CHAPTER 1

INVENTORY OF EXISTING CONDITIONS

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Introduction

The inventory chapter of a master plan describes existing conditions at an airport and its surrounding environment. The inventory provides a baseline for analysis that is compared to anticipated aviation activity to determine how to best accommodate the future needs of Sioux Falls Regional Airport - Joe Foss Field (also referred to as "FSD" or "Airport" throughout this document). Information on FSD is presented in the following sections:

- **Airport Background**
- **Referenced Plans and Resources**
- **Airside Facilities**
- **Landside Facilities**
- **Airspace**
- **Airport Zoning**
- **Constraints and Opportunities**
- **Inventory Summary**

1.1 Airport Background

Airport background information helps establish context for an airport's regional setting, influence, contributions, and significance. The following sections summarize the history of FSD, describe its location, climate, and environmental conditions, such as topography and soils, and identify airport management and major operators.

1.1.1 Airport Location

FSD is a public-use airport located in the City of Sioux Falls, South Dakota. Sioux Falls is the county seat of Minnehaha County in southeastern South Dakota, near the Tri-State Marker of Iowa, Minnesota, and South Dakota (**Figure 1-1: Airport Location Map**). FSD's terminal is approximately two miles north of downtown Sioux Falls and three miles southeast of the junction of Interstate 29 and Interstate 90. (**Figure 1-2: Vicinity Map**). FSD has a property footprint of approximately 1,600 acres.

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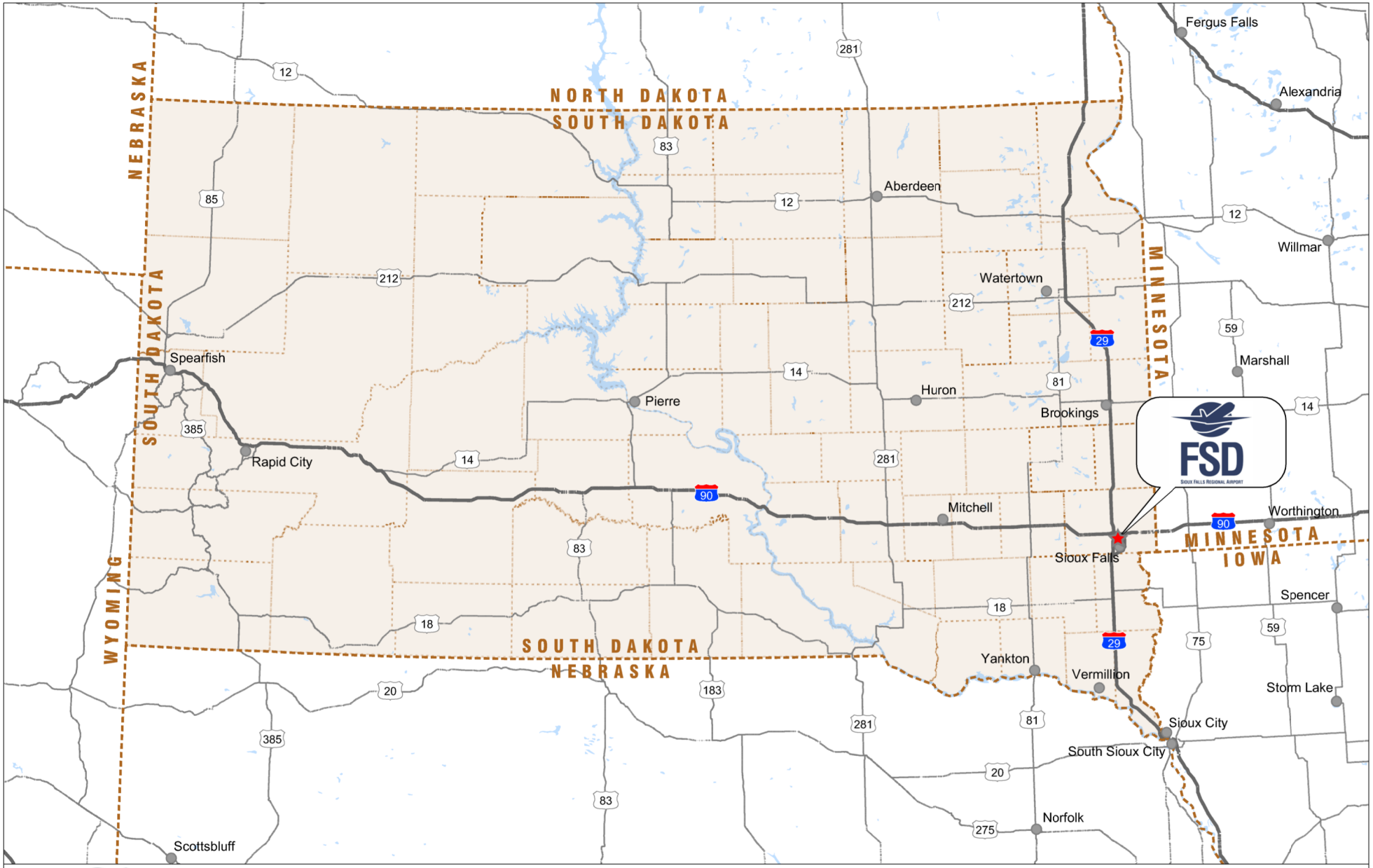

