



## Chapter 2

# Inventory of Existing Conditions

### 2.0 BACKGROUND

The master planning process requires the gathering of information related to the existing conditions of the airport. This information serves as the basis for future steps in the planning process. As such, information related to the Smith Reynolds Airport (INT) and its surrounding areas was collected in order to identify future aviation needs of the community. Data collected in this phase provides an inventory of the following:

- Existing physical facilities: runways, taxiways, parking aprons, navigational aids, airport terminal, and facility areas for general aviation, corporate, air cargo, and aviation support.
- The airport's overall role in the Winston-Salem community: development history, location, and access relationship to other transportation modes.
- Existing community, airport, and regional plans and studies that contain information that may relate to the development and eventual implementation of the recommendations of the Master Plan. This information is particularly relevant to future industrial/business development on or adjacent to the airport.

An inventory addressing these and other issues required data from a variety of sources in order to obtain an accurate depiction of INT and its surrounding community, including:

- Interviews with INT management and staff
- Interviews with INT users and tenants
- Contacts with local, state, and federal agencies
- Research and review of previous airport planning analyses and studies
- Review of aerial photography, mapping, and airport and terminal plans
- Review of facility directories, approach plates, sectional charts, etc.
- Reference materials, such as FAA publications, activity data sites, flight strip information, and planning guidelines
- Review of airport and FAA statistical reports

### 2.1 HISTORY

Back in 1927, city officials learned that Winston-Salem was a scheduled stop for Charles Lindbergh and the "Spirit of St. Louis" during a cross-country tour to celebrate advances in aviation. Although there was an existing grass strip airfield within Winston-Salem at the time, officials felt that an improved airfield would be better suited to accommodate the greatest aviator of the time. As such, a portion of land located approximately 4 miles north of downtown Winston-Salem was identified as an ideal site for a paved airport facility. A contribution of \$17,000 was made by Clint Miller to develop the new airport; as a result, the airport corporation



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named the new airport Miller Municipal Airport. From 1927 to 1933 Reynolds Aviation, one of the airport's most active users, provided commuter flights to New York, Detroit, Philadelphia, and Baltimore with weekend taxi service to Wrightsville and Myrtle Beaches. In 1933, The New Deal developed a program known as the Civil Works Administration. This administration began extending each runway by 500 feet, shifted the approach lighting system, and added concrete floors to hangars. Additional projects that occurred during the 1930's included a new administration building, a third runway, and a new airfield lighting system. By 1938, additional property was acquired and a new fourth runway was constructed. In 1940, Eastern Airlines agreed to add Winston-Salem to its North-South route. In support of Eastern's action, the Z. Smith Reynolds Foundation donated funds to further modernize and expand the airport for additional commercial service. In 1942, Miller Municipal Airport was renamed the Smith Reynolds Airport in honor of the foundation responsible for its many contributions. In 1949, the Forsyth County Airport Commission was established to oversee the daily operation and development of the airport. From 1942 through 1945, the airport served as a training base for military pilots but continued its commercial and private airline service. In 1947, the Civil Aeronautics Board awarded Piedmont Aviation a temporary certificate for regional air service of four feeder line routes with DC-3 aircraft. The routes extended from Wilmington, North Carolina to Cincinnati, Ohio and serviced twenty-two additional airports throughout the U.S. During the span of 1957 through 1960, a fire station and ATCT were constructed, an approach lighting system was installed, and the terminal building was further expanded. By 1963, the airport witnessed a resounding 129,313 annual operations which made Smith Reynolds the most active airport within the state and the 85<sup>th</sup> most active in the entire country. During the late sixties and early seventies, the airport experienced steady regional airline service and witnessed flourishing general aviation activity. From 1978 to 1992, the Airport Commission of Forsyth County continued to maintain and improve its facilities by completing several projects such as: new fencing, terminal improvements, and pavement strengthening. During the 1990s, commercial enplanements continued to decline from 23,000 in 1990 to 7,000 in 1999. In the year 2000, USAir, the airport's only remaining commercial carrier, terminated service at INT.

Since the completion of the 1995 master plan, the ACFC has orchestrated several projects to improve and expand the airport. One notable project includes the construction of a general aviation tie-down apron (south apron) which is located west of Runway 15/33 near the end of Runway 33. The apron has an attached automobile parking area located to the west that was constructed for use by travelers. Another notable project includes the recent overlay of Runway 15/33 which occurred in 2008. In July 2010, an Engineered Material Arresting System (EMAS) was constructed near the approach end of Runway 33 to allow the runway to comply with FAA safety standards.

## **2.2 LOCATION / LOCALE**

The Winston-Salem Chamber of Commerce defines the metropolitan statistical area (MSA) of Winston Salem to include 4-counties, Forsyth, Davie, Stokes, and Yadkin. In 2008, the population of Forsyth was reported as 343,000 and the population of the MSA was listed as 468,124. The Winston-Salem area is primarily recognized for its contributions to the education and health services industries. In 2007, the two top employers were Wake Forest University



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Baptist Medical Center (13,000 employees) and Novant Health (8,145 employees). Other top employers within the area include Reynolds American and Hanesbrands Inc. (manufacturing) and Wells Fargo / Wachovia and BB&T (financial activities). Corporate executives from these companies and others often travel into and out of Smith Reynolds Airport in order to conduct normal business between their home and satellite offices. For this reason, INT experiences a significant amount of corporate jet and large aircraft charter activity. In addition to business-related activity, several National Association of Stock Car Auto Racing (NASCAR) teams often travel to and from INT to conduct business and to attend the NASCAR series races that occur at the Bowman Gray Stadium which is located approximately 2 miles southeast of downtown Winston-Salem. North State Aviation, is a certified FAR Part 145 repair station with heavy maintenance, modification and repair capabilities for various models of 737 and 757 series aircraft. In 2008, Smith Reynolds accommodated approximately 51,839 operations and served as a home to 100 based aircraft. Of these based aircraft, 62 were single-engine piston, 20 were multi-engine piston, and 18 were comprised of jet aircraft.

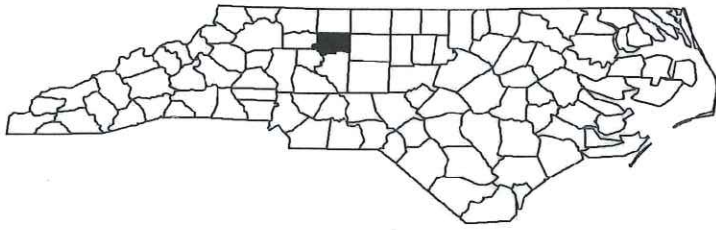
### **Airport Access**

Access to and from the Smith Reynolds Airport can easily be achieved by using one of several county roads and interstate highways which lead into and out of vicinity of the airport. The main access road leading to the airport, North Liberty St., travels in a north/south direction and perpendicular to the terminal's main entrance road (Norfleet Drive). Access to the airport's northernmost property can be achieved by traveling north on North Liberty until it splits into Lansing Dr. Lansing Dr. parallels the westernmost airport property and leads to several non-aviation related uses including tractor trailer storage, county bus parking, and to a community college. Access to the airport's southern facilities can be achieved by travelling south on N. Liberty St. until it intersects Fairchild Road. Fairchild road runs east until it turns into Aviation Drive which leads directly into the ARFF, small maintenance hangar, and t-hangar facilities. North Liberty St. also connects the airport to the nearby Highway 52 (John M Gold Freeway) which travels north from Winston Salem to Mount Airy and continues south until it intersects highway 40 (east/west) and continues further south to Lexington. **Exhibit 2-1** depicts a location and access map for the airport and surrounding areas.

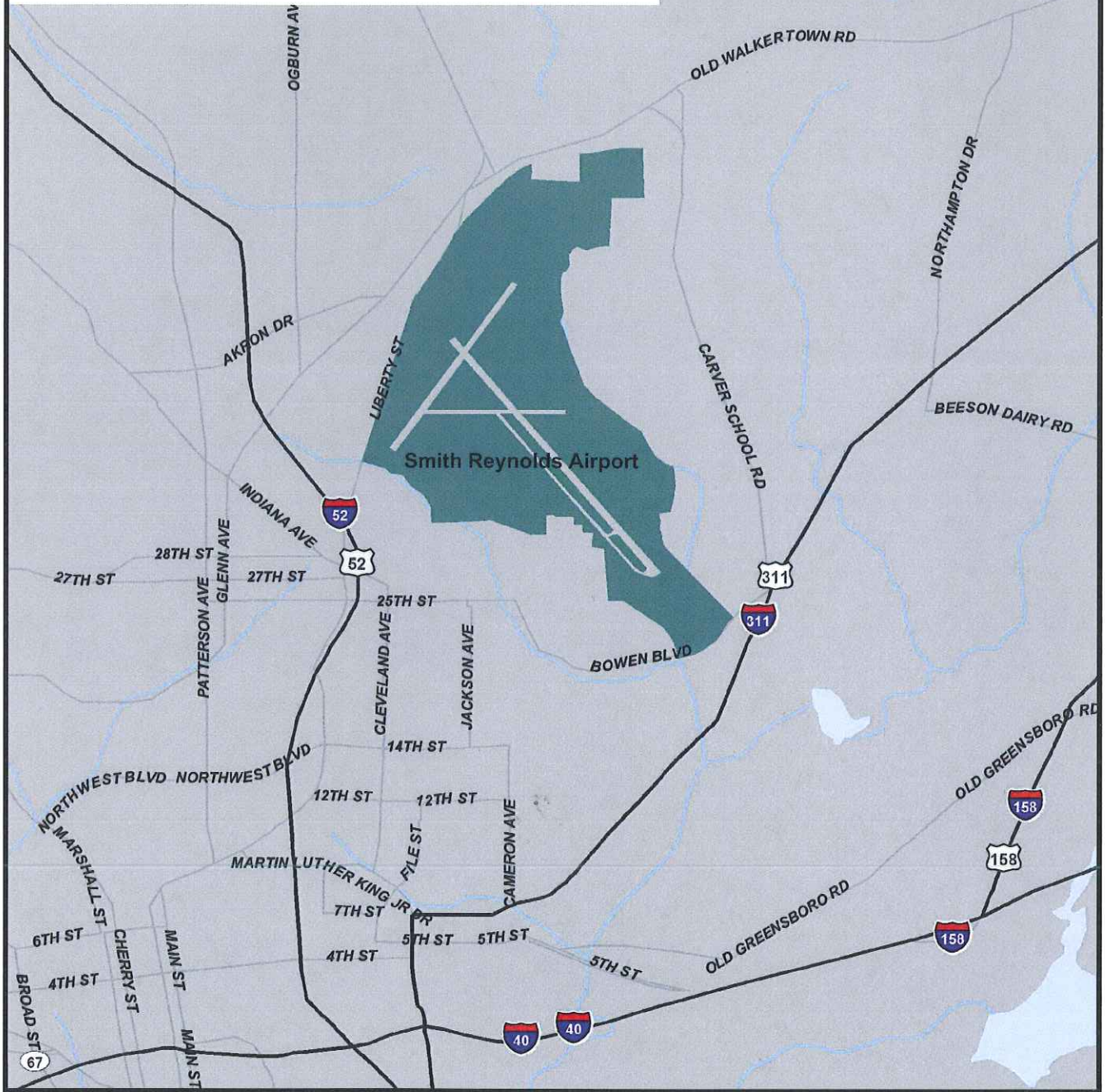
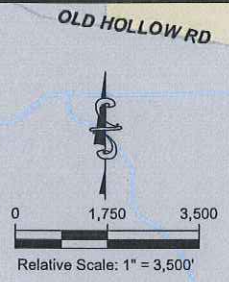
### **Nearby Airport Facilities**

There are several airports located within a 30 nautical mile radius of Smith Reynolds; however, many of these facilities are comprised of private facilities that were constructed to accommodate small aircraft flying clubs, fly-in communities, or are used solely for the use and benefit of the land owner. The nearest commercial service airport to Smith Reynolds is Piedmont Triad International (GSO) in Greensboro, which is located approximately 14 nm east. Several alternate public-use airports are also located within a 30-nm range of INT, as shown in **Table 2-1**.





**Forsyth County  
Winston-Salem, North Carolina**



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Smith Reynolds Airport - Master Plan Update

Location / Access Map

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**Table 2-1**  
**Airports In The Vicinity of Smith Reynolds**

Airport	Distance from INT	Paved Runways	Published Instrument Approach Procedures
N63 Meadow Brook Field Airport	11 nm N	16/34 – 2,725 ft x 30 ft	VOR/DME
GSO - Piedmont Triad International Airport	14 nm E	5R/23L - 10,001 ft x 150 ft 5L/23R – 9,000 ft x 150 ft 14/32 – 6,380 ft x 150 ft	ILS, RNAV/GPS, VOR/DME, NDB
8A7 - Twin Lakes Airport	17 nm SW	2,943 X 50 ft	NONE
EXX - Davidson County Airport	22 nm S	6/24 – 5,004 ft x 99 ft	ILS, GPS, VOR/DME
MWK - Mount Airy/Surry County Airport	25 nm NW	18/36 – 4,301 ft x 75 ft	GPS, NDB

Source: Airport/Facility Directory, August 2009.

### 2.3 PART 139 CERTIFICATION

The FAA provides certification of airports for commercial operations under Federal Aviation Regulations (FAR) Part 139, *Certification of Airports*. Airports with scheduled and unscheduled air carrier service with at least 31 seats and scheduled air carrier service with 10 to 30 seats must hold a FAR Part 139 Airport Operating Certificate (AOC) and comply with FAR Part 139 stringent safety, facility, security, and recordkeeping requirements for the respective class and must also be inspected by the FAA. The FAR Part 139 certification categorizes airports into four classes, based on the type of air carrier operations at the facility, as shown in **Table 2-2**. Based on INT’s existing level of activity by unscheduled large aircraft, (charter operations in aircraft with at least 31 seats), the airport is required to maintain a Class IV certificate; however, INT is categorized and maintains a Class I operating certificate and is open to all types of air carrier operations.

**Table 2-2**  
**FAR Part 139 Airport Classes**

Type of Air Carrier Operation	Class I	Class II	Class III	Class IV
Large Air Carrier Aircraft (30+ seats)	X			
Unscheduled Large Air Carrier Aircraft (30+ seats)	X	X		X
Scheduled Small Air Carrier Aircraft (10-30 seats)	X	X	X	

Source: FAR Part 139, *Certification of Airports*, 2006.

