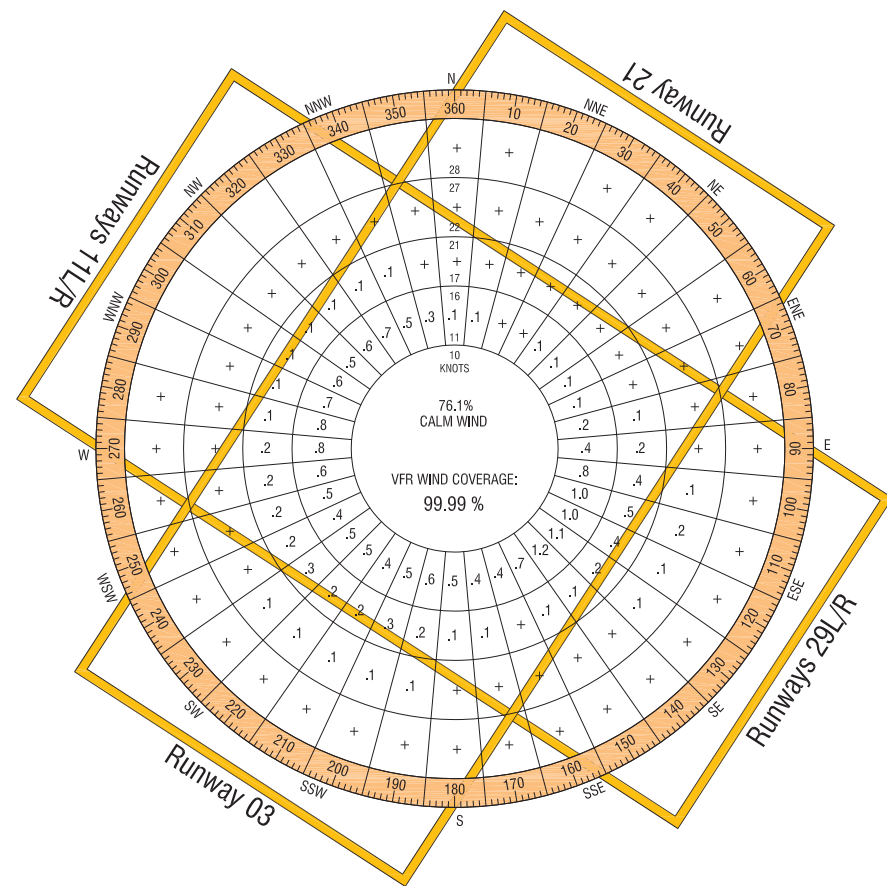
Source: HNTB Analysis based on data from the NOAA National Climatic Data Center

The runways operate in two primary flow patterns, northwest flow and southeast flow. Under northwest flow, aircraft arrive at and depart from Runways 29L and 29R. Under southeast flow, aircraft arrive at and depart from Runways 11L and 11R. Noise abatement policies at TIA dictate that preference is given to southeast flow when wind conditions are up to a ten-knot tailwind. In the event wind flows from the southwest at 20 knots or greater, Runway 3-21 is used (crosswind flow). The percentage of time aircraft operate in each flow is presented in **Table 2-9**.

Table 2-9: Directional Flow Percentages

Direction	Description	Percentage
Northwest Flow	Aircraft arrive at and depart from Runways 29L and 29R	40% day 10% night
Southeast Flow	Aircraft arrive at and depart from Runways 11L and 11R	60% day 90% night
Crosswind Flow	Aircraft arrive at and depart from the Runway 21 end	NA

Source: 2004 Master Plan Update; 1990 TIA Part 150 Study



WIND COVERAGE DATA

CROSSWIND COMPONENT	VFR COVERAGE	IFR COVERAGE	COMBINED COVERAGE
10.5 KNOTS	98.53%	92.50%	98.48%
13 KNOTS	99.59%	96.02%	99.57%
16 KNOTS	99.91%	97.84%	99.90%
20 KNOTS	99.99%	99.09%	99.98%

Wind Data Source: NOAA National Climactic Data Center (NCDC)

Station: Tucson Intl. Airport - ASOS Station

Period of Record: 1994 - 2011

No of Observations: 141,918



Source: HNTB Corporation

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TUCSON INTERNATIONAL AIRPORT

DRAWING SCALE: Not to Scale
DATE: APRIL, 2012

WIND COVERAGE DIAGRAM

FIGURE 2-5

2.5.4 Taxiways

The taxiways provide a network for aircraft to move around the airfield, connecting various airfield components and providing access to the runways. The primary Taxiways A and D run parallel to Runways 11L-29R and Runway 3-21, respectively. Both Taxiways were seal coated and restriped in 2011. Taxiway G, which was constructed in 2006, is currently inactive. The taxiway network at TIA is depicted in Figure 2-3 and the width and description of each taxiway is provided in Table 2-10.

Table 2-10: Taxiway Description

Taxiway	Design Aircraft	Width (feet)
A (Parallel to Runway 11L-29R)	D-IV	75
A1	D-IV	75
A2	D-IV	75
A4	D-IV	240
A5	B-II	40'
A6	D-IV	75
A7	D-IV	75
A8	D-IV	75
A9	D-IV	75
A10	D-IV	150
A11	D-IV	75
A13	D-IV	75
A14	D-IV	75
A15	D-IV	150
A17	D-IV	240
B	D-IV	75
ANG B	D-IV	75
C (Parallel to Runway 11R-29L) (Closed to fixed-winged aircraft)	B-II	35
D (Parallel to Runway 3-21)	D-IV	75
D1	D-IV	140
D2	D-IV	75
D3	D-IV	75
G	Inactive	Inactive
T	B-II	40

Source: HNTB Analysis

2.5.5 Aircraft Ramps

Aircraft ramp or apron areas are paved portions of the airfield where aircraft stop for loading and unloading of passengers and/or cargo, conduct maintenance, and park. It is also common to utilize ramp areas for aircraft ground servicing equipment storage. Ramp areas are considered non-movement areas by the FAA as they are not controlled by the ATCT. **Table 2-11** presents the number of aircraft parking positions and area of each ramp which are depicted on **Figure 2-6**.

Table 2-11: Aircraft Ramp Areas

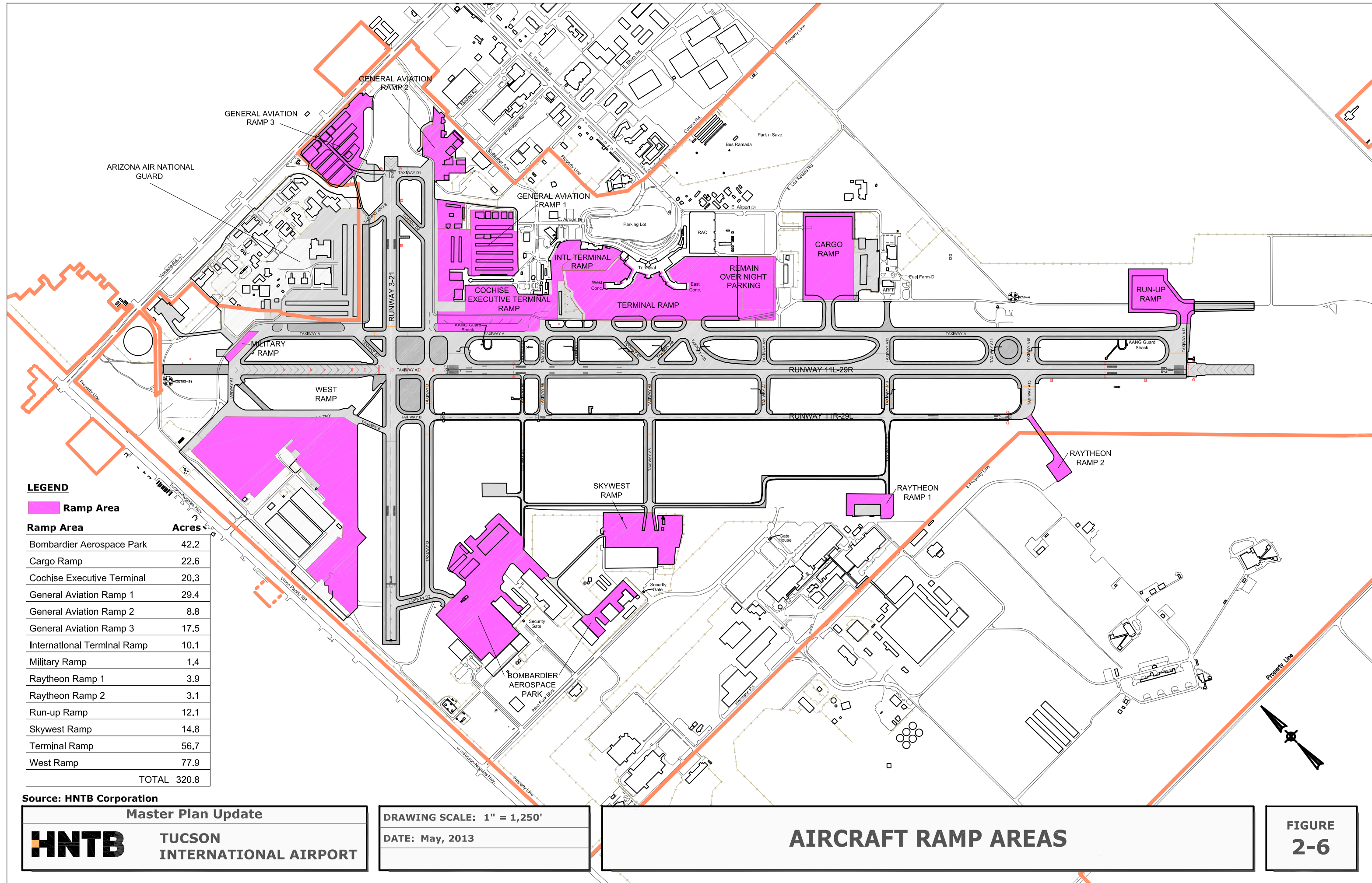
Ramp	Land Use Function	Aircraft Parking	
		Positions	Area (Acres)
Bombardier Aerospace Park	Aeronautical	NA	42
Cargo Ramp	Cargo	18	23
Executive Terminal Ramp	General Aviation	NA	20
General Aviation Ramp 1	General Aviation	NA	29
General Aviation Ramp 2	General Aviation	NA	9
General Aviation Ramp 3	General Aviation	NA	17
International Terminal Ramp	Terminal	6	10
Military Ramp	Military	NA	1
Raytheon Ramp 1	Aeronautical	NA	4
Raytheon Ramp 2	Aeronautical	NA	3
Run-up Ramp	Airport Support	12	12
SkyWest Ramp	Airline Support	NA	15
Terminal Ramp	Terminal	22	57
West Ramp	General Aviation, Aeronautical	NA	78
TOTAL		NA	321