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AIRPORT LOCATION MAP

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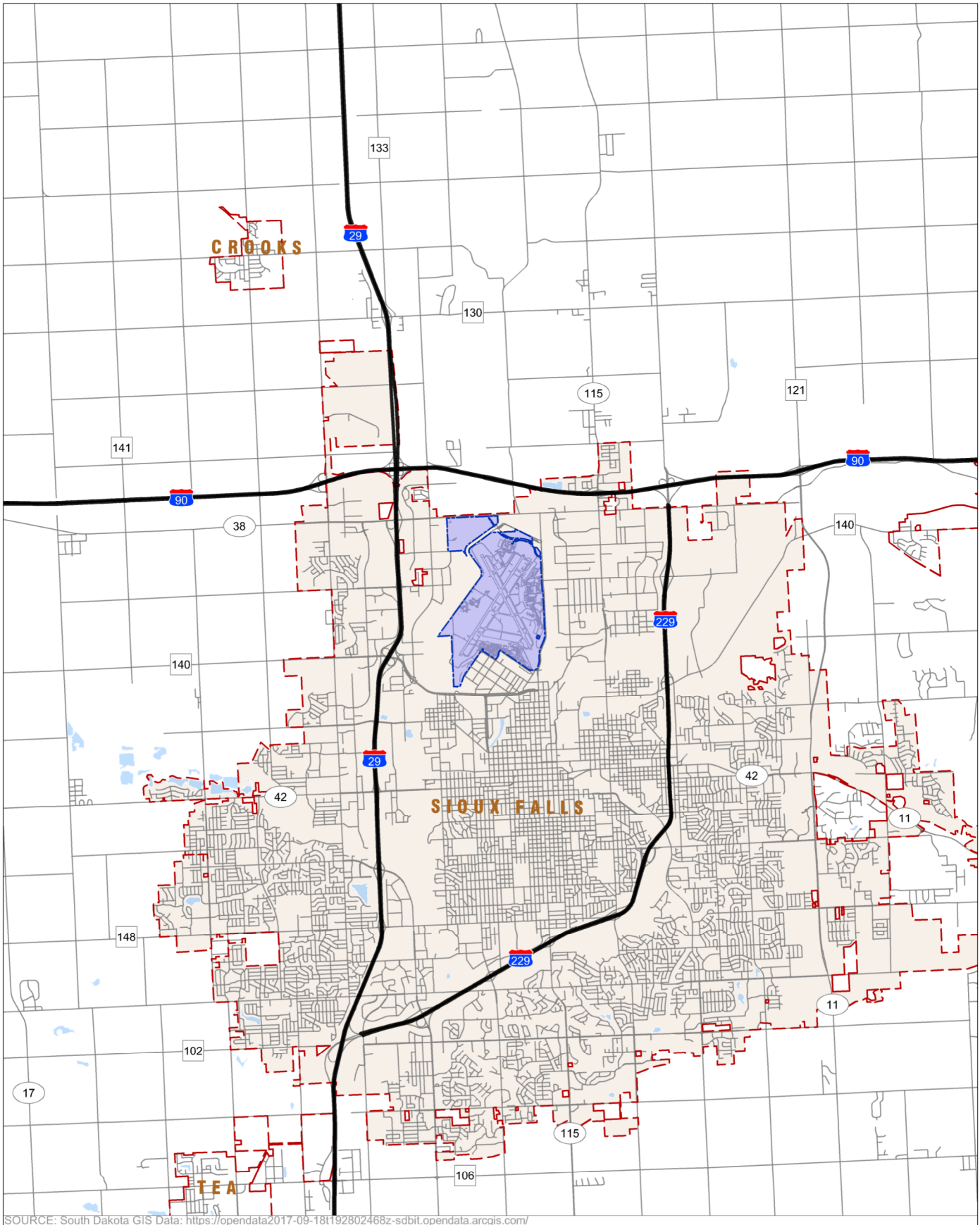
FIGURE 1-1