### 2.4 AIRPORT COMMISSION OF FORSYTH COUNTY (ACFC)

The Smith Reynolds Airport is owned by Forsyth County; however, it is managed and operated by an independent unit of Forsyth known as the Airport Commission of Forsyth County (ACFC). Each of the five member commission is appointed by the Forsyth County Board of Commissioners for a term of two years. One member has the added responsibility of oversight and is a sitting commissioner of the Forsyth County Board of Commissioners. Six full-time



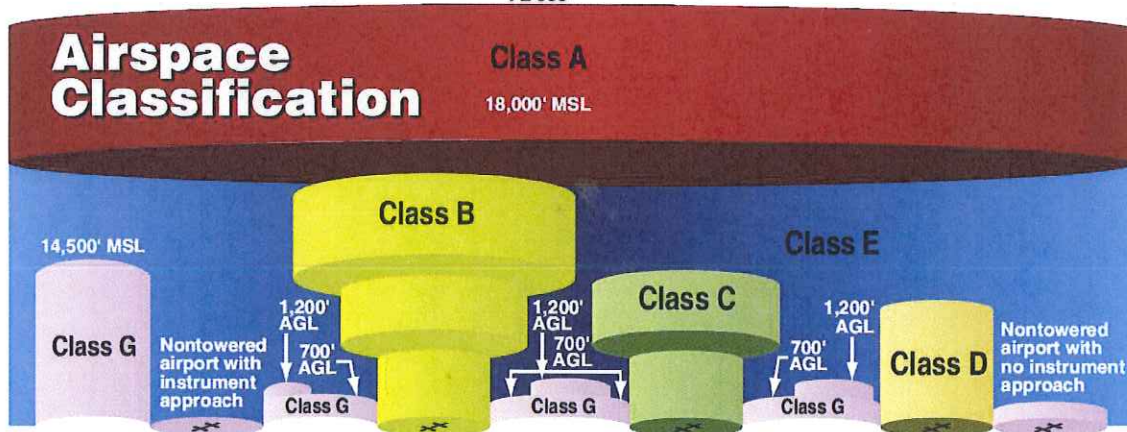


employees of the ACFC are responsible for the daily operation of INT. Administrative functions are performed by an Airport Director and Administrative Coordinator; whereas, airfield maintenance functions are performed by four employees, (a Maintenance supervisor along with three Maintenance Specialists). The INT airport maintenance building is located northwest of the ARFF facilities and provides airport fleet maintenance services, equipment storage, as well as airfield and landside facility maintenance. This building also acts as the headquarters for the maintenance department and therefore includes offices, restrooms, and a lounge for use by maintenance personnel.

## 2.5 AIRSPACE

The airspace which surrounds INT is classified as Class D. Class D airspace is otherwise referred to as “controlled” airspace which requires pilots to communicate and acquire permission from air traffic controllers prior to passing through, departing, or entering the Class D boundaries. The class D airspace generally extends horizontally a distance of four nautical miles from the airport center and vertically extends from the surface of the airport to 2,500’ above airport elevation, 3,500’ above mean sea level (AMSL). As mentioned earlier, Piedmont Triad International Airport (GSO) is located approximately 14 nautical miles east of INT. GSO is enclosed by class C airspace which is generally described as airspace above airports with an air traffic control tower that is serviced by radar approach control and that have a pre-established number of IFR operations or passenger enplanements. Class C airspace is sometimes referred to as an upside down wedding cake due to its differing inner and outer veil dimensions and elevations. **Exhibit 2-2** graphically depicts the differences between various airspace classes and **Exhibit 2-3** illustrates the aeronautical chart illustrating the airspace in the vicinity of INT.

**Exhibit 2-2  
Airspace Classes  
FL 600**



Source: FAA 2008 Pilot's Handbook of Aeronautical Knowledge





## 2.6 PREVIOUS STUDIES

During the course of the Master Plan, previous studies are reviewed and utilized whenever possible in order to gain as much background information possible prior to developing forecast projections and development recommendations. Examples of these studies include but are not limited to previous Master Plans, National Plan of Integrated Airport Systems (NPIAS) studies, State System Plans, and prior activity forecasts. The following section provides an overview of the various studies used during the development of this Master Plan.

### National Plan of Integrated Airport Systems (NPIAS)

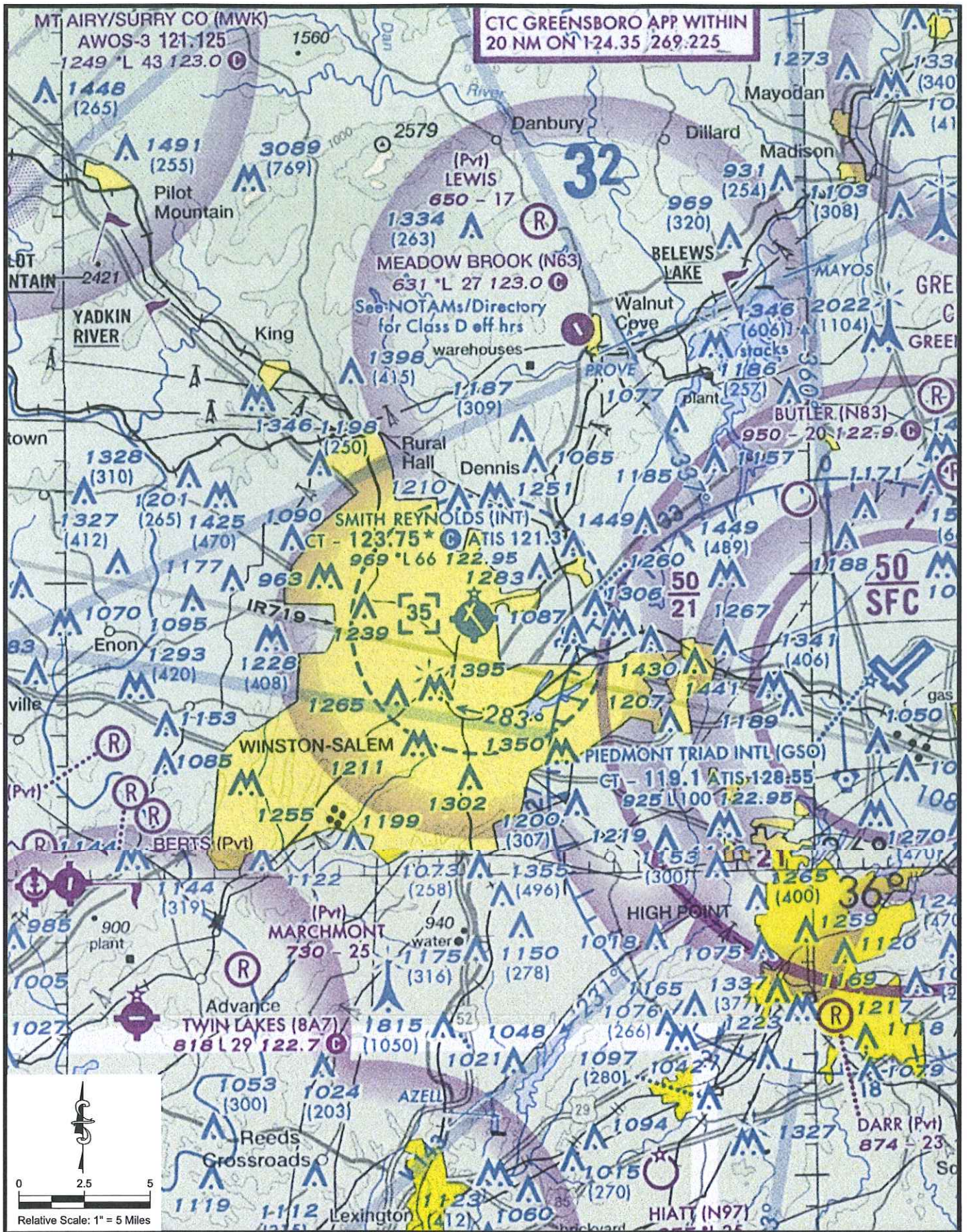
The FAA's NPIAS is a five-year planning report submitted every two years to Congress which identifies anticipated development needs for certain airports throughout the U.S. There are over 19,815 airports in the U.S., of which 5,190 are open to the public. INT and 3,356 others have been determined by the FAA to be of significant interest to the nation's air transportation system, known as the National Airspace System. These 3,356 airports are included in the FAA's 2009-2013 NPIAS. The NPIAS defines the service role of each airport by one of four basic service levels. These levels describe the type of service that the airport currently serves and is expected to serve at the end of the NPIAS five-year planning period. Airports listed in the NPIAS are eligible for federal funding under the FAA's Airport Improvement Program (AIP). The 2009-2013 NPIAS report estimates that approximately \$49.7 billion in AIP-eligible projects will be required by NPIAS airports within the next five years. It is important to note that this estimate of development costs is not FAA's commitment to fund any particular project; rather it is an estimate for budget planning and individual projects must be justified and approved before a grant is issued. The 2009-2013 NPIAS anticipates that INT will require more than \$8 million in improvements during the five-year period. The NPIAS classifies INT as a general aviation airport for the FAA's 2009-2013 NPIAS planning period. A comparison of the NPIAS' various airport service level classifications is shown in **Table 2-3**.



Classification	Definition
Commercial Service - Primary	Public-use commercial airports enplaning more than 10,000 passengers annually.
Commercial Service – Non-Primary	Public-use commercial airports enplaning between 2,500 and 10,000 passengers annually
General Aviation - Reliever	A general aviation airport that serves to relieve operational congestion at a nearby commercial service airport. Must have at least 100 based aircraft or 25,000 itinerant operations
General Aviation	Other airports with fewer than 2,500 annual enplanements or that do not receive scheduled or unscheduled commercial service

Source: FAA Order 5090.3C, Field Formulation of the NPIAS, 2000.



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 	<p>Smith Reynolds Airport - Master Plan Update</p> <hr/> <p>Aeronautical Chart</p>	<p>2-3</p> <hr/> <p>DRAWING NO.</p>
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## **North Carolina General Aviation Airport Development Plan**

In 2003, the State of North Carolina published the North Carolina General Aviation Airport Development Plan (NCGAADP) which was later revised in 2006. The plan provides standards for the NCDOT/DOA to prioritize the funding of eligible capital projects for all public-use general aviation airports in the North Carolina airports system. Airports were categorized into color groups according to several factors including: population, per capita income, tourism characteristics, and NPIAS classification. The NCGAADP classified INT as a red group airport, which is the highest development color grouping for airports. A detailed discussion of the plan's recommendations for red group airports is further discussed in the facility requirements chapter of this report.

## **1995 Smith Reynolds Master Plan Update**

The previous master plan update was performed back in 1995. At the time, the airport served as a feeder to USAir's hub in Charlotte and conducted regularly scheduled commercial service operations. Despite the airport's role change in 2000 due to its loss of airline service, the 1995 master plan provides useful information in identifying non-standard facilities and also presents the thought process and reasoning associated with proposed development recommendations. Thus, the 1995 master plan referred when necessary to gather missing data required as a part of this effort.

## **Smith Reynolds Airport Terminal Area Study**

In 2000, a report was published that assessed the existing airport terminal along with its associated apron, access roads, and parking facilities and then provided recommendations to improve the facility such that it could meet future demand. The study concluded that due to high operational and maintenance costs, the existing terminal was not suitable for renovation. Rather, the study recommended that a new terminal be constructed in a site identified south of the existing terminal facility. This study was referenced to gather detailed information regarding the existing airport terminal and its facilities.

## **2.7 METEOROLOGICAL DATA**

The weather associated with a particular area or region can potentially affect the performance of aircraft and ultimately influence airfield design recommendations. An overview of the climate and wind characteristics for the Winston-Salem area is presented in the following section.

### **Climate**

The Smith Reynolds Airport is located in north central North Carolina where the climate is typically mild. The warmest month of the year is July which has an average high of 89 degrees Fahrenheit (F); whereas, the coldest month of the year is January which has an average low temperature of 29 degrees F. The area receives approximately 3.79" of precipitation per month and receives an average annual precipitation of 45.44". March was recognized as one of the wettest months with an average of 4.31" of precipitation.





## Wind Coverage

Historical wind conditions were evaluated to determine the percentage of wind coverage at INT. This element is important since pilots prefer to depart and land into the wind and as such runways should be oriented such that they face a direction to provide the maximum amount of coverage. The FAA recommends that runways achieve 95% wind coverage. The 95% wind coverage is computed based on the crosswind not exceeding:

- 10.5 kts (12 mph) for airport reference codes (ARC) of A-I and B-I;
- 13 kts (15 mph) for ARCs A-II and B-II;
- 16 kts (18 mph) for ARCs A-III, B-III, C-I through D-III; and
- 20 kts (23 mph) for ARCs A-IV through D-VI.

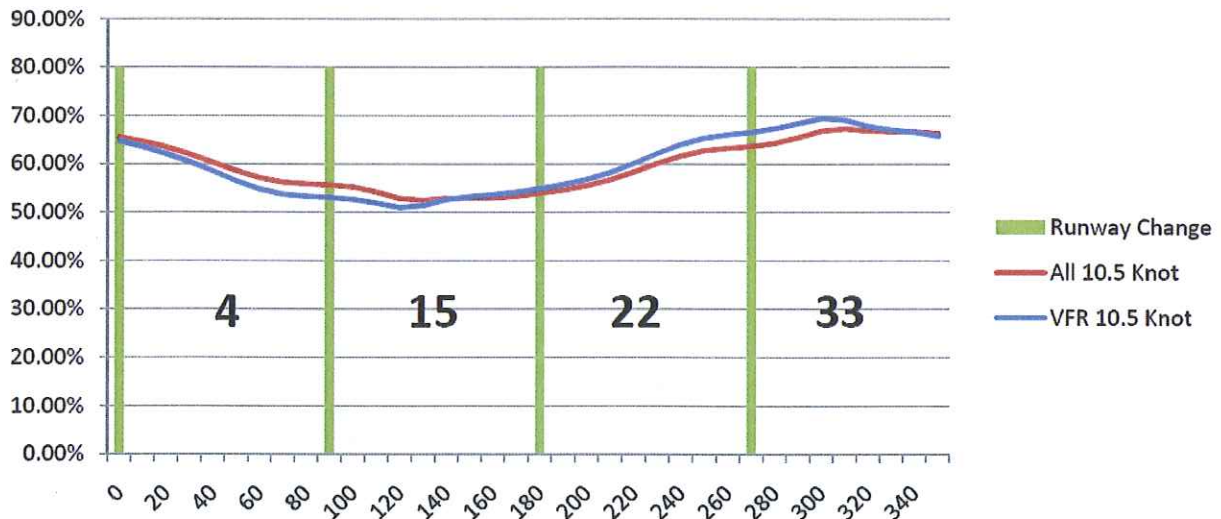
If the existing runways are unable to achieve the maximum crosswind component of the critical aircraft, then the addition of a crosswind runway or re-orientation of the existing runway should be considered. FAA Advisory Circular (AC) 150/5300-13, Airport Design, requires that a period of at least 10 consecutive years of wind data should be examined when evaluating airfield wind coverage. Wind data for INT was obtained through the National Oceanic and Atmospheric Administration's National Climatic Data Center located in Asheville, NC. In order to accurately assess wind coverage for a particular runway, data recorded during all-weather conditions as well as those observations recorded during instrument conditions are evaluated separately.