Source: HNTB Analysis

Note: NA = Not Available

2.5.6 Remain-Over-Night Parking

TIA currently has one designated remain-over-night (RON) parking area, shown on **Figure 2-6**. Located at the south end of the terminal ramp, the RON parking area measures approximately 8.5 acres and can accommodate approximately nine Group III or seven Group IV parked aircraft.



LEGEND

Ramp Area

Ramp Area	Acres
Bombardier Aerospace Park	42.2
Cargo Ramp	22.6
Cochise Executive Terminal	20.3
General Aviation Ramp 1	29.4
General Aviation Ramp 2	8.8
General Aviation Ramp 3	17.5
International Terminal Ramp	10.1
Military Ramp	1.4
Raytheon Ramp 1	3.9
Raytheon Ramp 2	3.1
Run-up Ramp	12.1
Skywest Ramp	14.8
Terminal Ramp	56.7
West Ramp	77.9
TOTAL	320.8

Source: HNTB Corporation

Master Plan Update



TUCSON
INTERNATIONAL AIRPORT

DRAWING SCALE: 1" = 1,250'

DATE: May, 2013

AIRCRAFT RAMP AREAS

FIGURE
2-6

2.5.7 Pavement Use and Management

Maintaining good pavement conditions are important to airfield operations to prevent aircraft damage and minimize Foreign Object Damage (FOD) risk. Airfield pavement management is governed by FAA *Advisory Circular 150/5380-6B: Guidelines and Procedures for Maintenance of Airport Pavements*, published September 28, 2007. Airports receiving Federal funding are required to have an airport pavement management program in place.

Pavement maintenance and improvement measures completed since 2004 are listed below.

- Runway 11L-29R rubber removal (three times a year)
- Sealcoat Taxiway D (2005)
- Reconstruct Runway 11L-29R (2006)
- Routing and slurry sealing of cracks on service roads for Taxiways A, D, and G (2009)
- Expand Terminal apron east of Concourse A (2010)
- Reconstruct Runway 3-21, and Taxiway A2 (2011)
- Sealcoat and stripe Taxiway A, D, and the general aviation apron (2011)
- Sealcoat portion of Executive GA Apron – Phase I/II/III (2011)
- Airfield Pavement Management Program Update (2011)
- Pavement grooving and stripping on Taxiway A13 (2011)
- Reconstruct all or parts of Taxiways A, A7, A10, air freight apron, customs apron, and Condo & D apron (2011)
- Rehabilitate and sealcoat Runway 11R-29L and connecting taxiways (Phase I 2012)

2.5.8 Surveillance Equipment and Navigational Aids

TIA utilizes a variety of surveillance equipment and navigational aids to enhance the safety of aircraft operations.

Arriving aircraft use both precision and non-precision instrument approaches. Precision approaches occur when both lateral and vertical guidance via a glide path and glide slope are used. Navigational aids (NAVAIDS) for precision approaches include: glide slope, localizer, medium intensity approach lighting system with runway alignment indicator lights (MALSR), precision approach radar (PAR), and Global Positioning System (GPS).

Non-precision instrument approaches occur when only lateral guidance (glide path) is used for approaches or landings. NAVAIDS for non-precision approach procedures include: GPS, area navigation (RNAV), very high frequency (VHF) omni-directional radio range (VOR) with or without distance measuring equipment (DME), non-directional radio beacon (NDB), airport surveillance radar (ASR), and tactical air navigation system (TACAN).

Pavement markings, such as runway centerlines, displaced thresholds, runway end thresholds, touchdown points, aircraft hold locations, and runway edges may differ for precision and non-precision approaches.

Runway 11L is the only runway at TIA that accommodates precision instrument approaches and is equipped with airport surveillance radar (ASR), a Category 1 instrument landing system (ILS) and a MALSR. The decision height minimum on Runway 11L is 200 feet above ground level (AGL) and the approach visibility minimum is 0.5 statute miles.

All other runway end instrument approaches are non-precision. Runway 29R is equipped with a localizer with DME, a VOR collected with a DME, and an RNAV-GPS.

For visual approaches, other navigational aids are available. The ATCT has a rotating beacon and a variety of other visual approach lights are used such as precision approach path indicators (PAPI), runway end identifier lights (REIL), and visual approach slope indicators (VASI).

To provide aid to pilots in times of low visibility or during nighttime operations, runway edge lighting, high intensity runway lighting (HIRL) or medium intensity runway lighting (MIRL) are provided.