SOURCE: South Dakota GIS Data: https://opendata2017-09-18t192802468z-sdbit.opendata.arcgis.com/

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VICINITY MAP

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FIGURE 1-2

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The airport is surrounded by various types of development (**Figure 1-3: Zoning Map**). Property north of FSD is less developed while the areas to the south and east are fully developed. Property to the west of FSD is being rapidly developed by Sanford Health.

1.1.2 Airport History

Sioux Falls Regional Airport was first established in 1937 as a civilian airport, following the 1936 purchase of 320 acres of Sioux Falls Water Department Land. Using a grant of $165,000 from the Works Progress Administration, the airport was built with a single hangar and terminal and was dedicated in September 1939 as the Sioux Falls Municipal Airport. With the United States' entry into WWII, the U.S. Government leased the airfield from the City of Sioux Falls and used it as Sioux Falls Army base, where the army trained approximately 40,000 radio operators between 1942 and 1945. The army base occupied land on the south side of the airfield where the South Dakota Air National Guard facilities and the adjacent industrial park currently reside.

Upon its return to civilian use in 1947, the Airport continued in its previous role as a passenger, mail, and cargo gateway to the region. The airport is named after Joseph J. Foss, a Marine Naval Aviator Ace who served as the 20th Governor of South Dakota, as well as a brigadier general in South Dakota's Air National Guard. Born in Sioux Falls in 1915, he was a decorated WWII pilot, receiving the Medal of Honor and a Distinguished Flying Cross for his service at Guadalcanal.