A 360 degree analysis of wind observations in comparison to 10.5 knot crosswind conditions revealed that wind conditions favor Runway 33, 22, 4, and then 15 respectively. **Exhibit 2-4** graphically illustrates the result of this analysis. Using the FAA's computer application Airport Design (Version 4.2D), an analysis of all weather, VFR and IFR wind coverage percentages was conducted. This information is presented in **Exhibit 2-5**, Wind Roses. Wind coverage is included for the crosswind speed that corresponds to the approach category and airplane design group that would utilize a runway. In the case of INT, 10.5 kts, 13 kts, and 16 kts crosswind components were analyzed. A review of INT's wind coverage during the last 10 years revealed that all runways meet the FAA's 95% milestone except during IFR conditions. During IFR conditions, Runway 15-33 only has coverage of 93.87% during 10.5 kt crosswind conditions. This issue will be further discussed during the facility requirements chapter.





Exhibit 2-4  
 IFR / VFR Wind Observations



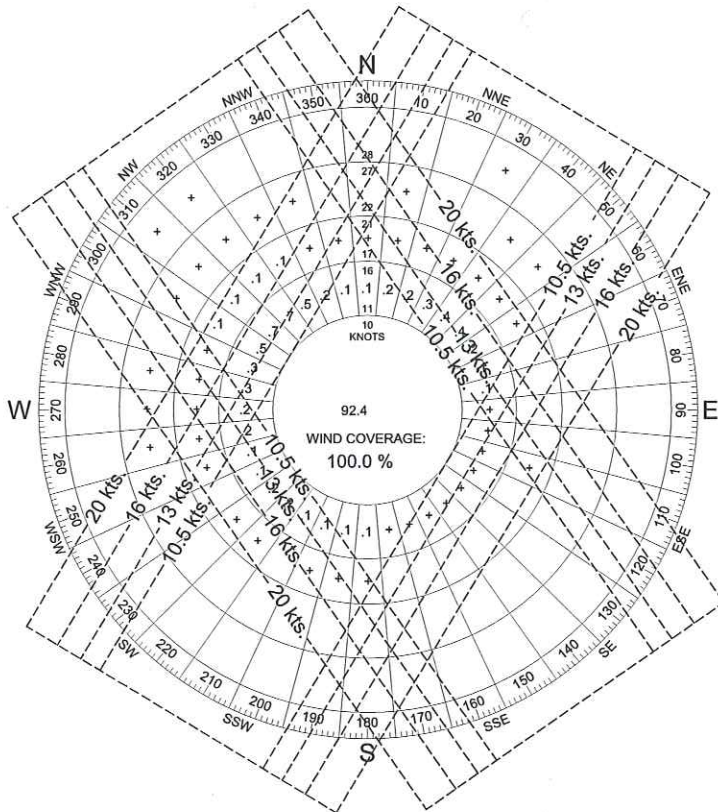
## 2.8 LANDSIDE INVENTORY

The inventory of airport landside facilities includes a discussion of all facilities located within the airport boundaries that are not required for aircraft movement and air navigation. Some examples of these facilities include but are not limited to hangar structures, parking, fuel storage and fueling facilities, fencing, and terminal facilities. The following sections detail the various landside facilities that currently exist at INT. **Exhibit 2-6** graphically depicts the various landside facilities at INT.

### T-Hangars

There are currently three t-hangar structures located at INT that are utilized for the storage of general aviation aircraft. Hangar #26 and #27 are controlled and leased by the Airport Commission of Forsyth County; whereas, Hangar #9 is leased and sublet by the FBO – Landmark Aviation. Hangar #26 includes 15 small hangar units for lease primarily to small single-engine aircraft; whereas, hangar #27 includes 13 small units and 3 larger units that are utilized primarily for the storage of twin-engine and other mid-sized general aviation aircraft. Hangar #9 includes 10 small t-hangar units. **Table 2-4** illustrates a comprehensive list of structures at INT which have been sorted by function.





All Weather Windrose			
Crosswind Component (kts)	Wind Coverage %		
	Runway 4-22	Runway 15-33	Combined
10.5	96.15%	97.02%	99.55%
13	97.82%	98.49%	99.93%
16	99.49%	99.81%	99.99%
20	99.90%	99.99%	100.00%

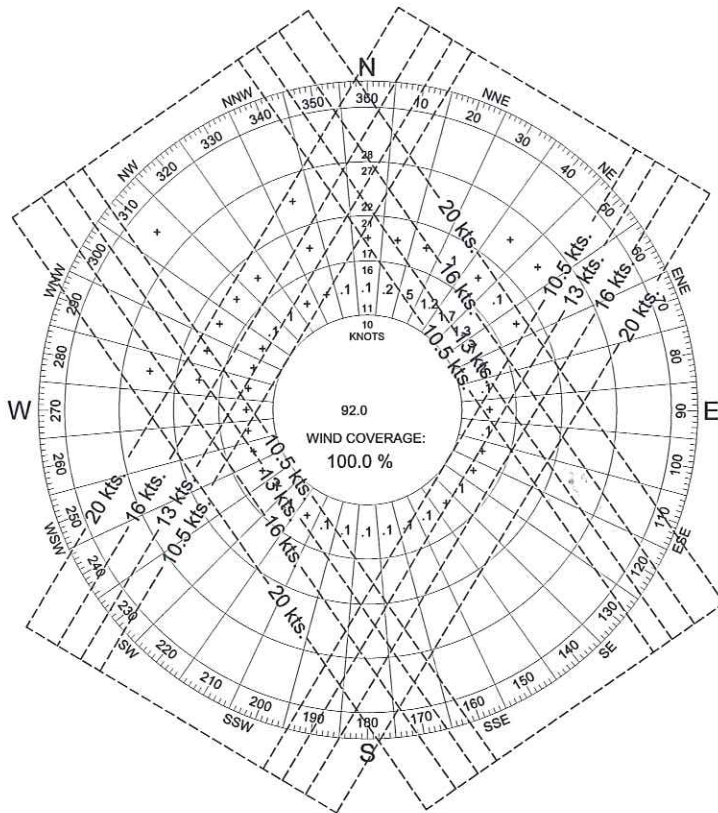
Based on 74,112 Observations

Wind Data Source:  
National Climatic Data Center  
Station 72319 - Winston-Salem, NC  
Years (1999 - 2008)

Notes

Wind Roses generated using FAA Airport Design 4.2d.

All wind coverages were calculated using the runway's true bearing.



IFR Windrose			
Crosswind Component (kts)	Wind Coverage %		
	Runway 4-22	Runway 15-33	Combined
10.5	99.10%	93.87%	99.79%
13	99.54%	96.56%	99.97%
16	99.85%	99.51%	99.99%
20	99.95%	99.91%	100.00%

Based on 7,270 Observations



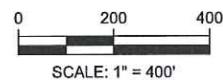
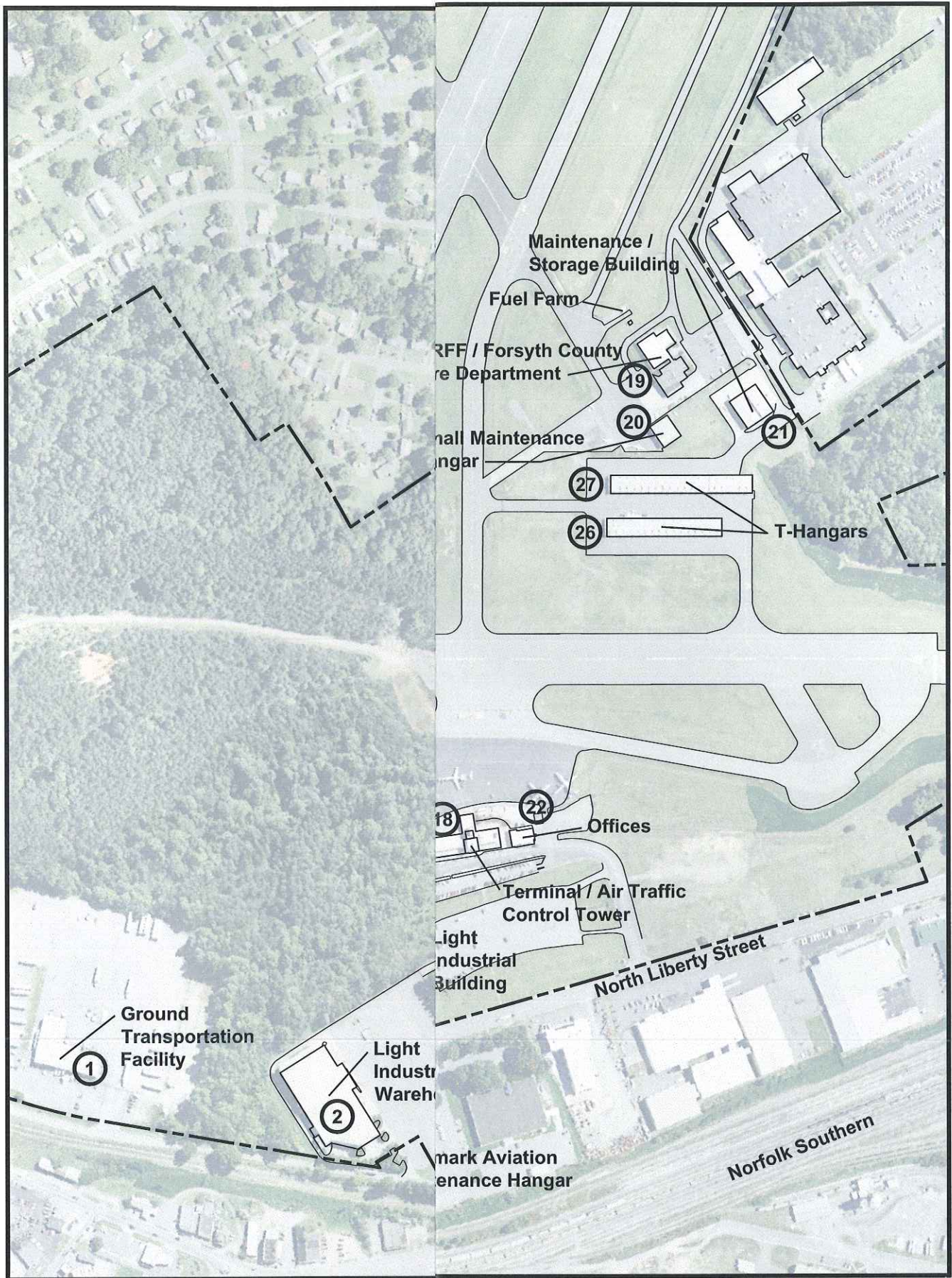
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All Weather and IFR Wind Roses

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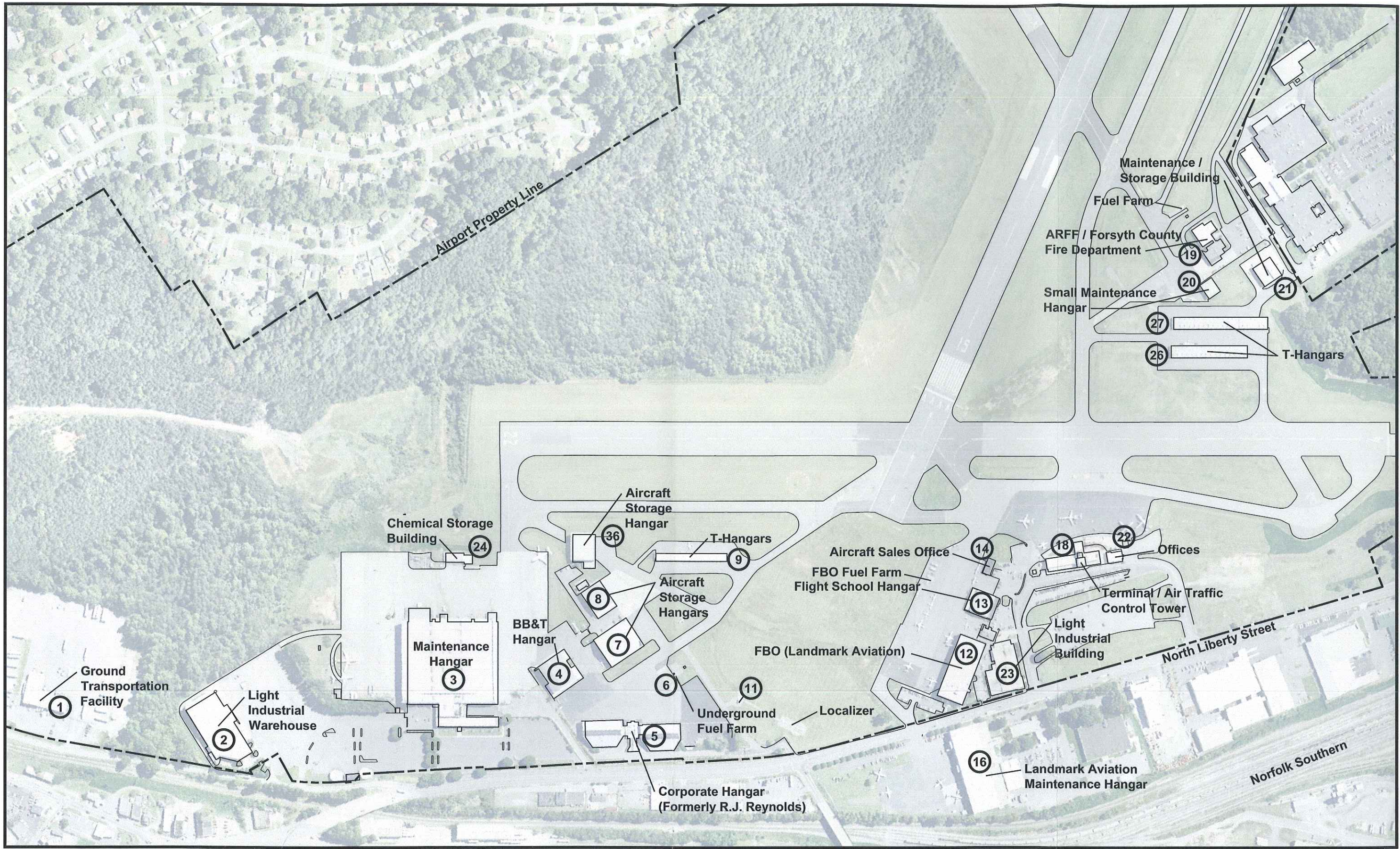


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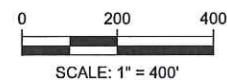


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SMITH REYNOLDS AIRPORT  
MASTER PLAN UPDATE

Landside Inventory



2-6

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## **Large Hangars**

In addition to t-hangar facilities, INT includes several large hangar facilities that are occupied by businesses that provide aircraft services or by corporate tenants that use hangars for storage of their larger jet aircraft. The hangar requirements for any future airport businesses is difficult to predict but aircraft storage facilities can be estimated based on the forecasted number of based aircraft. For the purpose of this study, hangars have been categorized by their use as either a maintenance facility or for aircraft storage. The large business hangars include the ACFC Maintenance Hangar and Landmark's facilities; whereas, the hangar storage includes BB&T's hangar and the larger hangars sublet by Landmark. **Table 2-4** illustrates a comprehensive list of structures at INT which are sorted by use.