2.5.9 Airspace

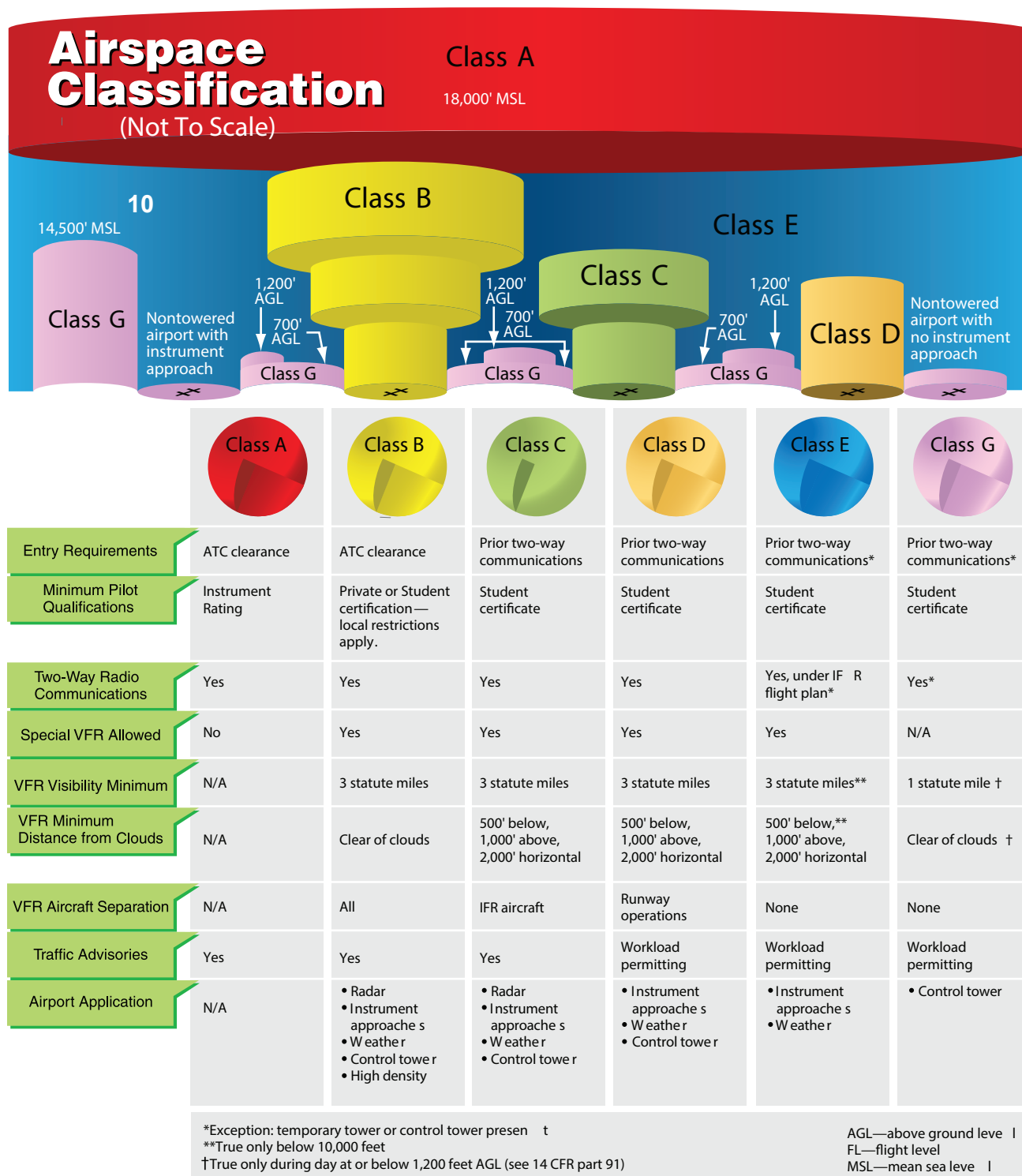
The National Airspace System (NAS) is the network of United States airspace which includes air navigation facilities, equipment, procedures, airports, and air traffic controllers, and . The NAS consists of six, 3-dimensional classes, lettered A, B, C, D, E, and G, that differ based on the flight rules appropriate to the airspace and level of interaction between the aircraft and Air Traffic Control (ATC). The NAS classes are shown in **Figure 2-7**.

The airspace above TIA is Class C airspace. Class C airspace applies to airports with an operational ATCT, serviced by a radar approach control with a certain number of IFR operations or passenger enplanements. It is comprised of two concentric circles extending from the surface with a diameter of 5 and then 10 nautical miles starting as low as 1,200 feet above the airport elevation. The vertical boundary is 4,000 feet above the airport elevation or 6,600 feet above MSL. Aircraft must establish two-way radio communications with ATC prior to entering the airspace and maintain communications within the airspace. Control within the Class C airspace is handled by ATC controllers stationed at the airport's ATCT who are responsible for arriving and departing aircraft and ground taxi movement on the airport surface.

Beyond the Class C airspace area at TIA, air traffic control is provided by the Tucson Terminal Radar Approach Control (TRACON) facility located at Davis-Monthan Air Force Base. The Tucson TRACON controls the airspace within a 30-nautical mile radius around Davis-Monthan Air Force Base and up to 17,000 feet above MSL.

Beyond the Tucson TRACON, aircraft flying en route to or from TIA must correspond with the Air Route Traffic Control Center (ARTCC) in Albuquerque, New Mexico. The Albuquerque ARTCC controls airspace through portions of the southwestern U.S. from the Arizona / California border to Amarillo and El Paso, Texas.

**FIGURE
2-7**



Source: FAA Instrument Flying Handbook (FAA-H-8083-15A),
Ch. 8, The National Airspace System, 2009

Master Plan Update



**TUCSON
INTERNATIONAL AIRPORT**

NATIONAL AIRSPACE SYSTEM CLASSIFICATION

2.6 PASSENGER TERMINAL

The existing passenger terminal, depicted in **Figure 2-8**, is approximately 430,000 square-feet. The three-level terminal processor serves passenger and baggage processing functions. Connected to the processor are two two-level concourses, Concourse A to the East and Concourse B to the West, where passengers wait for, enplane and deplane aircraft. The square footages of the primary areas within the passenger terminal are shown in **Table 2-12**. Level 1 is the baggage level within the processor and airport operations and maintenance offices within the concourses. Level 2 is the ticketing level within the processor and aircraft gate level within the concourses where passengers board and deplane aircraft. Level 3 is the mezzanine in the processor consisting of concessions, utilities, offices, and conference rooms.

Table 2-12: Terminal Functional Areas

Primary Function	Area (ft ²)	% of Total Area
Circulation	106,971	24.93%
Ticketing	31,132	7.25%
Baggage	83,592	19.45%
Concessions	39,666	9.24%
SSCP / TSA	21,257	4.95%
Restrooms	12,071	2.81%
Gates	30,203	7.04%
Utilities/MEP	19,726	4.60%
Airport Operations	45,106	10.51%
Airline Operations	11,779	2.74%
CBP	4,956	1.15%
Miscellaneous	2,272	0.53%
Walls/Voids*	20,437	4.76%
Total	429,168	100%

Source: HNTB Analysis

*Note: Walls and voids are broken out from the miscellaneous primary function for this table.

SSCP: Security screening check point

TSA: Transportation Security Administration

MEP: Mechanical, electrical and plumbing systems

CBP: Customs and boarder protection

The following sections describe each functional area by level. All areas accessible by the public or ticketed passengers are enclosed and climate controlled. Other terminal facilities outside of the main terminal building are also described.

2.6.1 Level 1, Baggage Level

Level 1 primarily accommodates passenger arrival functions including baggage claim along with inbound and outbound baggage facilities and maintenance and operations offices. The following functional areas are included on the Baggage Level.

Baggage Claim Area

The baggage claim area is where arriving passengers retrieve their checked baggage. Within the approximately 62,400 square-foot baggage claim area, there are 7 baggage carousels with a total of 986

linear feet of frontage. All of the baggage claim carousels have common-use functionality; however, airlines generally use the carousel that is closest to their ticketing position. The 7th carousel is twice the size as the other carousels and is currently used by American Airlines.

Meeter-greeters areas are also located within the baggage claim circulation area and near the exit to the security check point. These are areas where individuals can meet their party once the arriving passenger(s) pass through the security check point to the non-secure side of the terminal.

Baggage Service Offices

Baggage service offices (BSOs) are interspersed along the back wall of the baggage claim area along with various offices, storage, maintenance, and mechanical rooms. Existing BSOs total approximately 2,325 square feet.

Offices / Storage / Maintenance

Various offices for airport and airline operations personnel, tenant storage areas, and maintenance (custodial or mechanical rooms) are located on Level 1 of the terminal processor and concourses. Non-public restrooms are also located in this area. The square footages include the secure, non-public circulation areas and private restrooms. All of these areas are enclosed and climate controlled.

Military Liaison Office

The military liaison office or the United Service Organization (USO) office at TIA is located in the center of the processor and serves as a lounge for military personnel travelling through TIA and Tucson. The military liaison office totals approximately 705 square feet.

U.S. Customs and Border Protection

TAA has a U.S. Customs and Boarder Protection (CBP) processing facility within the main terminal complex. The CBP facility is located on Level 1 of Concourse A and can be accessed via sterile corridor directly from Gate A2 and/or via direct ramp loading. The CBP primary processing area has two piggy-back booths (4 total positions) for passport and immigration processing. Once passengers clear immigration, they retrieve their checked baggage from the CBP baggage claim carousel and proceed to the exit. If passengers are flagged for additional screening, they will be directed to the CBP secondary processing area. The CBP facility occupies a total area of approximately 5,000 square feet, including office and support space.

Outbound Baggage Area

Once baggage is checked in at an airline ticket counter on Level 2 it is sent to five designated baggage screening pods on Level 1, where it is screened by Transportation Security Administration (TSA) personnel with Explosive Detection System (EDS) machines prior to being loaded onto aircraft. Once baggage is screened, TSA staff place them onto a carousel for airline personnel to retrieve and load onto the appropriate departing aircraft. The outbound baggage screening areas is approximately 20,400 square feet and is enclosed.