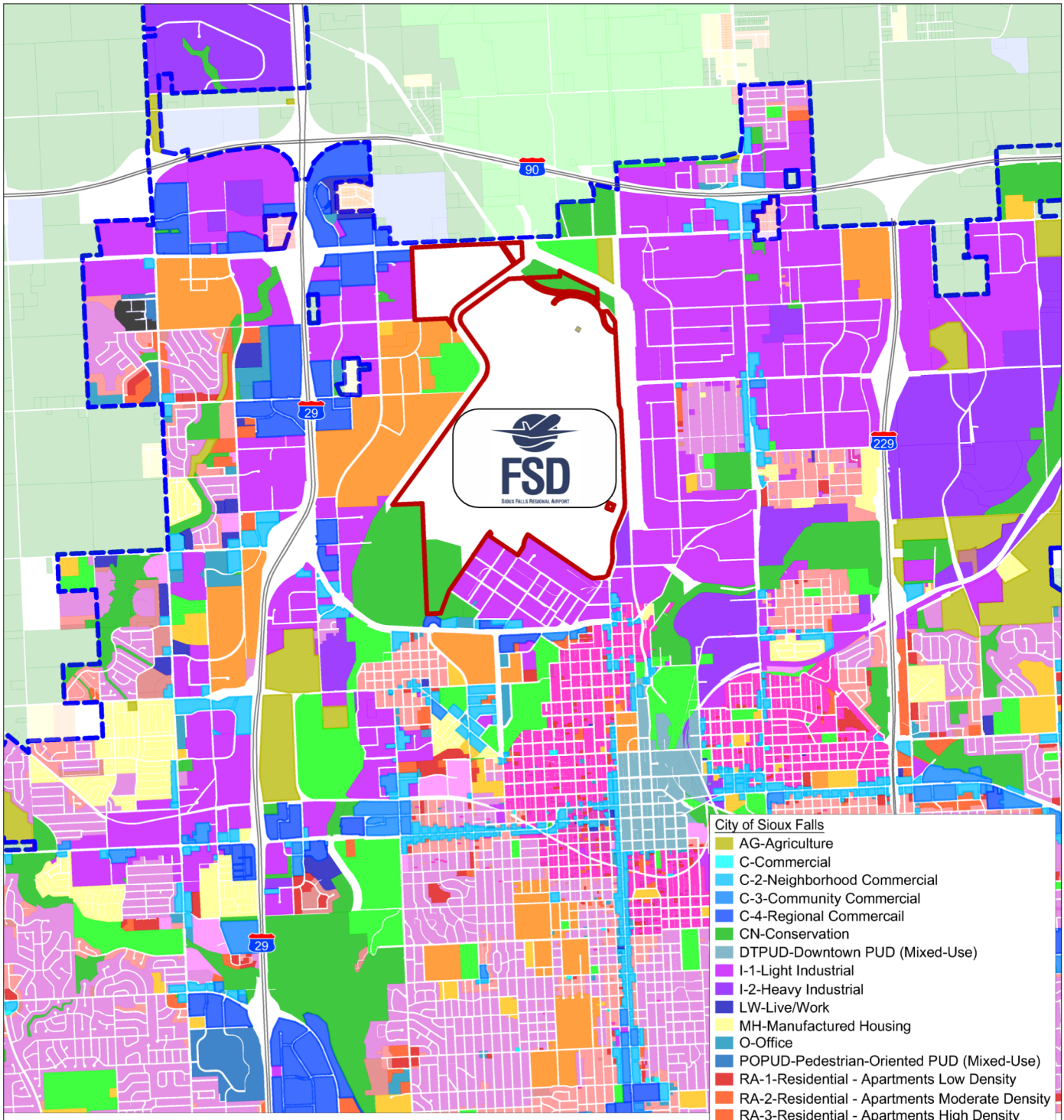
1.1.3 Climate, Topography, and Soils

Sioux Falls has a continental climate with four distinct seasons, ranging from cold, dry winters to warm, semi-humid summers. July is typically the hottest month with an average high temperature of 85.3°F and a low temperature of 63.4°F. January is typically the coldest month with an average high temperature of 27.2°F and low temperature of 8.2°F. Sioux Falls averages 28.5 inches of rain per year according to the National Centers for Environmental Information. Snowfall occurs mostly in light to moderate amounts during the winter, totaling approximately 45 inches on average. The field elevation at FSD is 1,430 feet above mean sea level (MSL).

Sioux Falls is in the Big Sioux River Valley in southeast South Dakota. The area is surrounded by gently rolling terrain. Flooding from melting snow runoff in the spring along the Big Sioux River and Skunk Creek is reduced by a diversion canal around the city. USDA Soil Survey data indicates airport property consists of approximately 85 percent silty clay and 15 percent loam. Both classifications are considered prime farmland if drained.

1.1.4 Demographics

The 2020 population of Sioux Falls was 192,517 per the 2020 U.S. Census. Population within the Sioux Falls Metropolitan Statistical Area (MSA), which includes four counties surrounding Sioux Falls was 276,730 in 2020, an increase of approximately 21 percent since 2010. This compares to roughly 9 percent statewide growth and 7.4 percent national population growth from 2010 to 2020.



City of Sioux Falls
- AG-Agriculture
- C-Commercial
- C-2-Neighborhood Commercial
- C-3-Community Commercial
- C-4-Regional Commercail
- CN-Conservation
- DTPUD-Downtown PUD (Mixed-Use)
- I-1-Light Industrial
- I-2-Heavy Industrial
- LW-Live/Work
- MH-Manufactured Housing
- O-Office
- POPUD-Pedestrian-Oriented PUD (Mixed-Use)
- RA-1-Residential - Apartments Low Density
- RA-2-Residential - Apartments Moderate Density
- RA-3-Residential - Apartments High Density
- RCD-Residential Cluster Development (PUD)
- RD-1-Residential - Single And Twin
- RD-2-Residential - Suburban Townhome
- REC-Recreational
- RR-Rural Residential
- RS-Single Family Residential - Suburban
- RT-1-Single Family Residential - Traditional
- RT-2-Residential - Traditional Townhome
- S-1- General Institutional
- S-2-Campus Institutional (PUD)
- VPUD-Village PUD (Mixed-Use)

Minnehaha County
- A1-Agriculture
- C-Commercial
- I-1-Light Industrial
- PD-Planned Developement
- RC-Recreation and Conservation
- RR-Rural Residential
- RS-1-Residential District
- RS-2-Residential District

Legend
- Airport Property
- City of Sioux Falls

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SOURCE: dataworks.siouxfalls.org

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ZONING MAP

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FIGURE 1-3

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The unemployment rate of the Sioux Falls MSA was 2.4 percent as of August 2021, slightly lower than the statewide rate of 2.8 percent and the national rate of 4.6 percent. Unemployment in Sioux Falls has historically been lower than statewide and national figures. Health care, retail trade, financial sectors, and manufacturing make up the majority of employers in the Sioux Falls area.