## **Other Structures**

In addition to hangars which are used for aircraft storage and servicing, there are several other types of buildings located throughout INT property. Some of these facilities such as the ARFF, ATCT, and airfield maintenance buildings serve as necessary aviation support facilities; whereas, others such as offices can serve multiple uses. Finally, some facilities are unrelated to the airport or to aviation functions. For the purpose of this study, facilities were categorized by its current or potential use. It is important to note that later chapters of this report evaluate the need for future aviation-related facilities. As such, requirements for facilities unrelated to the airport or aviation function will not be discussed and are therefore shown in **Table 2-4** for information purposes only.



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Bldg ID	Building Description	Use	Square Feet / Size
3	4001 N. Liberty – Large Hangar Facility	Aircraft Maintenance	322,280
12	FBO Headquarters / Hangar	Aircraft Maintenance	34,700
16	Landmark Aircraft Maint. Hangar	Aircraft Maintenance	64,000
20	Aircraft Maint. Hangar	Aircraft Maintenance	4,700
		<b>Subtotal</b>	<b>425,680</b>
4	Aircraft Hangar	Lg. Aircraft Storage	18,000
5	Corporate Hangar	Lg. Aircraft Storage	35,000 – (17,500 ea)
7	Aircraft Hangar	Lg. Aircraft Storage	22,400
8	Aircraft Hangar	Lg. Aircraft Storage	12,500
36	Aircraft Storage Hangar	Lg. Aircraft Storage	12,000
		<b>Subtotal</b>	<b>99,900</b>
9	North T-Hangar	Sm. Aircraft Storage	10 units (sm)
13	Flight School/Hangar	Sm. Aircraft Storage	13,100 (8 units - sm)
26	ACFC T-Hangars	Sm. Aircraft Storage	15 units (sm)
27	ACFC T-Hangars	Sm. Aircraft Storage	16 units (3 med, 13 sm.)
		<b>Subtotal</b>	<b>49 units</b>
2	Light Industrial Warehouse	Office / Other	42,300
14	Aircraft Sales Office	Office / Other	2,360
22	Offices	Office / Other	3,000
23	Components Facility	Office / Other	23,000
		<b>Subtotal</b>	<b>70,660</b>
18	Airport Terminal and ATCT	Aviation Support	34,620
19	ARFF Facility / Fire Dept. Hq. / 911 Center	Aviation Support	13,500
21	Airfield Maintenance / Lighting Vault	Aviation Support	8,000
24	Chemical Storage Building	Aviation Support	4,500
		<b>Subtotal</b>	<b>60,620</b>
1	Trucking Facility	Non-aviation related use	1,660
28	Rental House	Non-Aviation related use	816
30	Forsyth County Extension Agent Offices	Non-Aviation related use	23,000
31	Animal Control Facility (abandoned)	Non-Aviation related use	25,000
32	Forsyth County Sheriff – Maint.	Non-aviation related use	10,200
34	Winston-Salem School/Forsyth Co. System	Non-aviation related use	17,000
35	Forsyth Technical College	Non-aviation related use	39,100
		<b>Subtotal</b>	<b>116,776</b>
6	Underground fuel farm	Utility / Other	n/a
11	FAA Localizer Building	Utility / Other	130
		<b>Subtotal</b>	<b>130</b>
10 1	Modular Offices (removed)	Removed <sup>1</sup>	n/a
15 1	Airport Admin Office and ARFF (removed)	Removed <sup>1</sup>	n/a
17 1	Decommissioned Elec. Vault (removed)	Removed <sup>1</sup>	n/a
		<b>Subtotal</b>	<b>n/a</b>

<sup>1</sup> – Structure has been removed – shown for reference purposes only.





## **Terminal**

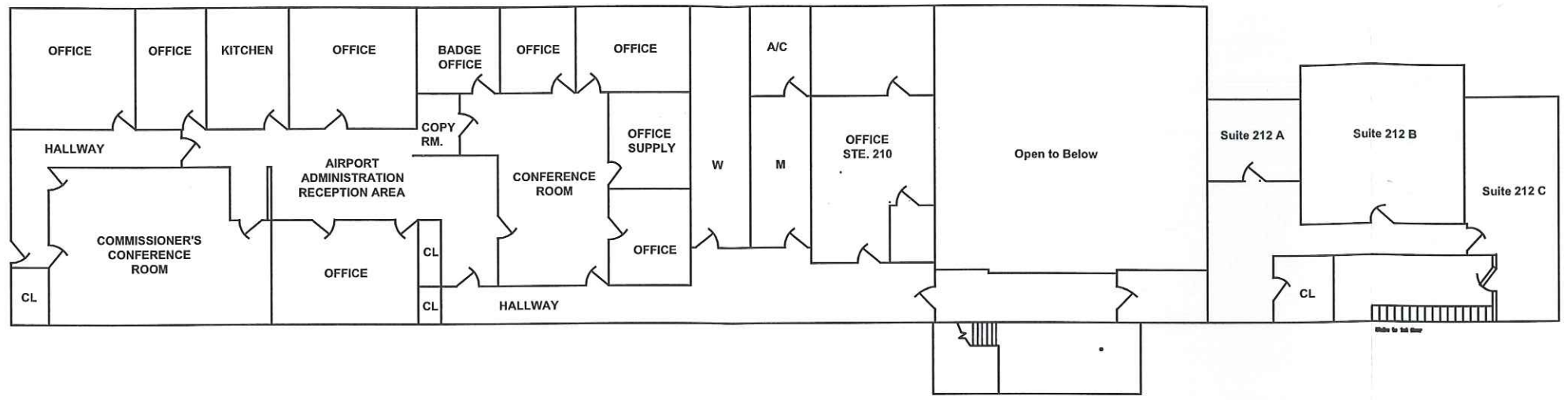
The terminal building was constructed in 1941 and is located on the west side of the airport, adjacent to Taxiway F, with surface access via Norfleet Street and Liberty Street. The terminal building was previously used by commercial airline passengers until 2000, when US Airways ceased commuter operations at INT. In total, the terminal building includes four levels and a basement. A majority of the basement space is occupied by boiler room and by air conditioning units while the remaining portion is utilized for storage. Level 1 of the terminal is the entrance (ground level) includes several offices that are leased by a variety of local business tenants and also by rental car providers. Level 1 also includes three previously-used airline ticket counters, an unusable baggage conveyor belt, a small vending area, and restroom facilities. In addition, Level one includes a large open area that leads to a 970 square-foot airside hold room area. The passenger waiting area is enclosed from the atrium with glass windows and doors, and provides airside access to the apron. Level two includes restrooms, airport administrative offices, and additional offices that are leased by airport tenants. Levels three and four are associated with the air traffic control tower operation. Several offices and a break room are located on level 3 for ATCT employee use; whereas, the top story consists of the ATCT cab. The total square footage of the terminal building area is approximately 34,620 SF, as follows:

- Basement: 13,500 SF
- Level 1 – Entrance Level: 11,900 SF
- Level 2 – Offices: 7,050 SF
- Level 3 – ATC Offices: 2,020 SF
- Control Tower: 150 SF

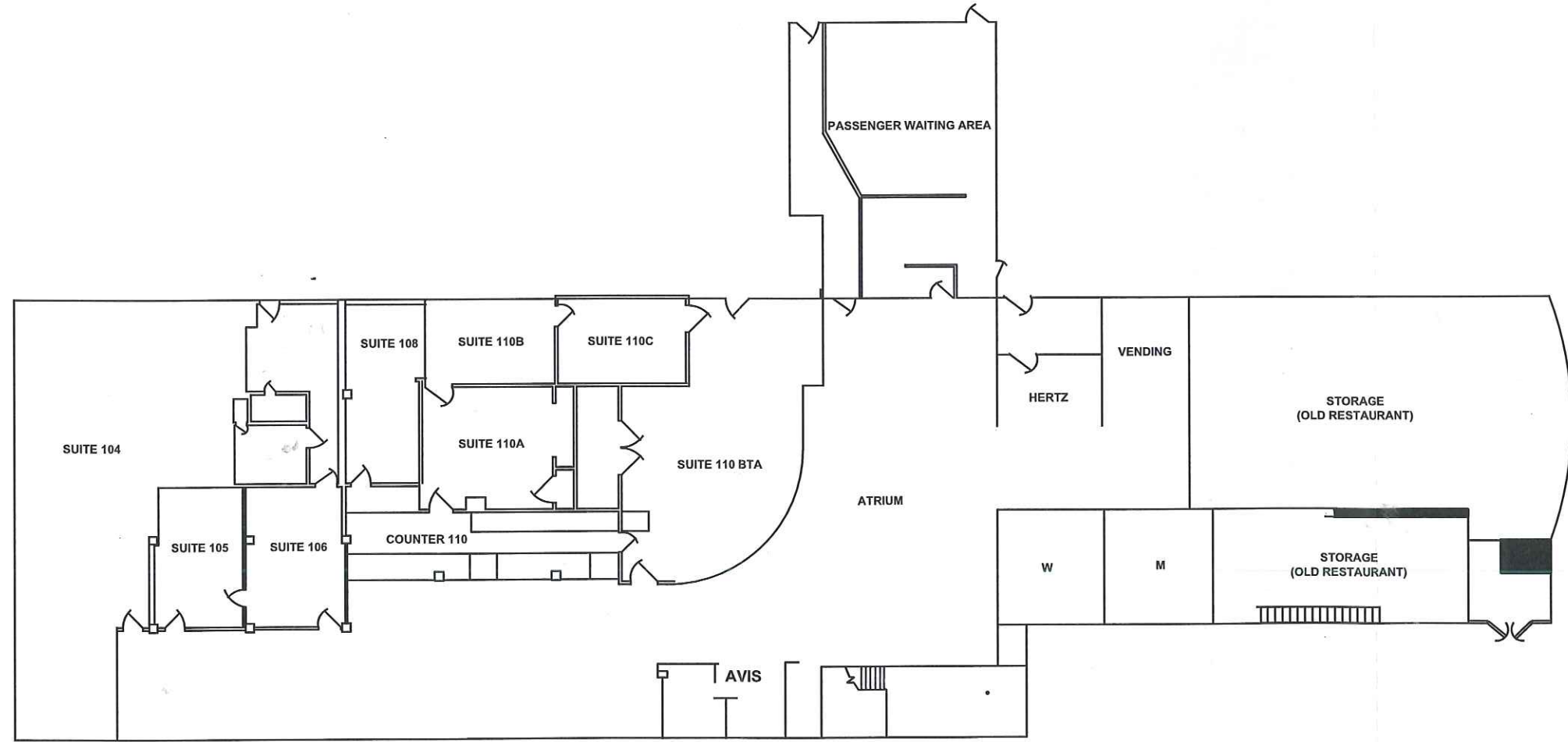
Airside access is gained through the terminal's central corridor which leads to a 970 SF hold room/passenger staging area that is commonly used by many large air taxi aircraft for passenger staging. In addition, approximately 88,000 SF of transient apron serves the terminal airside needs for aircraft parking. Levels 1 and 2 of the terminal are shown in **Exhibit 2-7**; whereas Level 3 and the ATCT are shown in **Exhibit 2-8**.



Y:\Planning\INT 1th Reynolds\MPU\Drawings\Exhibits\Exhibit 2-7 and 2-8 Terminal Layout - Levels 1.dwg May 11 2012-17:02



**Terminal Level 2**

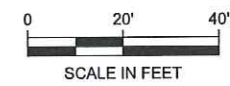


**Terminal Level 1**



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Terminal Layout Level 1 & 2

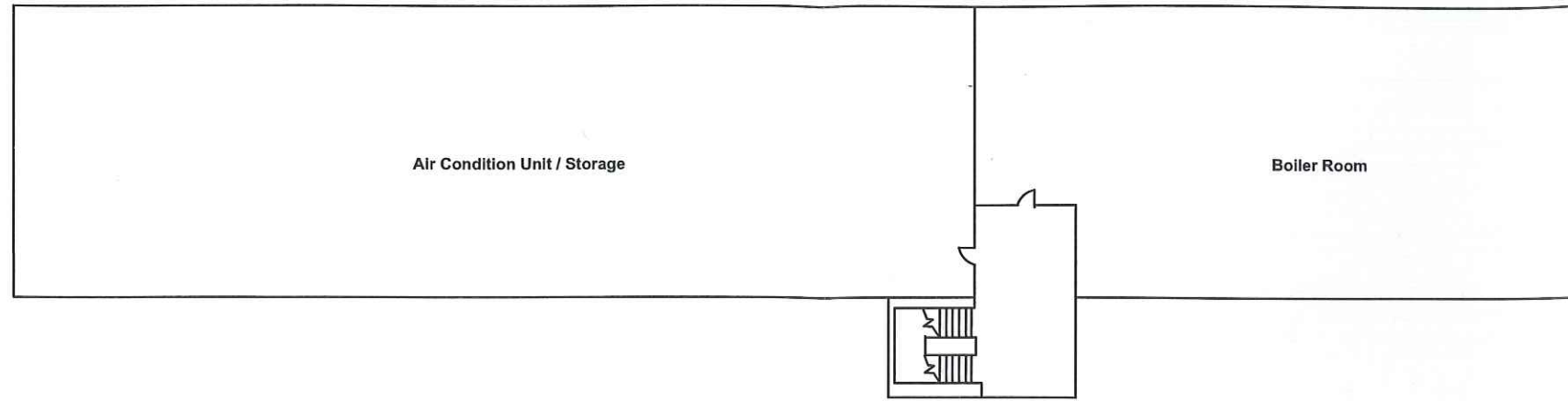


2-7

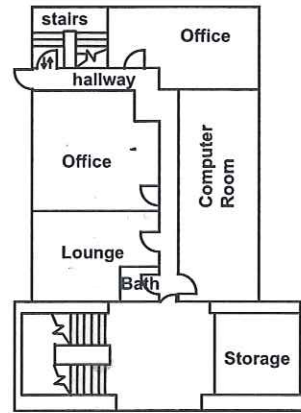
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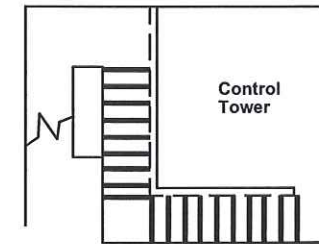
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**Basement**



**Level 3**



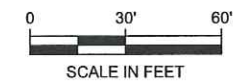
**Level 4 (Air Traffic Control Tower)**

SCALE: NTS



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Terminal Layout Level 3, 4 & Air Traffic  
Control Tower



2-8

DRAWING NO.