PRIMARY CATEGORIES

- CIRCULATION

Circulation
Exit Corridor
- Vertical Circulation
- TICKETING

Airline Ticket Office
Curbside Check-In
Ticket Counter/ Kiosk Area
Ticket Counter Queuing
- BAGGAGE

Baggage Claim Area
Baggage Service Office
Inbound Bag Conveyance
Outbound Bag Conveyance
- CONCESSIONS

Food & Beverage
Food & Beverage Office
Food & Beverage Storage
News & Gifts
News & Gifts Office
News & Gifts Storage
Other Concessions
Other Concessions Office
Other Concessions Storage
- RESTROOMS

Custodial Closet
Restrooms
- SECURITY / TSA

Outbound Baggage Screening
SSCP Queuing
SSCP Screening Area
TSA Offices
- GATES

Hold Room Area
- UTILITIES / MEP

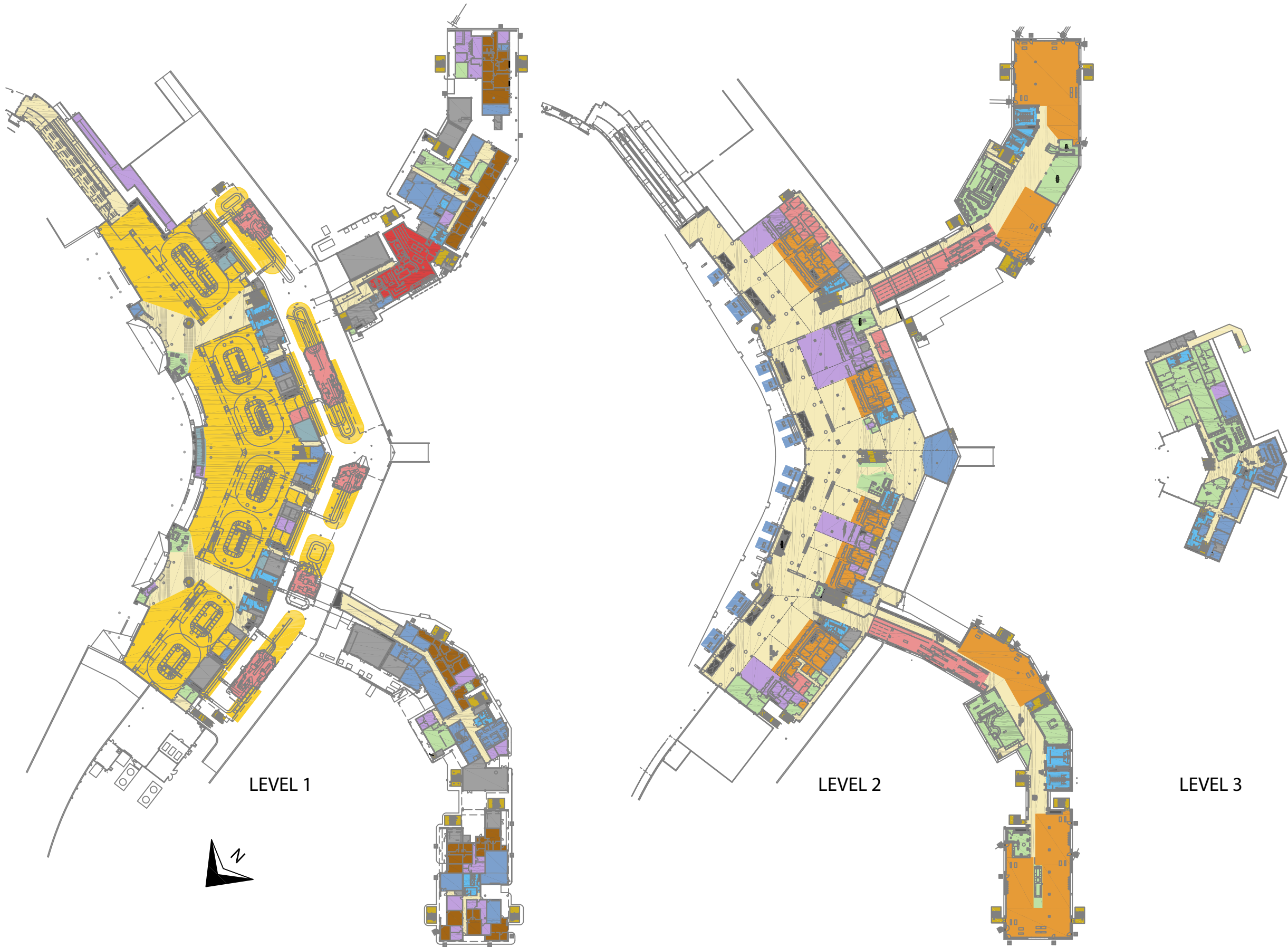
IDF Room
Mechanical/ Electrical Room
- AIRPORT OPERATIONS

TAA Administration
TAA Conference Room
TAA Custodial
TAA Maintenance
TAA Police
TAA Storage
- Vacant Area
- AIRLINE OPERATIONS

Airline Operations
- CUSTOMS & BORDER PROTECTION

CBP Primary Processing Area
CBP Secondary Processing Area
CBP Offices
- MISCELLANEOUS

Ground Transportation
Military Liason
Other Tenant Spaces
- WALLS/ VOIDS



Master Plan Update



TUCSON
INTERNATIONAL AIRPORT

NOT TO SCALE

DATE: February, 2013

FILE:

EXISTING TERMINAL

FIGURE
2-8

Inbound Baggage Area

Upon an aircraft's arrival at the passenger terminal, checked baggage is unloaded onto baggage carts and transported to the baggage claim area. The circulation area used for inbound baggage is separate from the outbound baggage delivery area and totals approximately 5,100 square feet. The inbound baggage delivery area is not enclosed.

Concessionaires

Level 1 has two small concessionaires and various information desks leased to transportation companies located near baggage claim. Concessions and concessions storage areas total 6,400 square feet.

Restrooms

There are a total of six public restrooms located in the baggage claim area including two for men, two for women, and two for families. Combined restroom space on Level 1 totals approximately 4,300 square feet. Within the public access baggage claim area, there are also two private, non-public use restrooms for airport staff.

2.6.2 Level 2, Ticketing Level

Level 2 primarily accommodates passenger arrival functions including ticketing and aircraft hold rooms and gates. The gates are separated from ticketing by security screening checkpoints (SSCP) which separate the public non-secure and secure areas of the airport and are described below.

Passenger Ticket Counters / Check-in Area

Ticket counters and kiosks, where passengers can get a boarding pass or check luggage, are located along the back of the terminal processor building on either side of each security check point and comprise approximately 4,900 square feet. American and Southwest airlines are located at Concourse A; and US Airways, Alaska, United, and Delta airlines are located at Concourse B. For some airlines, skycap positions are located outside the terminal on the curbside and allow passengers to check baggage prior to entering the building. There is additional area for passenger queuing in front of the ticket counters totaling 6,300 square feet on the east side of the terminal and 7,000 square feet on the west side of the terminal.

Airline Ticketing Offices

Airline ticketing offices (ATO) are located behind ticket counters and make up 7,600 square feet of the terminal processor. ATOs provide office space for airline employees and management operating the ticketing facilities.

Offices / Storage / Maintenance Areas (Secure)

Behind airline ticketing offices are several tenant offices, storage, and maintenance areas. Non-public restrooms are also located in this area. These offices and storage areas are currently occupied by staff from the TAA, TSA, concessionaires, and TAA maintenance personnel and are only accessible with a security badge.

Transportation Security Administration Passenger Security Screening Checkpoint

Two passenger security screening Checkpoints (SSCPs), where passengers are screened by the TSA before they enter the secure area, are located on the Concourse A and B throats. Each checkpoint includes three screening lanes and comprise approximately 4,300 square feet. Each lane is equipped with a divestiture table, x-ray, and bag belt. One lane is used exclusively for airline crew, TAA / tenant staff, and priority passengers. In addition, two walk through metal detectors are shared by the three screening lanes. The combined passenger queue area for both checkpoints totals approximately 5,000 square feet.

Aircraft Gates

TIA currently has 22 aircraft gate positions. Twenty are located at the main terminal (nine in Concourse A and eleven in Concourse B) and two are located at the International Terminal. The allocation of airlines to each gate is provided in **Table 2-13**. Within the main terminal, a total of 16 gates positions are currently capable of accommodating jet aircraft. The four remaining positions either lack a way of loading passengers or are blocked by operations at the adjacent gate. Holdrooms or departure lounges where departing passengers wait for their flights are located on level 2 of the concourses and total approximately 30,000 square feet.