According to the U.S. Bureau of Economic Analysis, per capita personal income (PCPI) for the Sioux Falls Metropolitan Statistical Area was $67,117 in 2020, higher than the statewide average ($59,281) and national average ($59,450). The aviation forecast chapter contains additional demographic and socioeconomic data along with future growth projections.

1.1.5 Airport Management and Operations

The Sioux Falls Regional Airport Authority is an independent governing body that has overall responsibility for the administration, development, and operations of the Sioux Falls Regional Airport. The Sioux Falls Regional Airport Authority was created in May 1986, replacing the Sioux Falls Airport Board, which reported to the City Council. The Airport Authority Board consists of five members, each appointed to a five-year term by the Sioux Falls mayor and approved by the City Council. The Airport Authority is self-funded and does not rely on tax dollars from the community. The Airport Authority Commissioners select the Executive Director and Deputy Director who carry out the Airport's day-to-day operations and administration. Additional Airport Authority staff members include various operations, maintenance, and administrative personnel.

1.1.6 Major Airport Operators

FSD serves a variety of user types, including air carriers, commercial passengers, cargo operators, General Aviation (GA) and recreational users, corporate users, the South Dakota Air National Guard (SDANG) and South Dakota Army National Guard (SDARNG), fixed-base operators (FBOs), specialized aviation service operators (SASOs), concessionaires, rental car companies, and air medical operators. Each type of user has unique needs that should be considered during the development of the Master Plan. More information about these users, their operations, and physical location at FSD is included in later sections of this chapter.

1.1.7 Based Aircraft and Operations

There are 111 aircraft based at FSD according to FAA Form 5010-1 Airport Master Record data. To be considered a "based aircraft," aircraft must be operational and air worthy and based at FSD for a majority of the year. Of the 111 based aircraft, 18 are military (F-16s). The remaining 93 civilian aircraft are comprised of 55 single-engine, 34 multi-engine, and 4 jet aircraft. Airport Master Record data indicates approximately 67,000 operations (takeoffs or landings) occur at FSD annually. Approximately 52 percent of operations are air carrier or air taxi, 41 percent are general aviation, and 7 percent are military. More details on based aircraft, operations, and other activity metrics are provided in the following chapter.

1.2 Referenced Plans and Resources

This section summarizes federal, state, local and Airport resources that provide baseline information for this Master Plan.

1.2.1 National Plan of Integrated Airport Systems (NPIAS)

The NPIAS is a report the Federal Aviation Administration (FAA) submits to Congress every two years. The report lists and categorizes airports that are integral to the national air transportation network. Airports may be included in the NPIAS if they meet certain location and size criteria. Upon inclusion, they are eligible for development grants under the FAA's Airport Improvement Program (AIP). The NPIAS describes the roles of included airports and provides an overview of the types of eligible AIP development projects and budgeted federal funding over the next five years. The 2021-2025 NPIAS identifies 3,304 public-use airports and 6 proposed airports that contribute to the national air transportation system, which is about 65 percent of the 5,080 total U.S. public-use airports and 17 percent of the 19,636 total U.S. airport facilities.
FSD is one of 58 airports in South Dakota included in the NPIAS and is classified as a Small Hub Primary Commercial Service airport. Primary Commercial Service airports are defined as public airports with scheduled passenger service serving more than 10,000 enplaned passengers per year. There are 398 airports nationwide that are categorized as Primary Commercial Service, of which 69 are Small Hub.

1.2.2 South Dakota State Aviation System Plan

The South Dakota Department of Transportation developed the South Dakota State Aviation System Plan (SDSASP). The SDSASP assesses the conditions and needs of the 56 public-use airports included in South Dakota's airport system and identifies the system's capability to meet existing and future demand. The SDSASP offers planning and development guidance based on an airport's role in the state system, and its categories differ from the categories in the NPIAS. The 2020 SDSASP categorizes FSD as a Commercial Service airport. This is defined as an airport that supports some level of scheduled commercial airline service in addition to a full range of GA aircraft. This includes both domestic and international destinations. The 2020 SDSASP also included an economic impact study that assessed the annual economic contribution of each individual airport and the South Dakota aviation system as a whole. FSD's economic impact was estimated at more than $400 million. The SDSASP forecasts growth in enplanements and commercial service operations based largely on the FAA's 2019-2039 FAA Aerospace Forecast. FSD-specific aviation activity forecasts are discussed in Chapter 2.