## **Fixed Base Operator**

A fixed base operator is generally described as an operation that provides services and facility amenities to aircraft, pilots, and passengers but most associate FBOs as suppliers of fuel. At Winston-Salem Airport Landmark Aviation is the sole provider of FBO services. Landmark is one of the largest FBO networks with 40 locations located throughout the United States, Canada, and in Western Europe. At INT, Landmark offers a number of amenities and services including:

Avgas and Jet-A Fuel	Rental Cars
Oxygen	Courtesy Transportation
De-Icing	Concierge Services
Ground Handling	Passenger Lobby
Aircraft Sales	Executive Conference Room
Aircraft Charter	Pilot's Lounge
Avionics	Flight Planning Room

In addition to the amenities and services listed, Landmark also has onsite equipment to de-ice aircraft, service lavatories, and stairs to unload passengers from larger aircraft. As pointed out earlier, Landmark also leases t-hangar units for small aircraft storage.

Aircraft Maintenance – Aircraft maintenance is a large component of Landmark Aviation's business at INT. Landmark conducts these activities within one of two separate airport facilities depending upon the size of the aircraft being serviced. A large hangar located on N. Liberty Street, across from Landmark's main FBO center facility, is utilized to service larger jet and turbine powered aircraft. A smaller hangar which is located north of the ARFF building, south of Taxiway A and the self-fuel facility is used specifically to service single-engine and small twin-engine aircraft. The small maintenance hangar includes approximately 3,500 square feet of space for small aircraft servicing. Aircraft covered under Landmark's repair station's certificate includes: Beech product line class IV repair and inspection, Piper and Cessna Line Class IV repair and inspection, Lear Jet Class IV repair and inspection, DeHavilland class IV repair and inspection.

Fuel Storage Facilities - All public sale of fuel is administered by the FBO, Landmark Aviation. Landmark owns and operates two underground storage tanks with 50,000 gallons of Jet A fuel, and 12,000 gallons of 100LL fuel. In addition, they operate a fleet of fuel trucks that contain additional capacity of 11,000 gal of Jet A and 1,700 gal of 100LL. The underground fuel tanks and fuel truck parking areas are centrally located along the edge of the FBO apron. The self-service facility is located near the ARFF facility on the east side of the airfield, along Taxiway E and includes a 6,000 gallon storage tank for 100LL fuel. **Table 2-5** illustrates the various fuel storage facilities at INT by type and size.





Fuel Type	Underground	Self Serve	Trucks
Jet A	50,000 gal	n/a	11,000 gal
100LL	12,000 gal	6,000 gal	1,700 gal
Total	62,000 gal	6,000 gal	12,700 gal

Source: Landmark Aviation, 2009.

## Vehicular Parking

An inventory of INT's vehicular parking facilities was necessary in order to establish a baseline for further analysis during later chapters of this report. Although there are several acres of parking facilities located throughout airport property, most of these facilities were specifically constructed to serve the needs of associated business developments rather than to serve the needs of the travelling public. One purpose of this study is to assess existing aviation-related parking facilities in comparison to anticipated aviation demand. For this reason, only parking facilities that are related directly to the aviation function rather than to an individual business were evaluated as a part of the airport inventory. **Table 2-6** illustrates the various aviation-related public parking facilities that are currently in place at INT.

Location / Description	Parking Spaces
Main Terminal Parking – Long-term / Short-Term	285* / 40 (4 Handicap)
Main Terminal Rental Car Return Lot	28
Main Terminal Designated Ready Spaces	12 (8-Avis, 4-Hertz)
South Apron Vehicular Parking Lot	49 (2 Handicap)
Employee Parking – North of Terminal	37*
FBO (Landmark) Parking Lot	38 (2 Handicap)
<b>Total</b>	<b>489</b>

\* No dedicated Handicap Parking identified

## Fencing / Security

The entire perimeter of the airport is enclosed with a 6 foot fence. Airside access through secure areas is accomplished by using either remote transmitters, keypads, or with the use of proximity cards. Gates located at remote locations throughout the property are chained and locked shut and can only be accessed by airport personnel with the appropriate keys.

## 2.9 AIRSIDE INVENTORY

The airfield or airside facilities generally include all facilities required to support the movement, navigation, and operation of aircraft. These facilities include the airport's runways, taxiways, airfield lighting, and pavement markings. The existing airfield facilities at INT are discussed in the following sections. A graphic denoting the various airside facilities is illustrated in **Exhibit 2-9**.





### **Runway 15/33**

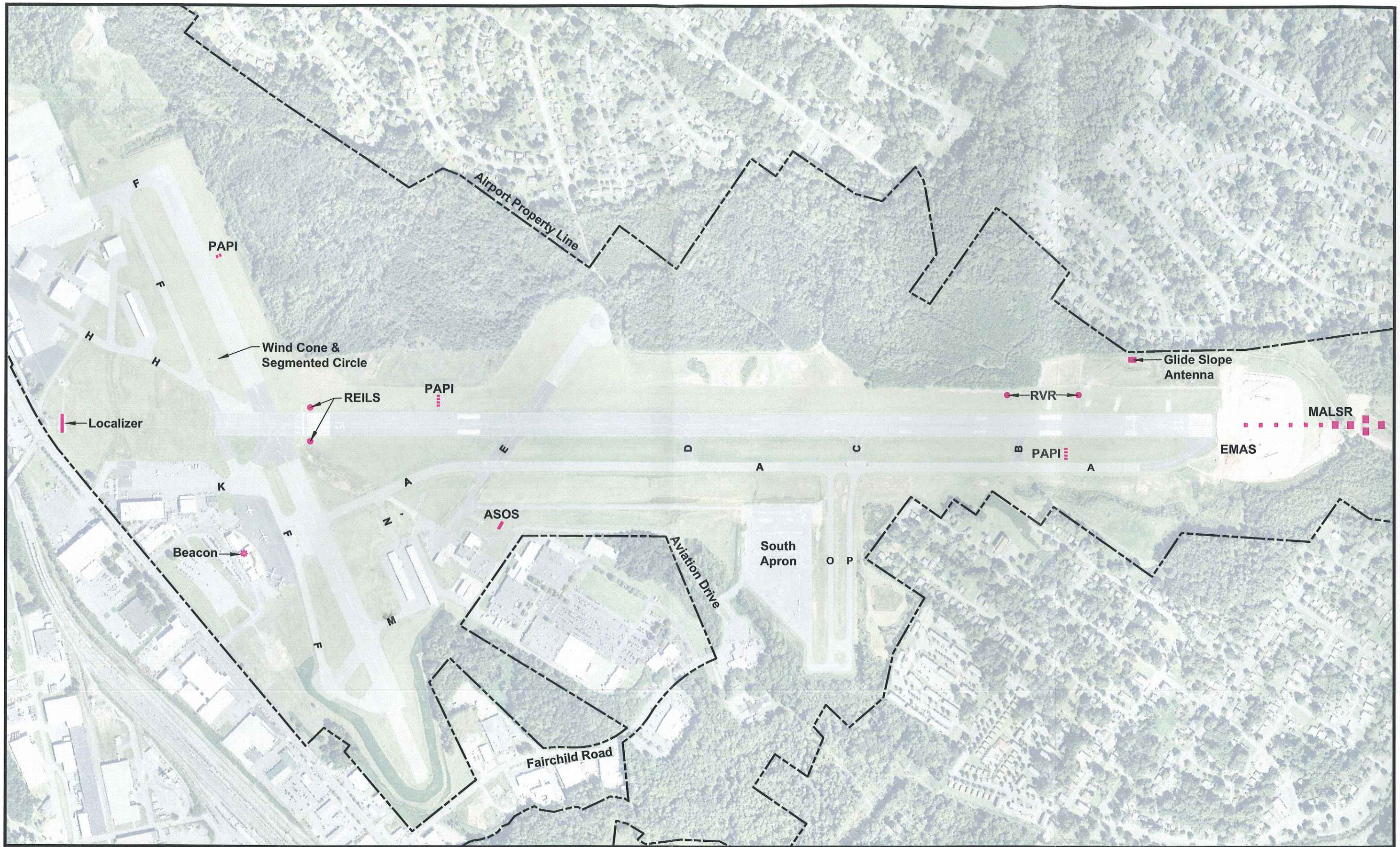
The primary runway at INT is Runway 15/33 which has a length of 6,655' long and a width of 150'. The runway is constructed of asphalt and is grooved to provide additional traction during wet weather conditions. In 2008, Runway 15/33 was rehabilitated with an asphalt overlay and was then re-marked with precision and non-precision markings. Hence, the runway and associated markings are in very good condition. Runway 15/33 currently incorporates FAA declared distance standards; these standards apply to runways that have differing landing and/or takeoff lengths due to a lack of adequate safety area or due to obstructions in the area. An analysis of structures in the vicinity revealed that the runway is displaced due to several buildings that exceed FAA safety criterion. Due to the intersecting of Runways 15/33 and 4/22, a hold bar is located near the end of Runway 15 near the displaced threshold marking. The hold bar represents the stop position for those aircraft landing at the end of Runway 33 that are performing land and hold short operations (LAHSO). LAHSO activity is monitored and controlled by the ATCT and is implemented while both runways are active in order to avoid an incursion. Additional information regarding Runway 15/33 is presented in **Table 2-7**. **Exhibit 2-9** illustrates the various taxiways and taxilane facilities at INT and **Exhibit 2-10** depicts the pavement conditions of the various runways and taxiways at INT.

### **Runway 4/22**

Runway 4/22 is INT's crosswind runway which has a length of 3,938 ft and a width of 150 ft. The asphalt runway has been repaired with crack seal projects in the past but despite these efforts the pavement has continued to deteriorate and needs to be overlaid with a new asphaltic course. This runway is primarily used by small general aviation aircraft or by flight schools to conduct their training activities. The utilization of this runway by smaller aircraft allows pilots to avoid intermixing with the larger jet aircraft and associated wake vortices that are typically associated with the main runway. Although there are no designated right hand traffic patterns at INT, the ATCT often directs traffic to Runway 4 to fly a right-hand pattern. This pattern allows the ATCT to avoid potential conflicts between traffic departing Runway 33 and those performing a left downwind track to Runway 4. Runways 4 and 22 are both marked with basic markings that are in good condition. Additional information regarding Runway 4/22 is presented in **Table 2-7**. **Exhibit 2-9** illustrates the various taxiways and taxilane facilities at INT and **Exhibit 2-10** depicts the pavement conditions of the various runways and taxiways at INT.

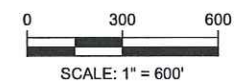


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ith Reynolds\MPU\Drawings\exhibits\Exhibit 2-9 airside inventory.dwg May 11 2012



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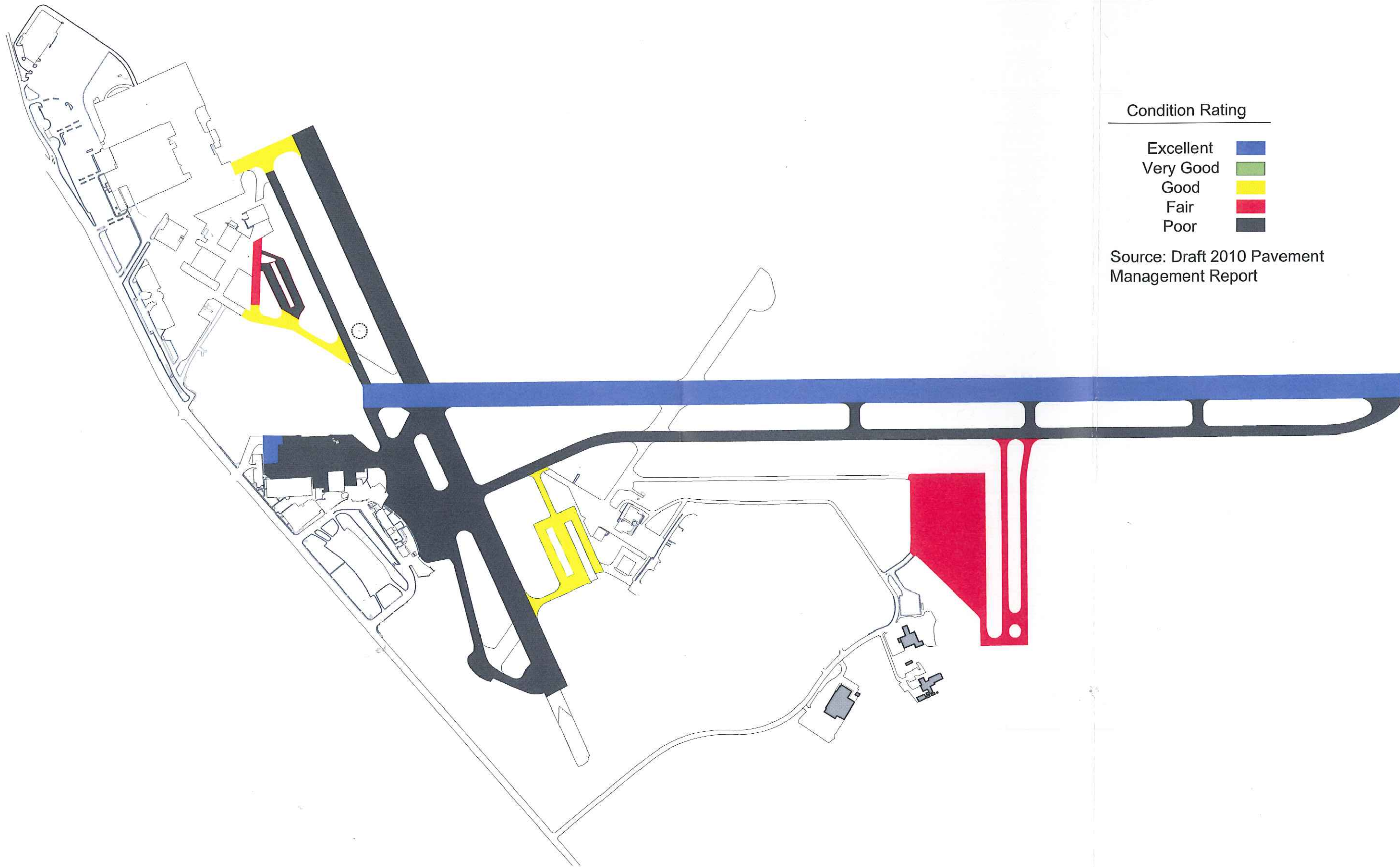
Airside Inventory



2-9

DRAWING NO.