Table 2-13: Gate / Airline Allocation Summary

Gate	Airline Allocation
1	NA
2	NA
A1	NA
A2	Southwest
A3	NA
A4	Southwest
A5	NA
A6	Southwest
A7	American
A8	American
A9	NA
B1	Delta
B2	Delta
B3	Alaska
B4	NA
B5	United
B6	United
B7	NA
B8	US Airways
B9	United
B10	US Airways
B11	NA

Source: Tucson Airport Authority

NA = Unallocated Gate

Concessionaires

Concessionaires and concessionaire storage areas are located pre- and post-security. Pre-security concessions area totals approximately 4,500 square feet. Post-security concession areas total approximately 14,000 square feet. Concessionaires include restaurants, news and gift shops, and miscellaneous services such as Automated Teller Machines (ATMs) and shoe shine stands.

Restrooms (Public)

Public restrooms are located pre-and post-security. Pre-security restrooms total approximately 2,000 square feet and include two for men, two for women, and 1 for families. Post-security restrooms total approximately 2,900 square feet and include one for men and one for women in each concourse.

2.6.3 Level 3, Mezzanine Level

Level 3 of the terminal processor building is the mezzanine, which is used as office, meeting, and concessionaire space. Only the restaurant and conference rooms are open to the public. The mezzanine level has a total area of approximately 25,000 square feet which are currently underutilized.

2.6.4 Other Terminal Facilities**International Terminal / Customs and Border Protection Facility**

TIA is a designated Port Of Entry facility for international flights. The one-level, 15,600-square-foot International Terminal / CBP facility consists of two gates with a passenger and baggage processing area. The Concourse A international infrastructure was recently built and has a sterile corridor connection to Concourse A with full CBP processing capabilities. CBP processing for scheduled air-carrier flights generally takes place within the Concourse A CBP facility while CBP services for un-scheduled international flights takes place at the International Terminal. The Tucson Port of Entry is operational seven days a week from 7:00 AM to 8:00 PM.

Pet Relief Area

TIA has a pet relief area called Prickly Paws Pet Stop, located outside the east end of the lower level baggage claim area.

Central Utility Plant

Located between the passenger terminal and International Terminal is the central utility plant (CUP). The CUP totals approximately 8,500 square feet and services the terminal and TAA administrative buildings. Included within the CUP are centralized chilled water, heating water, and domestic hot water systems. A list of the equipment within the CUP is presented below.

Central Chilled Water System

- 4 water-cooled chillers (Capacity -> 3 @ 305 tons; 1 @ 400 tons)
- Plat and frame heat exchanger
- 2 two-cell cooling towers

Central Heating Water System

- 3 gas fired heating water boilers
- 2 Peerless 211-19-WP boilers (output of 3,024 million BTU per hour (MBTU) each, input of 3,780 MBTU each) (will be replaced shortly with two, 3,500 MBTU capacity boilers)
- Potential space available for 1 additional boiler

Central Domestic Hot Water System

- 2 gas fired water heaters
- 1 water softener system

2.7 LANDSIDE / GROUND TRANSPORTATION

The layout and operation of landside facilities and ground transportation operations are described in this section and include the airport roadways, curbsides, parking, rental car, and commercial vehicle staging. The primary landside facilities are depicted on **Figure 2-9**.

2.7.1 On-Airport Access and Circulation

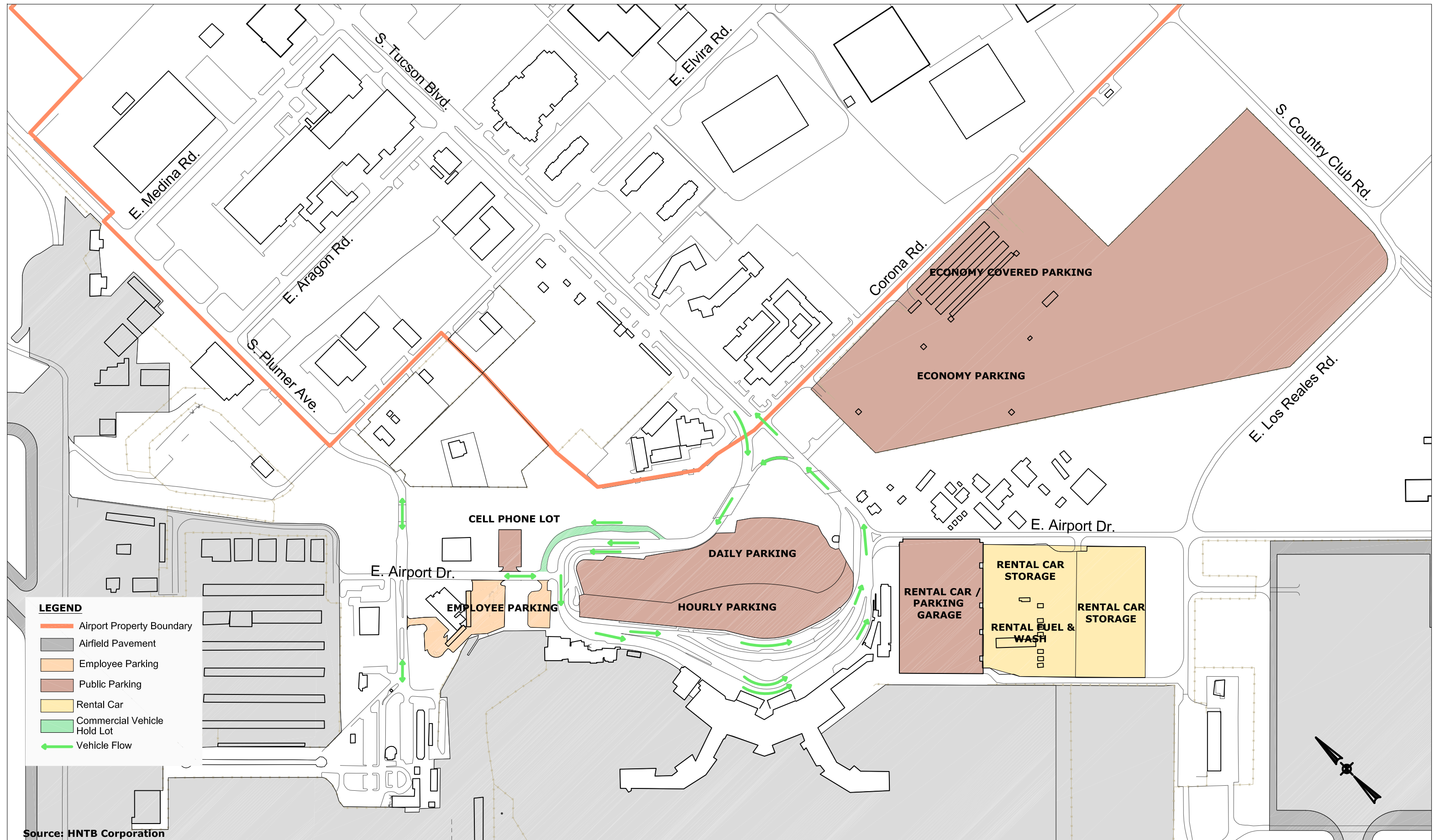
Airport Ingress / Egress

Primary access to TIA is provided from Tucson Boulevard, Country Club Road and Plumer Avenue to Airport Drive. Country Club Road provides access to the cargo facilities located along the south portion of Airport Drive while Plumer Avenue provides access to the general aviation facilities located along the north portion of Airport Drive. Airport Drive runs northwest to southeast connecting the general aviation facilities and TAA administrative offices in the north, the terminal in the center and cargo facilities to the south.

Primary terminal access is provided from southbound Tucson Boulevard which intersects South Airport Drive where it becomes the single direction terminal access roadway. At this point Tucson Boulevard is reduced from three to two lanes. However, shortly after the start of the terminal access roadway, the airport return-to-terminal lane merges to provide a third lane. This third lane then diverges into a two-lane entrance to the short-term and long-term surface public parking facilities. The taxi staging area is located along Airport Drive north of the terminal access roadway.

Immediately prior to the terminal, the terminal access roadway splits to provide access to the upper departure and lower arrival curbside roadways. Just before the two roadways merge, rental car customers can access the rental car structured parking garage from the upper level roadway. After the upper and lower roadways merge, the terminal access roadway is reduced to three lanes and intersects with the south portion of East Airport Drive providing access to the parking garage and cargo facilities.

After the terminal access roadway and East Airport Drive intersection, a fourth lane from the surface parking lot exit merges into the terminal roadway becoming the return-to-terminal lane. The remaining three lanes serve as the airport egress onto northbound Tucson Boulevard.



Source: HNTB Corporation

Master Plan Update

HNTB

TUCSON
INTERNATIONAL AIRPORT

DRAWING SCALE: 1" = 400'

DATE: February, 2013

EXISTING LANDSIDE FACILITIES

FIGURE
2-9

Terminal Curbside

The terminal curbside is the area designated for passenger arrival and departure vehicle drop-offs and pick-ups and consists of an upper and lower level roadway.