1.2.3 City of Sioux Falls – Comprehensive Plan

Sioux Falls has enjoyed continuous growth over the past century. To meet the demands of being one of America's fastest-growing cities, regional and local officials, as well as developers, have undertaken efforts to not only develop lands within city limits, but also develop greenfield sites in the surrounding counties, adjacent to the city limits. A notable area of development exists approximately two miles northwest of FSD at Foundation Park. This greenfield site, now zoned for heavy industrial use, has good highway and rail access, and promotes its proximity to the Airport. Current tenants include WinChill, Dakota Carriers, and Nordica. Additionally, an Amazon fulfillment center is slated to be finished in 2022 adding a projected 1,000 full-time jobs, along with a new CJ Foods processing center that will result in 600 projected new full-time jobs. FedEx is also building a large ground shipping facility on the development.

1.2.4 Previous FSD Planning Studies

The prior Master Plan (MP) and Airport Layout Plan (ALP) update for FSD began in 2013 and was completed in 2016. This study will be referenced during development of this MP/ALP update. Other studies completed for specific facilities (parking, passenger terminal, etc.) are also referenced.

1.2.5 Recent Capital Improvement Projects

Major airport improvements since 2014 are listed and depicted on **Figure 1-4: Recent Facility Improvements**. FSD has also renovated different spaces in the passenger terminal through $43 million in improvements including revitalized ticketing, concourse, dining, baggage claim, and checkpoint spaces.

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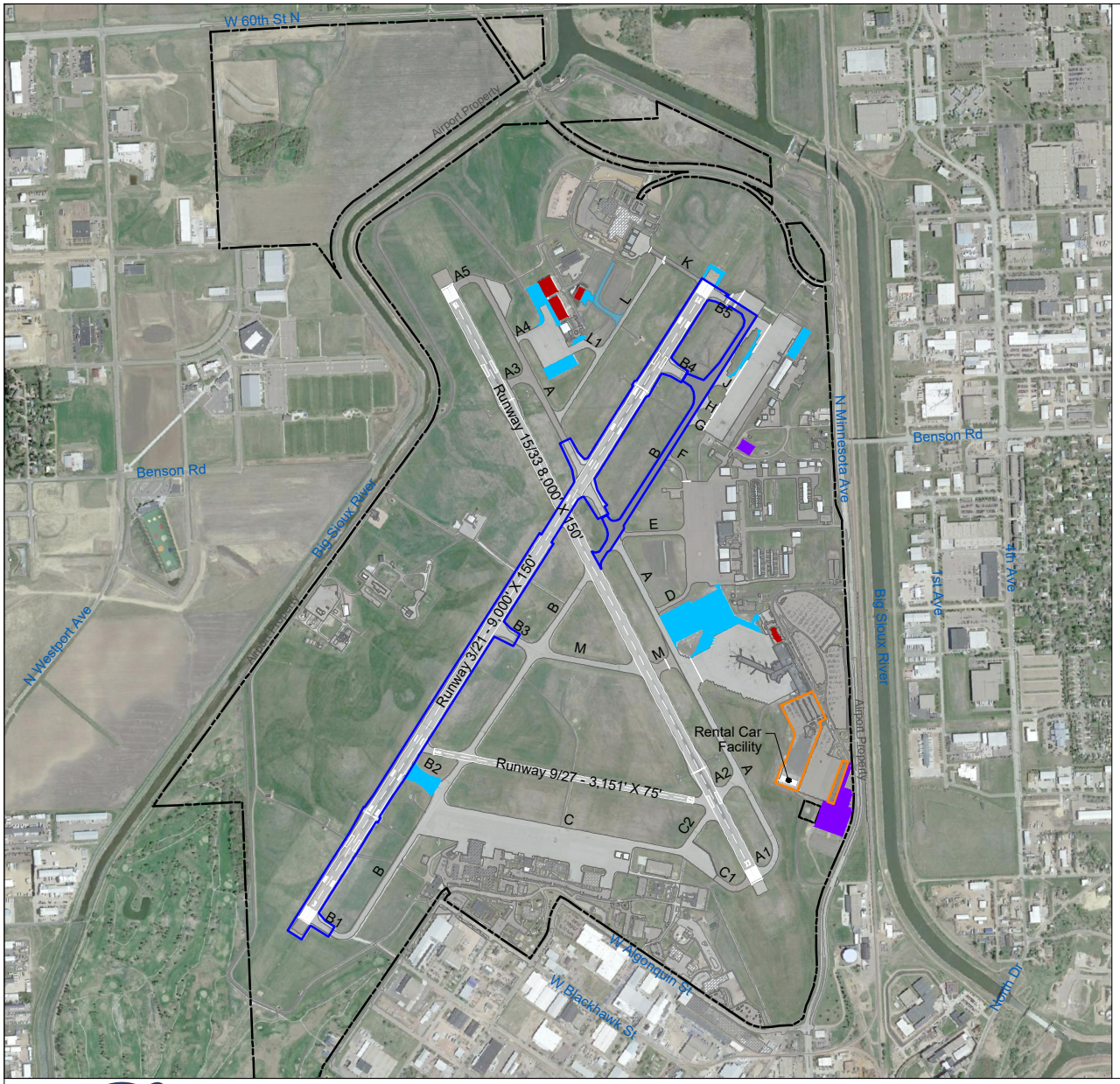
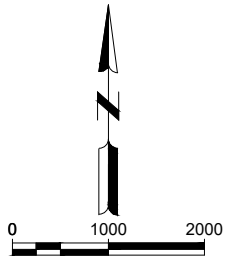