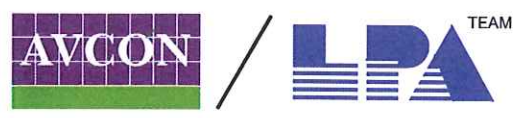


Condition Rating

- Excellent ■
- Very Good ■
- Good ■
- Fair ■
- Poor ■

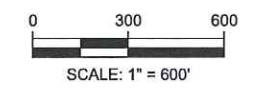
Source: Draft 2010 Pavement Management Report

\* NOTE: R/W 15-33 REHABILITATED IN 2008



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Pavement Condition Index (PCI)



2-10

DRAWING NO.





**Table 2-7  
Runway Characteristics**

Characteristic	Runway	
	4-22	15-33
Length (ft)	3,938	6,655
Width (ft)	150	150
Surface Composition / condition	Asphalt / fair	Asphalt – grooved / good
Effective Gradient	.5%	1.0%
Shoulder Width (ft)	n/a	n/a
Blast Pad (L x W)	(4) – 100' x 480' (22) – n/a	(15) – n/a (33) – n/a
Load Bearing Capacity		
Single-Wheel (lbs)	40,000	110,000
Dual-Wheel (lbs)	55,000	135,000
Double Tandem (lbs)	90,000	230,000
Markings / condition	Basic / good	Precision / good
Airport Reference Code	B-II	C-III
Critical Aircraft	King Air C90	737-500
Approach Type	Visual (no approaches)	15-NPI, 33-PIR

Source: FAA AC 150/5300-13, Change 14 Airport Design, www.airnav.com.

## Taxiways

Each runway at INT is supported by a full length parallel taxiway. Taxiway A serves Runway 15/33 to the west with taxiway connectors B, C, D, and E; whereas, Runway 4/22 is served by the full-length parallel Taxiway F and connector J. Taxiway A provides access to/from both runways to the terminal apron and Taxiway H provides access to/from the large maintenance hangar areas to taxiway F. Taxiways M and N provide access to the centrally located t-hangars. In addition to the above taxiways, there is an unnamed taxiway that parallels Taxiway A to the west. This taxiway leads to/from the south apron to the self-fuel and small maintenance hangar facilities. All taxiways that directly serve the main runways and those that lead to/from the large maintenance hangar facilities have a width of 50'. However, all taxiways that lead to/from the t-hangar and the south apron area have a width of 35'.

Two unnamed taxilanes provide airside access to/from the south general aviation apron. These taxilanes were constructed in this configuration to accommodate a dramatic change in grade in this area. The design of these taxilanes considers the importance of ingress and egress visibility zones to and from the apron in a non-movement area, or area that is not required to be controlled by the ATCT; therefore, each taxilane is designated with signage for one-way travel. **Exhibit 2-9** illustrates the various taxiways and taxilane facilities at INT and **Exhibit 2-10** depicts the pavement conditions of the various runways and taxiways at INT.

## Airfield Lighting

Airfield lighting is necessary at all airports that accommodate operations during nighttime hours and/or during periods of low visibility. It allows pilots to identify the airport from the air as well





as maneuver safely on the ground during these conditions. The following section details the various airfield lighting currently employed at INT.

Runway Lighting – Runway 15/33 is equipped with High Intensity Runway Lighting (HIRL); whereas, Runway 4/22 is lighted with Medium Intensity Runway Lighting (MIRL). While the ATCT is closed, Runway 15/33 HIRLs are available via pilot-activation through the Common Traffic Advisory Frequency (CTAF). During hours of operation, the tower controls the lighting of Runway 4/22; however, the lights are inactive after 9:30pm, (after the tower is closed), in order to preclude intersecting operations.

Runway End Identifier Lights (REILs) – A REILs system is comprised of two bright white strobes, one located on each side of the runway threshold facing towards approaching traffic. REILs enable pilots to visually locate the runway threshold during poor visibility conditions. Runway 15 is equipped with Runway End Identifier Lights which are located approximately 110' outbound from the runway center line. The airport recently installed REILs at the end of Runway 15 that are scheduled to be operational prior to the completion of this report. For this reason, the REILs at this end will be shown and considered existing.

Taxiway and Apron Lighting – Each of the primary taxiways (A & F) and associated connector taxiways at INT are lit by Medium Intensity Taxiway Lighting (MITL). The terminal apron, FBO apron, and general aviation apron areas are all illuminated by security flood lighting mounted on poles.

Approach Lighting – Runway 33 is equipped with a Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) to support the existing precision instrument approach. The MALSR consists of a combination of threshold identification lights, steady burning lights, and strobe flashing lights spaced in 200' intervals to 2,400 ft from the runway threshold. This approach lighting system provides visual transition and runway alignment height perception guidance information to pilots on approach in poor visibility to pilots on approach to landing.

## **Airport/Airfield Signage**

INT has illuminated airfield signs which display position and guidance information to pilots, as required by FAA AC 150/5340-18D, Standards for Airport Sign Systems. There are three background colors used to define the type of signage being displayed. The following list illustrates the different types of signage along with an example of each:

- ➔ Mandatory instruction signs – red background and white inscription, such as a hold position sign for a runway;
- ➔ Directional signage – yellow background and black inscriptions, such as an entrance to a taxiway or exit from a runway;





- Location signage – black background and yellow inscriptions, identifying where an aircraft is located.

## **Weather Reporting Facilities**

The weather reporting capability at INT is comprised of an Automated Weather Surface Observation System (ASOS) which is located on the west side of the airport, between Taxiway A and the ARFF facility. The ASOS is a modern weather reporting system that measures the following meteorological data:

- Wind velocity and direction
- Temperature and dew point
- Visibility
- Sky conditions,
- Altimeter setting, and
- Prevalent weather conditions (fog, thunderstorms, rain, snow)

The ASOS gathers and updates weather data at INT every minute – 24 hours a day. During business hours, tower personnel access the ASOS data by phone and record a more detailed message on the ATIS frequency which is updated every hour, or more frequently as needed for changing weather and operational conditions. The recorded message includes additional operational data such as the active runway, power outages, notice to airmen (NOTAMS) etc. When the tower is closed, the ASOS weather data is broadcast on the ATIS frequency (121.3). The current airport weather conditions are also accessible via telephone and through various aviation websites.

## **Instrument Approach Facilities**

Instrument Landing System (ILS) – The ILS at Smith Reynolds consists of a localizer antenna, end-fire glide slope antenna, Medium Intensity Approach Lighting System (MALSR), and inner and middle distance markers. The localizer provides horizontal electronic course guidance, while the glide slope provides vertical electronic course guidance. Together the localizer and glideslope enable pilots to align the aircraft with the runway centerline and descend along a path clear of obstacles down to the runway threshold during low visibility conditions. The MALSR lighting system provides pilots a transition from aircraft instruments to the visual runway environment. The distance markers emit audible signals in the cockpit, indicating distance information from the runway threshold. At INT, the standard ILS approach provides guidance down to 1,141 ft MSL (200 ft AGL) and visibility of 2,400 ft RVR (~1/2 mile).

Runway Visual Range (RVR) – Runway visual range is defined as the horizontal distance that a pilot can see down the runway. RVR measuring equipment is installed at airports to record horizontal visibility distances and then to transmit the results to the air traffic control tower or to pilots directly via weather reports or through ATIS frequencies. The RVR equipment at INT is comprised of two devices, one lighted transmitter and one receiver; however, newer single-point RVRs utilize only a receiver which operates by measuring the luminance of nearby runway



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lighting. The RVR measurement is significant as pilots approaching INT must obtain a horizontal visual reference of the runway at least ½ mile prior to landing or the approach is considered unlawful per FAA standards. RVR measurements are reported in either feet or meters and the maximum RVR measurement is 2,000 meters, 6,500’.

Very High Frequency Omni-Directional Range (VOR/DME) – The Greensboro VOR station, designated GSO, is located 13 mi east of INT. The VOR provides aircraft instruments with horizontal course information, to or from the station. It operates by emitting a steady 360° signal, as well as producing a rotating signal which compares aircraft position information with the steady signal in order to transmit course information back to the aircraft. Its low altitude standard service volume has a range of 40 nm between 1,000 ft and 18,000 ft MSL. The GSO VOR provides a non-precision instrument approach capability to Runway 15 at INT. The VOR approach minimums are 1,500 ft MSL (532 ft AGL) in 1-sm visibility. Distance Measuring Equipment (DME) is co-located with the GSO VOR and transmits on the same frequency. The DME ground station receives signals from aircraft transmitters, converts the information into distance and ground speed data, then transmits back to the aircraft. DME is limited to providing slant-range, or line-of-sight, distance information. It provides distance information to pilots navigating the VOR instrument approach to INT.

Global Positioning System (GPS) – The GPS is a space-based navigation system comprised of satellites, ground stations, and user receivers. An aircraft GPS receiver can track the position of the aircraft by calculating and comparing signal distance from several satellites. The system is reliable in all terrain and all weather conditions and is typically accurate within 100 ft. INT is currently served by GPS approaches to Runways 15 and 33.

Wide Area Augmentation System (WAAS) – WAAS is a GPS-based navigation system which augments the existing GPS signals to provide the user highly accurate position and tracking information. The Localizer Precision with Vertical Guidance (LPV) is an instrument approach procedure utilizing WAAS technology to provide both vertical and horizontal guidance to aircraft. Like basic GPS navigation, WAAS and LPV approaches are available in all weather and terrain conditions. INT received published LPV approach to Runway 33 that match the standard ILS minima. **Table 2-8** illustrates the various approaches and minima associated with Runway 15/33 at INT.

Table 2-8 INT Instrument Approach Summary		
Instrument Approach	Lowest Minima	
	Descent	Horizontal Visibility
<b>Runway 15</b>		
RNAV GPS (LPV)	1,420 ft MSL (452 ft AGL)	1 SM
VOR/DME	1,500 ft MSL (532 ft AGL)	1 SM
<b>Runway 33</b>		
ILS Category I	1,141 ft. MSL (200 ft. AGL)	2,400 ft. RVR
RNAV GPS (LPV)	1,141 ft. MSL (200 ft. AGL)	2,400 ft. RVR

Source: US Terminal Procedures, August 2009.



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Notes: AGL – Above Ground Level, MSL – Mean Sea Level, RVR – Runway Visual Range.

**Precision Approach Path Indicator (PAPI)** – A Precision Approach Path Indicator (PAPI) lighting system provides aircraft with a visual descent reference during approach. These lights are typically visible from five miles during the day and up to 20 miles or more at night. PAPIs use a light bar unit which contains white and red lights that are installed in a single row perpendicular to the runway edge. Depending on the aircraft angle in relation to these lights, the pilot will receive a combination that indicates his position relative to the desired glide slope. A white indication notifies pilots that their approach is too high; whereas, a red light indication alerts pilots that they their approach is too low. An indication of two white and two red lights reveals to pilots that they are on the correct approach slope. Runway 22 has a 2-light PAPI located left of the approach end, approximately 700’ past the landing threshold. Runway 15 has a 4-light PAPI located left of the approach end, approximately 800’ past the landing threshold.

**Segmented Circle** – A segmented circle and lighted wind cone is located on the north side of the airfield, between Runway 4/22 and Taxiway F, just east of Taxiway H.

**Rotating Beacon** – The airport is equipped with a rotating beacon located on the ATCT above the terminal building. Two high intensity lamps mounted on an assembly rotate 360° every six seconds, giving the illusion of emitting flashes of light. The designation for INT, a civilian land airport, is alternating green and white lights in equal duration and is often visible in excess of 30 nm on a clear night. The rotating beacon is operational from sunset to sunrise and during Instrument Meteorological Conditions (IMC).

### Apron

Paved apron areas are required for the parking of based aircraft in the form of tie-downs and also for transient aircraft parking in the form of open ramp. There are multiple apron areas located throughout the airfield at INT for aircraft parking; however many of these aprons are directly associated with nearby hangars where private business is conducted. For the purpose of this study, only aircraft parking areas that are utilized by the travelling public were inventoried rather than those associated with private businesses. It is assumed that the future construction of hangars for private businesses will be constructed with adequate ramp to accommodate their operation. **Table 2-9** illustrates a description and size of the various public-use apron facilities at INT.

Location / Description	Apron Area (s.f.)
Terminal / Transient Apron	88,480
FBO Apron (Landmark)	165,121
South General Aviation Apron	332,654
Small Maintenance Hangar / ARFF Apron	39,870
<b>Total</b>	<b>626,125</b>





### **Air Traffic Control Tower (ATCT)**

The ATCT is a terminal facility that uses air/ground communications, visual signaling, and other devices to provide ATC services to aircraft operating in the airspace within the vicinity of an airport and also facilitates movements on the ground within designated control areas at commercial service airports. The ATCT at INT is a participant in the FAA contract tower program. This program was developed for airports that are generally classified as in need of a control tower; however, they are not fully eligible for ATCT tower funding. In 1999, congress added this cost-sharing provision which allowed airports that would normally not qualify to gain eligibility provided that the owner fund a portion of the tower's operational expenses. The ATCT at INT is referred to as a VFR only tower which denotes that it has no radar equipment and controllers must therefore provide air traffic management via visual cues only. Offices for tower personnel are located on the third floor of the terminal building. The ATCT is operational from 6:45 am to 9:30 pm, local time. Pilots can contact tower personnel on frequency 123.75 and can contact ground control on frequency 128.25.