The upper level curbside roadway, adjacent to the terminal ticketing level, is four lanes, 740 feet long, and is used for passenger drop-offs by private and commercial vehicles. The innermost two lanes are available for passenger unloading and the outer two lanes serve as maneuvering and through lanes. In addition, vendor loading and unloading areas are provided. The rental car and parking garage entrance is also accessed from the upper level roadway immediately beyond the main terminal.

The lower level curbside roadway, adjacent to the terminal baggage level, is used for passenger pick-up and includes an inner and outer curbside area separated by a large landscaped median. The inner curbside is approximately 740 feet and is used by private vehicles. The outer curbside is comprised of two pick-up areas, each approximately 500 feet long. The outer commercial curbside roadways are access controlled.

Commercial vehicles using the outer curbsides include various ground transportation service providers including taxis, limousines, and hotel and parking courtesy shuttles. The allocation of ground transportation providers on the commercial curb is shown in **Figure 2-10**. The first commercial vehicle roadway, located closest to the terminal, is allocated for coaches, taxicabs, shared ride vans, and executive sedans. The second commercial vehicle roadway is allocated for limousines, economy parking, off-Airport parking, and hotel courtesy shuttles. Other pre-arranged transportation also uses the second curbside roadway. Sun Tran buses pick-up and drop-off passengers on the upper level roadway at the beginning of the terminal curbside.

A commercial vehicle hold lot is located off the terminal access roadway, north of the terminal, and accommodates a queue of approximately 25 taxis. This area is predominately used by taxis and chartered buses and currently three taxi companies are under contract with TAA to provide services. Taxis must enter the hold lot prior to picking up a passenger and once dispatched can proceed to the lower level curbside taxi queue.

2.7.2 Parking

Parking facilities at TIA include TAA operated on-airport public and employee parking and privately-operated off-airport private parking. TAA operated parking lots are summarized on **Table 2-14**.

On-Airport Public Parking

TAA operates several public parking lots, shown in **Figure 2-9**. Located directly across the curbside are the hourly and daily public uncovered surface parking lots. In addition, in 2002 TAA built a parking and rental car garage that currently accommodates covered public parking on the second floor.

A remote economy parking lot is located at the intersection of Corona Road and Tucson Boulevard with courtesy shuttle service to the terminal. Both covered and uncovered parking stalls are available at the economy parking lot. A cell phone lot is also located on Airport Drive northwest of the terminal. Meeters

and greeters are allowed to wait here for their passenger to arrive before proceeding to the terminal curbside. Parking rates for the TAA-operated public parking facilities are shown in **Table 2-15**.

On-Airport Employee Parking

The primary employee parking area is located on the top level of the garage providing 675 parking spaces. Sixty-five employee parking spaces are also provided at the TAA administration building. Other small employee parking areas are located throughout the airport near various employment centers.

Off-Airport Private Parking

There are several privately operated remote off-airport parking lots located around TIA, primarily along Tucson Boulevard, Country Club Road, and Valencia Road. These lots provide courtesy shuttle service to the main terminal.

Table 2-14: Airport Operated Parking Supply

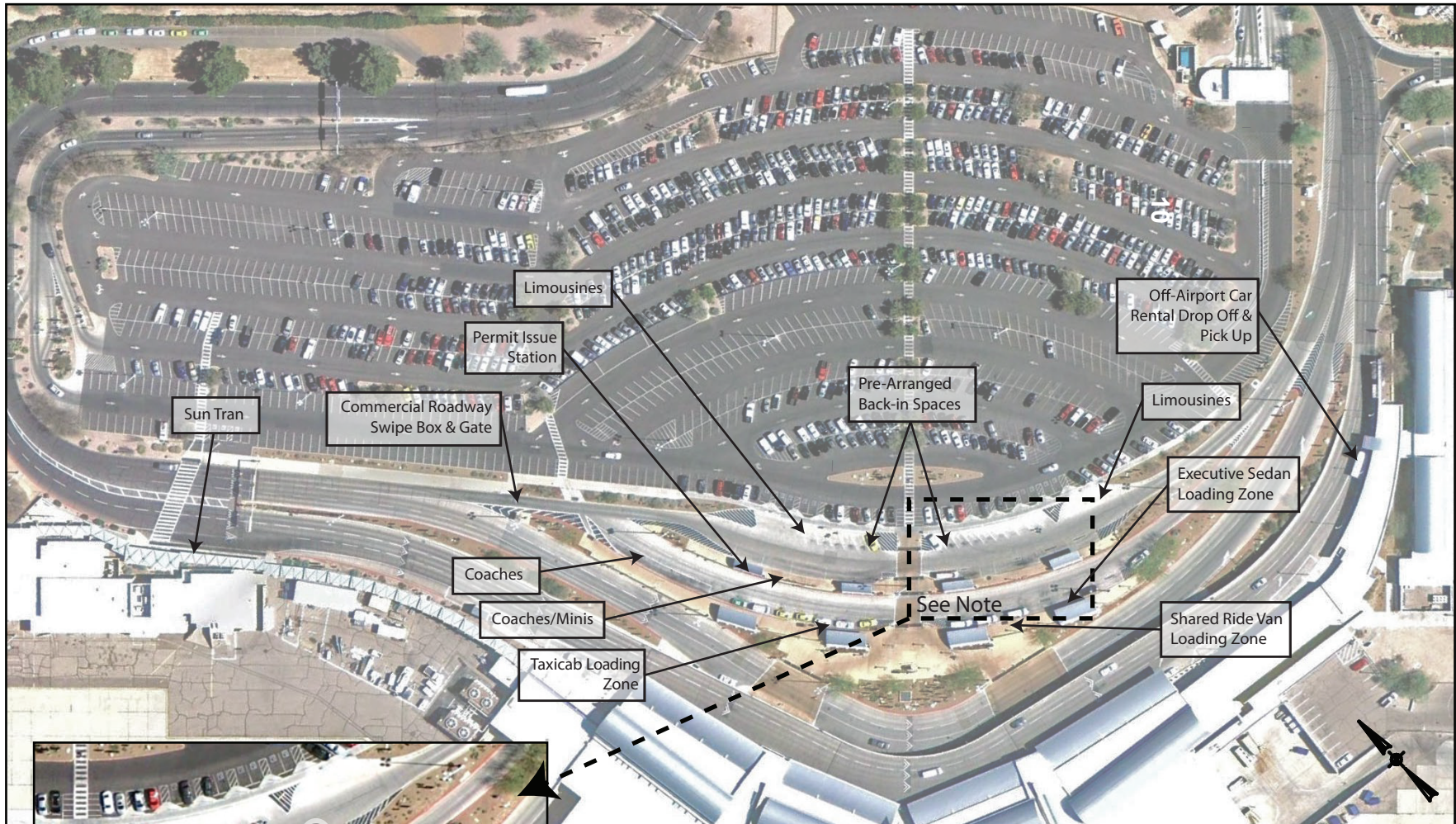
Parking Facility	Total Stall Count	ADA Stalls	Total Parking Stalls
Public Parking			
Hourly (uncovered)	422	25	447
Daily (uncovered)	917	0	917
Economy (uncovered)	5,500	20	5,520
Economy (covered)	303	6	309
Garage – 2 nd Floor (covered)	631	20	651
Cell Phone (uncovered)	28	0	28
Overflow Parking	204	0	204
Subtotal	8,005	71	8,076
Employee / Other Parking			
Garage – 3 rd Floor Employee (uncovered)	661	14	675
TAA Administration (uncovered)	65	NA	65
Executive Terminal (non-ATCT stalls) (uncovered)	30	NA	30
Executive Terminal (ATCT stalls) (uncovered)	28	NA	28
Subtotal	784	14	798

Source: HNTB Analysis

Table 2-15: Airport Operated Parking Rates

Parking Facility	Parking Rate per Hour	Duration when the per Hour Rate Applies	Parking Rate per Day	Duration when the per Day Rate Applies
Hourly (uncovered)	\$2.00	Up to 6 hours	\$12.00	After 6 hours (each day)
Daily (uncovered)	\$2.00	First hour	\$9.00	After 6 hours (each day)
	\$1.50	Next 5 hours		
Garage (covered)	\$3.00	First 3 hours	\$9.00	After 3 hours (each day)
Economy (uncovered)	NA	NA	\$4	All
Economy (covered)	NA	NA	\$5	All

Source: HNTB Analysis



Note:
 A/B: Off-Airport Parking Shuttles
 C/D: Hotel Shuttles

Source: Tucson Airport Authority

Master Plan Update

HNTB

TUCSON
INTERNATIONAL AIRPORT

**EXISTING CURBSIDE
ALLOCATION**

**FIGURE
2-10**

2.7.3 Vendor Delivery

Vendors making deliveries may park their vehicles at the end of the terminal curbside area on the upper level roadway once cleared by TAA staff. TAA is currently exploring plans for a remote central receiving facility with landside and airside access where all goods would be received, screened, and stored eliminating the need for curbside delivery.