Airfield Improvements Since 2014	
	Pavement Maintenance and Shoulder Additions
	Landside Pavement Reconfiguration
	New Airside Pavement
	New Buildings
	New Landside Pavement

Major Projects 2015-2021

Year	Project
2015	Reconstruct/Rehab Taxiway B2
2015	Security Checkpoint/Main Lobby Expansion (Phase 1-3)
2016	Security Checkpoint/Main Lobby Expansion (Phase 4-5)
2019	Construct Baggage Claim/Handling Terminal Expansion
2020	Construct Rental Car Wash/Maintenance Facility
2020	Expand Economy Public Parking Lot (600 stalls)
2020	Construct Passenger Terminal Apron Expansion/RON/Deicing (Phase 1A)
2020	Rehabilitate East & West Cargo Apron & Taxiways G, H and J
2020	Construct West General Aviation Hangar Taxilanes
2021	Reconstruct Runway 3-21 (5,570') and paved shoulders
2021	Rehabilitate Taxiway A, B, K, A2; Reconstruct Taxiway B1, B3, B4, B5



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RECENT FACILITY IMPROVEMENTS

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FIGURE 1-4

1.3 Airside Facilities

This section discusses the various airside facilities necessary for aircraft movement (runways, taxiways, aprons, and other facilities). **Figure 1-5** depicts FSD's airfield facilities along with major functional areas (i.e., passenger terminal, East General Aviation, etc.). This section also discusses aircraft categories and design surfaces applicable to runways and other airside facilities.