Greensboro Terminal Radar Approach and Departure Control (TRACON) provides terminal air traffic services, clearance delivery, and also provides local control operations for INT pilots when the ATCT is closed. The Atlanta Air Route Traffic Control Center (ARTCC) provides enroute air traffic services, as well as approach and departure air traffic services when Greensboro TRACON is closed.

## **2.10 AIRPORT INFRASTRUCTURE**

The facility requirements and development alternatives to be created as a component of this study are partially dependent upon the airport's ability to provide the essential utilities to service the area. During a site visit conducted early in this study, it was noted that a number of electrical, drainage, sanitary sewer, and water lines are available to the many structures located on airport property. These utilities currently provide service to the various terminal and hangar facilities that are located along N. Liberty St. However, additional utilities currently support the midfield development area which includes the ARFF, maintenance, and Heritage FBO facilities. Since these areas include the most realistic development areas for future airport expansions, it is assumed that obtaining the services necessary to support future development is a non-development consideration. Conversely, any proposed development located east of Runway 15-33 would likely incur additional infrastructure costs in order to run utilities to this area.





## **2.11 ENVIRONMENTAL OVERVIEW**

An environmental overview was conducted as part of this Master Plan Update study in an effort to identify environmental considerations that could affect future airport development. This overview was based on a review of available resource materials and literature, which included the following:

- United States Environmental Protection Agency (USEPA) Green Book of Non-attainment Areas for Criteria Pollutants;
- U.S. Census Bureau, American Fact Finder database;
- United States Fish and Wildlife Service (USFWS) Endangered Species Program;
- United States Department of Agriculture, Natural Resources Conservation Service, Web Soil Survey, Hydric Rating by Map Unit - Forsyth County, North Carolina;
- Federal Emergency Management Agency (FEMA) digital 100-year floodplain mapping;
- NC One Map, Geographic Data Serving a Statewide Community;
- North Carolina Department of Environment and Natural Resources (NCDENR) Data, Statistics, Reports, and Maps;
- North Carolina Natural Heritage Program Element Occurrence database; and,
- Environmental FirstSearch Report of known hazardous material sites.

Although this overview does not constitute an Environmental Assessment (EA), as defined by the Federal Aviation Administration (FAA) Order 5050.4B, the information included in this chapter was collected based upon the guidelines set forth in that FAA Order, entitled National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions, which includes 23 categories of potential areas of impact that must be addressed in compliance with NEPA. These categories are:

- |   |  |
|---|--|
| 1. Air Quality  | 12. Floodplains                        |
| 2. Biotic Resources   | 13. Hazardous Materials                |
| 3. Coastal Barriers   | 14. Historic and Archaeological        |
| 4. Coastal Zone Management                                    | 15. Induced Socioeconomic              |
| 5. Compatible Land Use  | 16. Light Emissions and Visual Effects |
| 6. Construction   | 17. Noise                              |
| 7. Section 4(f)   | 18. Social Impacts                     |
| 8. Federally Listed Endangered and Threatened Species         | 19. Solid Waste                        |
| 9. Energy Supplies, Natural Resources, and Sustainable Design | 20. Water Quality                      |
| 10. Environmental Justice                                     | 21. Wetlands                           |
| 11. Farmlands   | 22. Wild and Scenic Rivers             |
|   | 23. Cumulative Impacts                 |

For the purpose of this overview, only the environmental categories that may be applicable to Smith Reynolds Airport are addressed, with the goal of identifying natural features that could be affected by development projects identified in this Master Plan Update study. Environmental





considerations identified on and adjacent to airport property are depicted on **Exhibit 2-11**. After specific projects are identified in the master planning effort, guidelines provided in FAA Order 1050.1E, *Environmental Impacts and Procedures*, will be used in determining the level of environmental documentation needed to satisfy the requirements of NEPA.

## Air Quality

The National Ambient Air Quality Standards (NAAQS) were established by the USEPA under the Clean Air Act (CAA) to protect public health, the environment, and the quality of life from the detrimental effects of air pollution. The NAAQS have been set for the following criteria pollutants: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), particulate matter (PM), and sulfur dioxide (SO<sub>2</sub>). The NAAQS primary standards that are to protect human health and the secondary standards that are to protect human welfare are listed in **Table 2-10**.

Table 2-10 National Ambient Air Quality Standards				
Pollutant	Standard			Type of Standard <sup>c</sup>
	Averaging Time	PPM <sup>a</sup>	µG/M <sup>3b</sup>	
Carbon monoxide (CO)	1-hour	35	-	Primary
	8-hour	9	-	Secondary
Lead (Pb)	Rolling 3-month average	-	0.15	Primary & Secondary
Nitrogen dioxide (NO <sub>2</sub> )	Annual mean	0.053	-	Primary & Secondary
	1-hour	0.100	-	
Ozone (O <sub>3</sub> )	8-hour	0.080 <sup>d</sup>	-	Primary & Secondary
Particulate matter (diameter less than/equal to 10 µm, PM <sub>10</sub> )	24-hour	-	150	Primary & Secondary
Particulate matter (diameter less than/equal to 2.5 µm, PM <sub>2.5</sub> )	24-hour	-	35	Primary & Secondary
	Annual mean	-	15	
Sulfur oxides (SO <sub>x</sub> )	1-hour	75PPB <sup>e</sup>	-	Primary
	3-hour	0.03	-	Secondary

Source: USEPA, Office of Air and Radiation, <http://www.epa.gov/air/criteria.html> (November 17, 2011).

<sup>a</sup>PPM = parts per million.

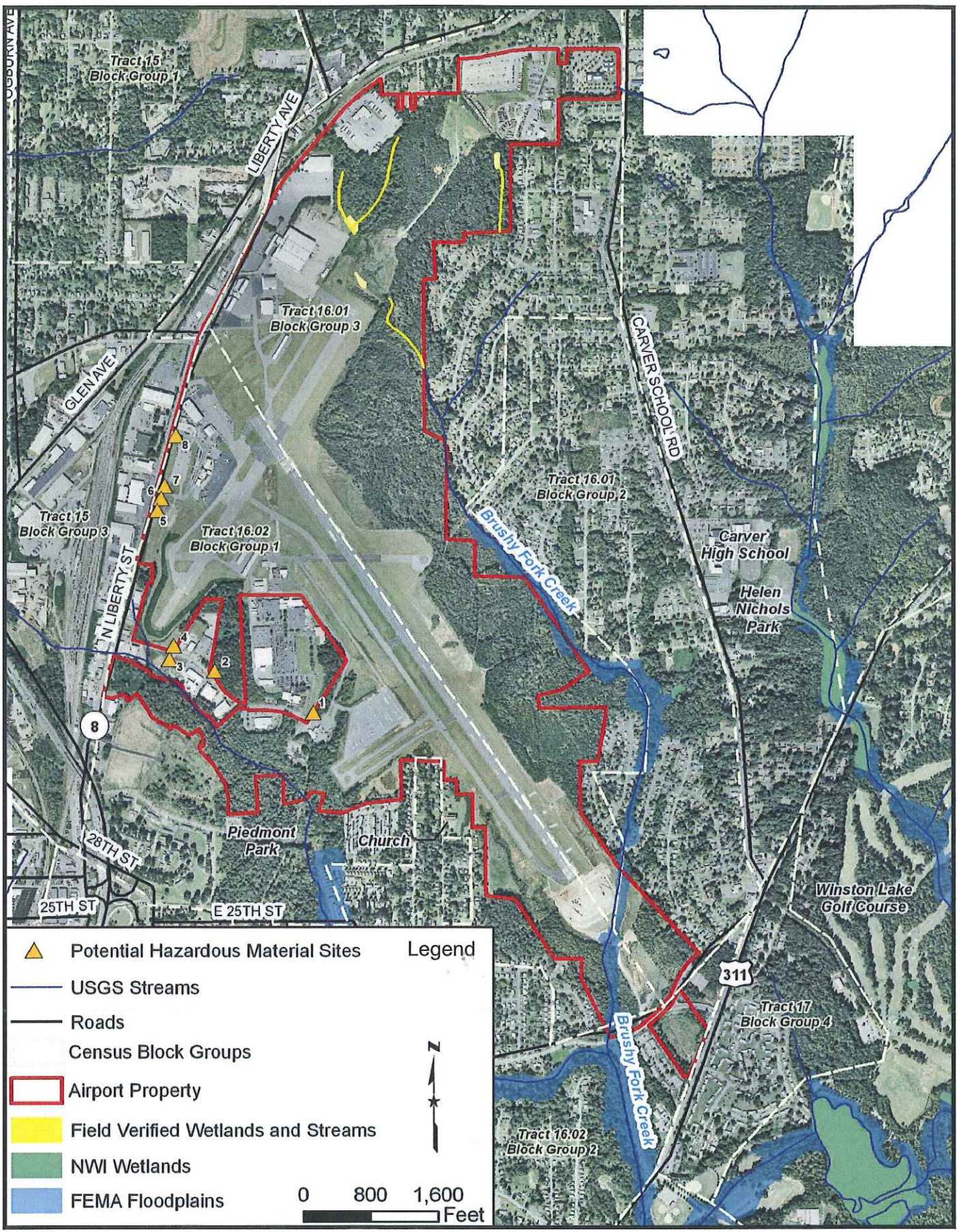
<sup>b</sup>µG/M<sup>3</sup> = micrograms per cubic meter.

<sup>c</sup>Primary standards are set to protect public health. Secondary standards are designed to protect public welfare.

<sup>d</sup>1997 standard currently in place, pending re-evaluation of the 2008 standard by USEPA.

<sup>e</sup>PPB = parts per billion.





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Sources of NAAQS Air Pollutant Emissions – Air pollutants at airports can be released by aircraft, ground support equipment, ground access vehicles, and stationary sources. An airport's configuration can factor into the amount of air emissions and construction activities also have the potential to release air pollutants into the environment.

Current Status of Air Quality Attainment in the Project Area – In accordance with the CAA, all portions of North Carolina are designated as in attainment, non-attainment, or unclassifiable for meeting NAAQS standards. An area with air quality that is better than NAAQS standards is considered to be in attainment, while an area with air quality that is worse than NAAQS standards is designated as being in non-attainment.<sup>1</sup> If there is a lack of information for determining an attainment status, the area is designated as unclassifiable. Each state determines which areas within its boundaries are designated to be in attainment or non-attainment, and must develop a State Implementation Plan to ensure that areas achieve and/or maintain attainment status for NAAQS standards.

The airport is located in Forsyth County, which although currently in attainment for all NAAQS criteria pollutants, is one of 18 North Carolina counties attaining the 1997 standard for ozone but violating the stricter 2008 standard of 0.075 ppm.<sup>2</sup> As part of a 2002 Early Action Compact Area, Forsyth County voluntarily implemented air pollution control strategies and was designated as in attainment for the 1997 ozone standard on April 15, 2008. This designation will remain valid until spring 2012 when the USEPA will issue final designations of attainment regarding the 2008 ozone standards. Based on USEPA recommendation documents from December 2011, it is anticipated that Forsyth County will remain in attainment under the 2012 designation.<sup>3</sup>

Section 176(c) of the CAA requires that proposed actions by federal agencies conform to their respective State Implementation Plans. An air quality analysis is required for proposed actions at commercial service airports with greater than 1.3 million enplanements or more than 180,000 general aviation/air taxi operations.<sup>4</sup> Although INT maintains a Class IV FAR Part 139 Airport Operating Certificate due to the existing level of activity by unscheduled large aircraft, the airport is designated as a general aviation airport by the National Plan of Integrated Airport Systems and experienced 2,387 total enplanements and 42,403 total operations in 2009.<sup>5</sup> Thus, Smith Reynolds Airport does not exceed the enplanement or operation thresholds and air quality analysis would not be required for construction of airport improvement projects.

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<sup>1</sup> USEPA, Office of Air and Radiation, "Cleaning Up Commonly Found Air Pollutants," (April 20, 2009).

<sup>2</sup> USEPA, Office of Air and Radiation, "Air Quality Information," (April 20, 2009).

<sup>3</sup> USEPA, "Area Designations for 2008 Ground-level Ozone Standards,"

<http://www.epa.gov/ozonedesignations/2008standards/rec/region4R.htm> (December 29, 2011).

<sup>4</sup> FAA, *Air Quality Handbook*, Figure 1, p. 8, (April 21, 2009).

<sup>5</sup> FAA, Terminal Area Forecast, December 2010.





## Compatible Land Use

Land use compatibility is evaluated in association with the development of noise contours in Chapter 6 of this Master Plan Update.

### Section 4(f)

Section 4(f) of the *Department of Transportation Act of 1966* provides protection to publicly owned parks, recreation areas, wildlife and waterfowl refuges, and historic sites. Under Section 4(f), properties must not be impacted unless no prudent and feasible alternative exists and efforts to minimize impacts to the property are completed. Based on the desktop review of available sources, nearby public parks and recreation areas include: Piedmont Park located just southwest of the airport; Helen Nichols Park located approximately 0.53 mile northeast of the airport, adjacent to Carver High School; and Winston Lake Golf Course located approximately 0.33 mile southeast of Runway 33, just east of U.S. Route 311.

## Federally Listed Endangered and Threatened Species

Pursuant to Section 7 of the *Endangered Species Act* and the *Bald and Golden Eagle Protection Act*, a literature search was conducted to determine if any federally protected species are known to exist in the vicinity of the airport. **Table 2-11** is the USFWS list of protected species that are known to occur or possibly occur in Forsyth County.

Common Name	Scientific Name	Status	Occurrence
Bog turtle	<i>Glyptemys muhlenbergii</i>	Threatened (S/A)	Current
Red-cockaded woodpecker	<i>Picoides borealis</i>	Endangered	Historical
Small-anthered bittercress	<i>Cardamine micranthera</i>	Endangered	Historical

*Notes: Threatened (S/A) = Threatened due to similarity of appearance; Current = the species has been observed in Forsyth County within the last 50 years; Historical = The species was last observed in Forsyth County more than 50 years ago.*  
*Sources: USFWS, Endangered Species, Threatened Species, Federal Species of Concern, and Candidate Species, Forsyth County, North Carolina, September 22, 2010, <http://www.fws.gov/nc-es/es/cntylist/forsyth.html> (December 29, 2011)*  
*The North Carolina, Natural Heritage Program database, updated on April 23, 2010, <http://149.168.1.196/nhp/quad> (December 29, 2011).*

The North Carolina Natural Heritage Program's (NCNHP) online database was accessed to obtain more specific occurrence information for the species listed by the USFWS. This database provides online maps and/or lists of the rare species that fall within each county. Based on information from the NCNHP, there are known occurrences of three federally protected species within Forsyth County; two occurrences are classified as historical (observed over 50 years ago) and one is classified as current (observed within the last 50 years). Of these three known occurrences, one (the bog turtle) is located on the Winston-Salem East U.S. Geological Survey (USGS) 7.5-minute quadrangle map. Although the specific site location is not available to the public on the NCNHP website, this same quadrangle contains the airport also. However, the bog turtle in North Carolina is listed due to similarity of appearance with the northern population of



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bog turtle found in New York and Massachusetts, south to Maryland. The southern population of bog turtle found in North Carolina is not considered biologically threatened and is not subject to consultation under Section 7 of the *Endangered Species Act*.<sup>6</sup>

As shown in **Exhibit 2-11**, existing airport property contains undeveloped areas and a perennial stream (Brushy Fork Creek) that have the potential to contain suitable habitat for protected species. Coordination with the USFWS regarding the need to survey for protected species or potentially suitable habitat should be completed prior to construction of airport improvements.

## Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, requires federal agencies to identify community issues of concern during the NEPA planning process, particularly those issues relating to decisions that may have a disproportionate impact on low-income or minority populations. To determine if there were higher concentrations of environmental justice populations in the vicinity of Smith Reynolds Airport, socioeconomic data was evaluated (refer to **Table 2-12**). The percentage of low-income and minority populations in Forsyth County were used as thresholds for identifying environmental justice populations.

There are several residential areas located adjacent to the airport property. The 2000 United States Census Data was used at the Block Group (BG) level for determining population and housing characteristics in the vicinity of the airport. A BG is the smallest geographic division that is used by the United States Census Bureau to categorize data.<sup>7</sup> The airport is located within Census Tract (CT) 16.01 BG 3 and CT 16.02 BG 1 (refer to **Exhibit 2-11**). The demographic and housing characteristics of the population in the BGs adjacent to the airport, including CT 15 BGs 1 and 3, CT 16.01 BG 2, CT 16.02 BG 2, and CT 17 BG 4 (refer to **Exhibit 2-11**), are also included in **Table 2-12**.

CT 16.01 BG 3 and CT 16.02 BG 1, which contain the airport property, have a total population of 874 and 1,886 people, with 96.5 and 96.2 percent being African American, respectively. The percentage of the population living below the poverty level in these same two BGs is 10.0 and 50.3, respectively. Comparatively, African Americans comprise 25.6 percent of the total population of Forsyth County, and 10.7 percent of the County's total population lives below poverty level. As shown in **Table 2-12**, each of the adjacent BGs, with the exception of CT 16.01 BG 2, would exceed both the minority and poverty level percentages for Forsyth County. CT 16.01 BG 2 falls below the County threshold of 10.7 percent living below poverty level with only 5.1 percent. Notably, although at 17.4 percent CT 17 BG 4 falls below the County threshold of 25.6 percent African-American population, the percent for Other Races in CT 17 BG 4 is 53.8 percent and far exceeds the County's threshold of 3.1 percent for this category. Since each block group surrounding the airport contains environmental justice populations,

<sup>6</sup> USFWS, <http://www.fws.gov/nc-es/es/cntylist/forsyth.html> (December 29, 2011).

<sup>7</sup> United States Census Bureau, "Glossary," (May 9, 2009).



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future projects at the airport will need to be evaluated to determine if there are disproportionate impacts to these populations.

Table 2-12 Select Population and Housing Characteristics in the Airport Vicinity									
Category	CT 15		CT 16.01		CT 16.02		CT 17	Forsyth County	North Carolina
	BG 1	BG 3	BG 2	BG 3 <sup>c</sup>	BG 1 <sup>c</sup>	BG 2	BG 4		
<b>POPULATION AND RACE</b>									
Total Population	1,861	1,082	1,291	874	1,886	1,541	1,445	306,067	8,049,313
Percent White	39.3	40.4	0	3.5	2.3	0.5	21.3	68.5	72.1
Percent Black	53.6	45.2	98.4	96.5	96.2	99.0	17.4	25.6	21.5
Percent AIAN <sup>a</sup>	0	0.7	0	0	0	0	1.3	0.3	1.3
Percent Asian	0	0	0	0	0	0	0	1.1	1.4
Percent NHOPi <sup>b</sup>	0	0	0	0	0	0	0	0.03	0.1
Percent Other	6.3	5.7	1.6	0	1.4	0.5	53.8	3.1	2.3
Percent Two or More Races	0.8	8.0	0	0	0	0	6.2	1.4	1.4
<b>AGE, HOUSEHOLD SIZE, AND INCOME</b>									
Median Age	29.7	31.8	44.8	43.5	23.0	42.5	23.4	35.3	36.0
Average Household Size	2.87	2.81	2.49	2.43	2.66	2.24	4.02	2.49	2.39
Median Household Income (in dollars)	22,837	26,779	38,529	51,250	15,051	22,813	28,906	42,097	39,184
Percent Below Poverty Level	36.9	25.9	5.1	10.0	50.3	24.9	31.4	10.7	11.9
<b>HOUSING CHARACTERISTICS</b>									
Median Home Value (in dollars)	62,200	57,700	75,000	77,200	47,900	53,900	88,600	108,900	95,800
Number of Housing Units	699	390	570	355	863	770	387	133,093	3,523,944

<sup>a</sup>AIAN – American Indian and Alaskan Native

<sup>b</sup>NHOPi – Native Hawaiian or Other Pacific Islander

<sup>c</sup>Includes the airport.

Notes: CT – Census Tract; BG – Block Group

Source: United States Census Bureau, 2000 Census: Summary File 3.





## **Farmlands**

According to the Farmland Protection Policy Act (FPPA P.L. 97-98), lands already committed to urban development such as the airport, do not meet the definition of prime or unique farmlands. Therefore, no additional analysis was necessary as a part of this effort.

## **Floodplains**

According to Executive Order 11988, *Federal Floodplain Management*, agencies must reduce the risk of flood loss, minimize the impacts of floods on human safety, health, and welfare, and restore and preserve the natural and beneficial values served by floodplains. The 100-year floodplain is the area adjacent to any particular waterway that would be inundated by the base flood, which is an event that has a one-percent chance of occurring in any given year. Federal regulations permit development in the 100-year floodplain if it is demonstrated through a hydraulic analysis that the development would meet the requirements set forth by FEMA. Filling within the floodplain is discouraged, because it removes floodwater storage capacity.

Information on the floodplains in the vicinity of the airport was obtained from the FEMA Flood Insurance Rate Maps. As indicated on **Exhibit 2-11**, 100-year floodplains are associated with Brushy Fork Creek to the southeast of the airport and an unnamed tributary to Brushy Fork Creek southwest of the airport. Brushy Fork Creek crosses the Runway Safety Area (RSA) on the south end of Runway 15/33, approximately 766 feet from the edge of pavement. The floodplains associated with this portion of Brushy Fork Creek are approximately 251 feet wide at their widest point, but average approximately 145 feet wide. Projects that would require the placement of fill within the 100-year floodplain should be avoided or potential impacts minimized.

## **Hazardous Materials**

Hazardous waste sites are regulated by the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA). In general, hazardous materials include substances that, because of their quantity, concentration, physical, chemical, or infectious characteristics, may present substantial danger to public health or welfare, or to the environment, when released or otherwise improperly managed.<sup>8</sup>

A regulatory records search was performed by a specialized commercial vendor to identify known or potential hazardous material sites, hazardous waste generators, and hazardous material users. As listed in **Table 2-13**, and as depicted on **Exhibit 2-11**, the records search identified eight potentially hazardous material sites located within one half-mile radius of the airport.

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<sup>8</sup> RCRA Subtitle C, 40 CFR Part 251.





**Table 2-13**  
**Potentially Hazardous Material Sites in the Airport Vicinity**

Site No.	Name	Location from Airport	Database
1	B/E Aerospace, Inc.	0.30 mile southwest	RCRA TSD and COR, STATE, LUST
2	Forsyth County Garage	0.38 mile southwest	LUST
3	Wachovia Oil Company	0.45 mile southwest	LUST
4	Sun Chemical Specialty Tanks	0.46 mile southwest	LUST, NFRAP, Brownfield, STATE
5	Hertz Rental Car	0.49 mile northwest	LUST
6	Lowe's-Liberty Street	0.49 mile northwest	LUST
7	Airport Exxon	0.50 mile northwest	LUST
8	Piedmont Hawthorne	0.52 mile northwest	STATE

*RCRA TSD and COR = Resource Conservation and Recovery Information System – Required Corrective Action, Transport, Storage and Disposal, Large Quantity Generators; STATE = NCDENR file; LUST = Leaking Underground Storage Tank; Brownfield = Brownfields Property Reuse Act.*

*Source: Environmental FirstSearch Technology Corporation, Job Number: PL725001-03, September 3, 2009*

With the exception of B/E Aerospace, Inc., the potential sites are categorized as low risk. The B/E Aerospace manufacturing facility is classified as a large quantity generator, with over 1,000 kilograms (2,205 pounds) of hazardous waste generated per month. The facility received seven citations from NCDENR between 2001 and 2004, with an initial compliance order issued in April of 2005.

Piedmont Hawthorne is the only potentially hazardous material site identified in the airport vicinity that is not located down gradient from the airport.

### **Historic and Archaeological**

Section 106 of the National Historic Preservation Act, Protection of Historic and Cultural Resources, requires agencies to consider the effects of their actions on sites listed on the National Register of Historic Places (NRHP) and sites that are eligible for listing. Historic and archaeological sites, including structures such as houses, churches, monuments, and cemeteries, as well as prehistoric sites, should be avoided wherever possible when constructing or performing improvements at airports. In addition, sites not formally eligible for listing and sites discovered during planning or construction of a project should also be considered.

The National Park Service's National Register Information System database, the National Register of Historic Places, and the North Carolina Office of State Archaeology contain records of documented historic and archaeological resources listed on or eligible for listing on the NRHP. A preliminary review of these sources indicates that there are no known properties recorded in the National Register of Historic Places within or near the airport.

Although no historical or archaeological sites listed on the NRHP are known within airport property, an archaeological field survey for potentially eligible NRHP sites may need to be performed by qualified personnel prior to construction of a specific improvement project and should be coordinated with the North Carolina Department of Cultural Resources, State Historic Preservation Office (SHPO).





## **Induced Socioeconomic**

Induced socioeconomic impacts could result from airfield improvement projects, as local retailers and commercial establishments could directly benefit, particularly those providing construction equipment and materials. Although no appreciable changes in local population or employment patterns are anticipated, airport improvements could have a positive effect on industrial/commercial development in the vicinity of the airport.

## **Light Emissions and Visual Effects**

Due to the residential development adjacent to the airport, it will be necessary to evaluate potential sources of annoyance to nearby residents. Preventative measures should be taken during the design and construction of future projects to minimize light annoyances and visual impacts to nearby residential areas.

## **Noise**

Generation of noise contours and evaluation of land use compatibility will be completed in Chapter 6 of this Master Plan Update.

## **Social Impacts**

Due to the dense residential development that exists adjacent to INT, future land acquisition could result in impacts to the “human environment.” Proposed future land acquisition would require evaluation of potential social impacts including: effects on health and safety risks to children and socioeconomic impacts, such as residential and business relocations, disruption of established communities, and changes in local population or employment patterns.

## **Water Quality**

The airport is located in the Yadkin-Pee Dee River Basin, Yadkin River Headwaters, 8-digit sub-basin 03040101.<sup>9</sup> Under the CWA, states are required to record the condition of surface waters in their respective jurisdictions by Section 305(b) and Section 303(d) documentation. The Section 305(b) documentation serves to evaluate the extent to which surface waters are supporting their designated uses for categories such as drinking water supply, aquatic life, recreation use, and fish consumption. NCDENR produces a Watershed Water Quality Assessment (WWQA) to meet the requirement under Section 305(b), with each basin in the state having an updated WWQA produced every five years. The most recent WWQA for the Yadkin-Pee Dee Basin was published in 2007.

The Section 303(d) documentation is a comprehensive list of impaired water bodies that do not support their designated use classifications. The NCDENR develops this priority list of water bodies, which includes those that do not meet state water quality standards after the application

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<sup>9</sup> NCDENR, Division of Water Quality, Yadkin-Pee Dee River Basin, Ambient Monitoring System Report, January 1, 2002 through December 31, 2006.





of required controls for point and non-point source pollutants, as well as priority water bodies to which the NCDENR can direct its attention when developing required controls such as Total Maximum Daily Loads (TMDLs).<sup>10</sup> NCDENR evaluates surface waters based upon a permanent monitoring network of water quality sampling stations located throughout each watershed. The closest monitoring station to the airport is located approximately 3.2 miles south/southeast on Salem Creek. Based on information from the WWQA and the Draft 2008 303(d) List, Brushy Fork Creek is not listed as an impaired stream. However, water quality at station 12-94-12-(4) on Salem Creek is considered “impaired” for aquatic life uses due to the criteria for biological integrity not being met.<sup>11</sup> Biological integrity data are objective measurements typically involving aquatic insects, fish, or algae communities.

A National Pollutant Discharge Elimination System (NPDES) permit (or modification of an existing NPDES permit) may be required for the stormwater run-off associated with construction of airport improvement projects.

## **Wetlands**

Executive Order 11990, Protection of Wetlands, requires federally supported projects to preserve wetlands and to avoid and minimize wetland impacts to the maximum extent practicable. An on-site determination of jurisdictional waters of the United States, including wetlands and streams, was conducted by the U.S. Army Corps of Engineers (USACE) and the NCDENR for the northern portion of INT in October 2008. National Wetland Inventory (NWI) mapping from the USFWS and the Web Soil Survey from the U.S. Department of Agriculture, Natural Resources Conservation Service were used to identify potential wetlands and other jurisdictional waters of the United States on the remainder of airport property.

As a result of the on-site determination, three wetland areas and four segments of perennial stream were determined to be jurisdictional waters of the United States (refer to **Exhibit 2-11**). A portion of the stream in this area, northeast of Runway 4-22, is piped and not considered jurisdictional.

The only wetlands identified on the NWI map are located east of airport property. Prior to construction activities, however, the southern portion of airport property that was not included in the October 2008 on-site determination should be field verified regarding the presence of jurisdictional wetlands, especially along Brushy Fork Creek and its tributaries. If jurisdictional wetlands are identified, a delineation may be required to determine the limits of each wetland and to assess the ecological quality and function of each area. If jurisdictional wetlands are identified on site, coordination with the USACE would be necessary prior to any filling, clearing, dredging, or land altering activities that may affect wetlands.

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<sup>10</sup> NCDENR, Draft 2008 303(d) List – Integrated Report Category 5 Version -20080107, p. 86.

<sup>11</sup> Ibid.