2.7.4 Rental Car Facilities

The garage built in 2002 also serves as part of a consolidated rent-a-car facility (ConRAC), located immediately east of the terminal building and connected to level 1 of the terminal by an interior walkway. The ConRAC includes an 18,000 square foot customer service area which accommodates rental counters and offices for seven rental car companies, a parking structure with approximately 697 ready-return parking spaces on the ground floor, and quick-turn-around (QTA) facilities for fueling, washing and servicing vehicles between rentals. The seven rental car companies are: Alamo, Avis, Budget, Dollar, Enterprise, Hertz and National. QTA facilities for these seven companies are located east of the parking structure with seven service bays and seven car washes, (one for each company) as well as office and storage space. Additional storage and maintenance facilities are accommodated in a remote location. The second and third floors of the garage are currently being used for public and employee parking but could accommodate additional rental cars if the parking was relocated.

One additional rental car company, Thrifty, is located off-Airport and shuttles customers to its off-site location. This company does not have facilities in the ConRAC but customers can call for a shuttle from the service phone located in the rental car facility breezeway and will be picked up on the curb outside the ConRAC.

2.7.5 Pedestrian Access

At the terminal curbside, there are two main crosswalks on the lower level connecting the terminal with the hourly and daily parking lots. Sidewalks are also provided along the perimeter of the terminal access roadway.

2.7.6 Transit

Sun Tran operates two public local bus routes that serve TIA. Route 6 operates between TIA and the Tohono Transit Center and Route 11 operates between TIA and N. Dodge Loop at E. Kleindale Road.

2.8 GENERAL AVIATION

General Aviation facilities comprise approximately 124 acres of airport property. The majority, including the Executive Terminal, are situated along Plumer Avenue. However, there are also several facilities located on the West Ramp. All GA facilities, which accommodate approximately 230 based aircraft (handling 74,833 operations annually), are summarized in **Table 2-16**.

Table 2-16: General Aviation Facilities

Facility	Area
Executive Terminal Building (B-40)	21,784 square feet
Conventional Hangar (includes aircraft storage, general storage, and maintenance / shop areas)	257,100 square feet
T-Hangar	111,500 square feet
Shade Hangar	31,900 square feet
GA Ramp (includes pavement areas used by aircraft (includes tie-downs and fuel areas), excludes buildings)	~105 acres
Restaurant (vacant)	1,900 square feet
Landside Areas (Circulation and Parking) (includes 427 stalls)	~10 acres
Total Area Leasehold	~124 acres

Source: HNTB Analysis

The Executive Terminal, a 21,784 square-foot building located at the base of the FAA tower, is owned and operated by TAA. Amenities offered include the following:

- Pilot lounge
- Aviation fuel (Jet A and 100LL)
- Ground Power Unit cart and lavatory service
- Covered aircraft / Ramada parking (7)
- Business center
- Courtesy transportation to nearby hotels and restaurants
- Tiedowns (350+)
- Passenger lobby
- Catering
- WiFi and internet access
- Meeting rooms

Aircraft storage and parking areas include tie-down positions, conventional hangar parking, T-hangar parking, and covered aircraft / ramada parking areas.

TIA has more than 350 tie-down positions. Hangars include private individual hangars accommodating more than 240 aircraft, common fixed base operator (FBO) hangars, and corporate hangars. The Executive Terminal and several FBOs offer a total of approximately 61 shade hangars.

TIA has five FBOs which provide a variety of general aviation services including flight training, flight charters, fuel sales, aircraft rentals and sales, aircraft maintenance, and aircraft storage and parking. Services offered by the FBOs are summarized in **Table 2-17**.

Table 2-17: FBO Services

FBO	Services	Fuel	Aircraft Storage
Arizona Aero-Tech	Charter service Flight school / instruction Parking	Jet A, 100L	Tiedowns
Atlantic Aviation	Avionics Parking	Jet A, 100LL	Closed hangars, Ramadas, Tiedowns
Bombardier	Avionics Heavy aircraft maintenance Parking	Jet A	Closed hangars, ramp parking
Double Eagle Aviation	Charter service Parking	Jet A, 100LL	Tiedowns
Ascent Aviation	Avionics Heavy aircraft maintenance Parking	None	None
Leading Edge Aviation	Parking	Jet A, 100LL	Tiedowns, T-hangars, Shade ports
Million Air		Jet A, 100LL	Hangar
Premier Aviation	Avionics Light aircraft maintenance Authorized Cessna service center Parking	Jet A, 100LL	Tiedowns, hangars
Sonoran Wings	Aircraft rental Flight school / instruction		
Tucson Executive Terminal	Aircraft fuel Aircraft parking Passenger terminal	Jet A	Tiedowns, hangars
Tucson Jet Center	Charter service Light aircraft maintenance Parking	Jet A, 100LL	Tiedowns, ramadas
Velocity Air	Aircraft rental Avionics, Charter service Flight school / instruction Light aircraft maintenance Parking, Helicopter instruction, rental, maintenance	Jet A, 100LL	Tiedowns, hangars

Source: Tucson Airport Authority

2.9 MILITARY

The AANG established an 84-acre base at TIA in 1956 that was and still is occupied by the 162nd Tactical Fighter Training Group. Currently, the 162nd Fighter Wing flies two variations of F-16s, the F-16-PW220 and F-16-GE132. There are currently a total of 72 based AANG aircraft at TIA. To accommodate military aircraft operations, the ends of Runways 11L-29R and 3-21 have aircraft-arresting gear. These cable-type arresting devices span the runway width, marked on the pavement with a dotted yellow line, and are engaged by an arresting gear hook attached to military aircraft for the purposes of slowing a landing aircraft.

2.10 AIR CARGO

Air cargo brought into and out of TIA is categorized by their means of transport and includes integrated carrier cargo and belly cargo. The majority of cargo at TIA is transported by integrated cargo carriers which are fully dedicated to transporting cargo with flights typically operated on a schedule. For the purpose of the Master Plan Update, any cargo carriers that are not typical fully integrated carriers but are fully dedicated to cargo are included in the integrated cargo category. Other cargo is transported in the cargo hold or “belly” of aircraft that transport passengers and is referred to as belly cargo. Air carriers providing belly cargo services include American Airlines, Delta Air Lines, and Southwest Airlines. Historic air cargo volume is summarized in **Table 2-18**. Air mail is included in the table, but the transport of mail occurs via both integrated and belly cargo carriers.

Table 2-18: Cargo Volumes

Cargo Carrier Type	2008	2009	2010
Integrated (tons)	36,712	29,898	33,143
Belly Cargo (tons)	1,757	1,514	1,542
Mail (tons)	7.7	3.9	5.9

Source: HNTB Analysis

Note: A ton is equivalent to 2,000 pounds.

Integrated cargo carriers at TIA today include FedEx, Ameriflight, and Matheson Flight Extenders, Inc., along with a variety of other smaller cargo carriers. Service is both scheduled and chartered. UPS no longer operates at TIA and UPS packages are trucked to and from Phoenix. DHL ceased U.S. integrated freight operations in 2009 but continues to contract freight services with Ameriflight. Integrated cargo carriers operate out of a 54-acre site located southeast of the passenger terminal with three dedicated air cargo buildings on airport property and one cargo ramp. The cargo facilities are summarized in **Table 2-19**.

Table 2-19: Cargo Facilities

Facility	Owned By	Leased By	Area
Buildings (Processing and Warehouse)			
West Air Freight Terminal (B-239)	TAA	Belly cargo carriers	19,400 square feet
East Air Freight Terminal (B-298)	TAA	Belly cargo carriers	30,000 square feet
Air Freight Terminal (B-415)	TAA	Integrated cargo carriers	15,000 square feet
FedEx Freight Terminal (B-255)	FedEx	FedEx (integrated cargo carrier)	16,000 square feet
Ramps			
Cargo Ramp	TAA	-	23 acres
Landside Areas (Circulation and Parking)			
	TAA	-	5 acres

Source: HNTB Analysis

2.11 AIRLINE / AIRPORT SUPPORT

Airline and airport support facilities include those facilities that are important to the operation and maintenance of aircraft and the airport. Support facilities include the Airport Traffic Control Tower, Aircraft Rescue and Fire Fighting (ARFF) facility, US Customs and Border Protection, airline maintenance, fueling facilities, and utilities.

2.11.1 Airport Traffic Control Tower

The existing ATCT (B-40) is used by FAA air traffic controllers, who communicate with and give direction to pilots. There are currently 26 controllers assigned to TIA's ATCT. The ATCT is located approximately 1,000 feet northwest of the passenger terminal building. Originally constructed in 1958, the ATCT is 10 stories high. A total of 28 parking stalls within the Executive Terminal Parking lot are dedicated to ATCT personnel.

Since the 2004 Master Plan, three potential sites were assessed for a new ATCT that meets current line of sight standards. The FAA chose an optimal site located on the southwest side of the airfield, and at the time of this Master Plan Update, the new tower was being designed.

2.11.2 Aircraft Rescue and Fire Fighting

TIA has an Index D level Aircraft Rescue and Fire Fighting facility (B-284) located southeast of the air cargo area. Originally constructed in 1977, the ARFF facility is approximately 11,000 square feet in size and has seven bays for storing equipment. The facility has 17 employees and three vehicles. Two vehicles have a capacity of 3,000 gallons and one vehicle has a capacity of 1,500 gallons.

2.11.3 Airline Maintenance

Several airlines have maintenance and storage facilities on airport property. Delta Airlines has a ground service equipment facility and Skywest Airlines has a regional jet maintenance facility located on the south side of the Airport. In addition, several FBOs have facilities where they perform light and heavy maintenance on commercial and general aviation aircraft.

2.11.4 Ground Support Equipment

Ground service equipment (GSE) at TIA is stored in the vicinity of the terminal area.

2.11.5 Trash and Recycling

TAA currently has compactors and dumpsters located on each concourse to collect trash and recycling.

2.11.6 Airport Administration

The TAA administrative office building is located next to the ATCT and Executive Terminal at the southeast corner of Plumer Avenue and Airport Drive. Originally constructed in 1983, the building is 14,385 square feet in size. The building contains office space for TAA staff and management. There are a total of approximately 65 employee parking spaces provided adjacent to the building.

2.11.7 Flight Kitchen

TIA has one flight kitchen located southeast of the air cargo area. Originally constructed in 1980, the 28,400 square foot building was leased to LSG Sky Chefs; however, the building is currently vacant. The building is situated with access to both airside and landside areas. Concessionaire OTG currently provides airport catering services from their kitchen facilities on the mezzanine level of the main terminal.

2.11.8 Fueling Facilities

For GA aircraft, Jet A is available at Fuel Farm A and Fuel Farm B, located northwest of the passenger terminal, adjacent to the GA apron. At the passenger terminal, there are six hydrant vehicles, seven Jet-A fuel tankers, and three AvGas fuel tankers which distribute fuel to commercial aircraft parked at the passenger terminal. Fuel is obtained via an in-pavement fuel hydrant system.

Fuel Farm C is located near the Runway 11L approach end, but is not in use. A total of 10 underground storage tanks with a 25,000-gallon capacity each are located at Fuel Farm C. There is also one self-service facility, Fuel Farm D, with underground storage tanks for 12,000 gallons of diesel fuel and 24,000 gallons of unleaded gasoline located southeast of the East Air Freight Terminal.

The AANG and Bombardier facilities contain their own fuel farms to fuel respectively, military and Bombardier aircraft. The Bombardier facility is leased from TAA, but Bombardier is responsible for all operations and activities. In addition to this fueling facility, a Compressed Natural Gas (CNG) vehicle fueling station is located adjacent to the economy parking area.

An inventory of the existing fueling facilities is shown in **Table 2-20**.

Table 2-20: Existing Fueling Facilities

Storage Unit	Capacity (Gallons)
Jet A Fuel Inventory	
<i>Fuel Farm A</i>	
Belowground Storage Tank	40,000
Belowground Storage Tank	40,000
Belowground Storage Tank	30,000
Belowground Storage Tank	30,000
<i>Fuel Farm B</i>	
Belowground Storage Tank	40,000
Belowground Storage Tank	40,000
Belowground Storage Tank	40,000
Belowground Storage Tank	40,000
Subtotal	300,000 (240,000 are usable)
100 Low Lead AVGAS Fuel (100 LL) Inventory	
<i>Fuel Farm A</i>	
Belowground Storage Tank	20,000
Belowground Storage Tank	20,000
Subtotal	40,000

Source: Tucson Airport Authority

2.12 OTHER ON-AIRPORT FACILITIES

2.12.1 Bombardier

Originally opened in 1976 as a Learjet production and service facility, the Bombardier Tucson Service Center has been a tenant of TAA for over 30 years. Today, Bombardier's 847,800 square foot facility provides maintenance for Learjet, Challenger, Global Express, regional jets, and other Bombardier aircraft.

2.12.2 Raytheon

Founded by Howard Hughes in 1951 and today, one of the largest employers in Southern Arizona, Raytheon has a missile systems campus encompassing on the southwest side of TIA.

2.12.3 Triple Hangars

The triple hangars are the three large hangars located on the West Ramp. The hangars were originally built to support bomber aircraft production during World War II. Later, they were used as the first passenger terminal. Since the relocation of the passenger terminal to its current location in 1962, the triple hangars have been leased out for warehouse storage. The entire space totals 192,000 square feet and still retains its original wooden framing. Airfield access is not provided from the triple hangars.

2.12.4 Educational Facilities

University of Arizona has an environmental research lab located northeast of the ConRAC along E. Airport Drive. In addition, Pima Community College has an aviation technology facility located north of the Runway 3 threshold on the West Ramp which includes classrooms and a hangar with airfield access. A non-airworthy Boeing 727 is used for teaching purposes.

2.13 UTILITIES

Access to utility services is essential for aeronautical and non-aeronautical development. TIA is served by the following utility providers listed below. The locations of utilities in the Study area are illustrated in Figure 2-11.

<u>Utility Service</u>	<u>Service Provider</u>
Potable Water	Tucson Water
Waste Water	Pima County Regional Wastewater Reclamation Department
Natural Gas	Southwest Gas, El Paso Natural Gas
Electricity	Tucson Electric Power
Telecommunications	CenturyLink, Cox Communications, and Time Warner Cable

Water

Tucson Water, a department of the City of Tucson, provides water service to TIA via 12-inch or greater diameter mains. There is an existing Tucson water reservoir (Martin reservoir) located near the corner of

Park Avenue and Valencia Road. Three large water mains are distributed from this location; a 48-inch concrete pipe running east along Valencia Road; a 36-inch concrete main running south along Nogales Highway; and a 42-inch concrete main running west along Valencia Road. There are also 16-inch mains along Country Club Road, Aero Park Boulevard, and along a portion of Nogales Highway.

Waste Water

Sanitary sewer is provided to the airport by Pima County Regional Wastewater Reclamation Department. There are four primary connection points for TIA's existing sewer needs. A 10-inch pipe branches off of the 18-inch main along Nogales Highway and enters the airport near the southwestern end of Runway 3-21. The same 10-inch pipe enters the property near the Raytheon complex.

There are numerous storm drain systems at TIA. Most of those systems flow into one of three washes. The bulk of the storm drains associated with the terminal, the parking garages, and public parking lots all drain into Airport Wash. Much of the runoff on the taxiways and runways also eventually exits into Airport Wash. Additional runoff from the taxiways and runways also flow into a wash near the southern end of Taxiway C and around the Raytheon complex. Other storm drain systems along the western end of the property run into a channel ditch adjacent to the Nogales Highway and the Union Pacific Railroad. TIA maintains and controls the storm sewer facilities located on the airport property.

Natural Gas

There are two natural gas lines that exist on or near TIA operated by Southwest Gas and El Paso Natural Gas. Southwest Gas is the main supplier to the airport, whereas El Paso Natural Gas has a dual pipeline crossing the airport property. Service is available in the developed portions of the TIA property with outlying areas served via existing lines along the Old Nogales Highway on the west and Wilmot Road to the east.

Electricity

Electric service is provided by Tucson Electric Company and is substantially provided via overhead 14 kilo-Volt (kV) lines that parallel the developed roadways. A major east-west overhead power line runs along Hughes Access Road connecting Alvernon Way to Nogales Highway.

Telecommunications

TIA is served by multiple telecommunication providers. Existing copper wire and cable service lines are being upgraded to fiber optic as commercial and residential development warrants expansion. Alignments substantially mirror the electric distribution system.