1.3.1 Airport Design Classifications

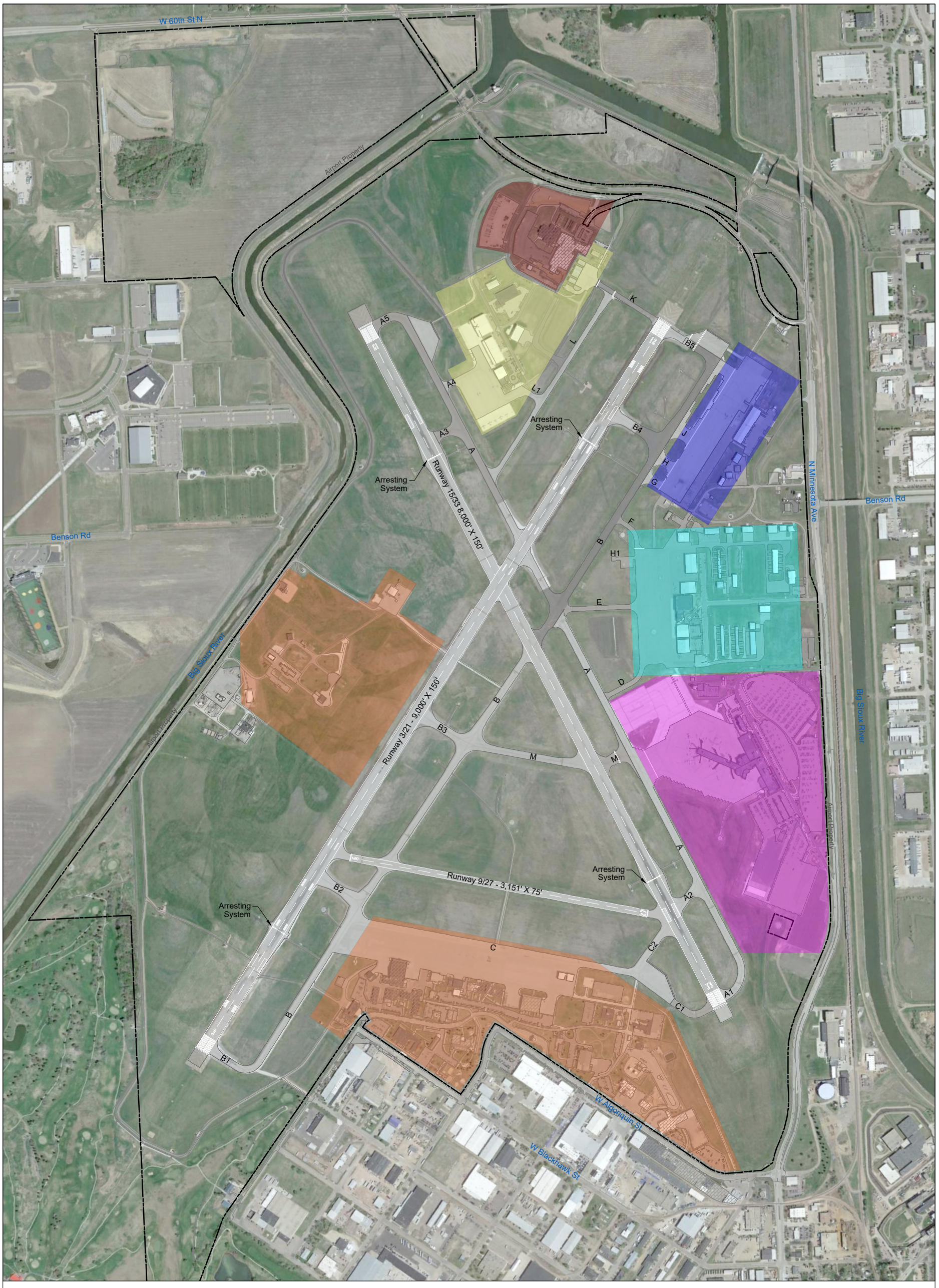
To identify the appropriate design parameters for a runway and many associated facilities, aircraft are categorized by dimensions and performance using the Runway Design Code (RDC). The RDC contains three separate parts that are discussed below and listed in **Table 1-1: Runway Design Code Components**. These design classifications are used throughout this Master Plan.

The first component is the Aircraft Approach Category (AAC) and is designated by a letter that corresponds to the approach speed of an aircraft. The second component is the Aircraft Design Group (ADG) and is represented by a roman numeral based on the aircraft tail height and wingspan. When there is a conflict between the tail height and the wingspan, the more demanding or higher group identifier is used. Runway approach visibility minimums are expressed as the runway visual range (RVR) in feet equal to quarter mile increments, with this last component not being descriptive of aircraft characteristics but of a particular runway's approach capability.

Table 1-1 Runway Design Code Components

Aircraft Approach Category (AAC)		Airplane Design Groups (ADG)			Runway Visual Range (RVR)	
AAC	Approach Speed	ADG	Tail Height	Wingspan	RVR (feet)	Visibility (statute miles)
A	< 91 knots	**I**	< 20 feet	< 49 feet	**1600**	1/4
B	≥ 91 knots, < 121 knots	**II**	20 – 29 feet	49 – 78 feet	**2400**	1/2
C	≥ 121 knots, < 141 knots	**III**	30 – 44 feet	79 – 117 feet	**3200**	5/8
D	≥ 141 knots, < 166 knots	**IV**	45 – 59 feet	118 – 170 feet	**4000**	3/4
E	≥ 166 knots	**V**	60 – 65 feet	171 – 213 feet	**4500**	7/8
		VI	66 – 79 feet	214 – 261 feet	**5000**	1
					VIS	Visual

Source: FAA Advisory Circular (AC) 150/5300-13A, *Airport Design*



Legend
West General Aviation Area
East Cargo Area
East General Aviation Area
Passenger Terminal Area
South Dakota Air National Guard Area (SDANG)
South Dakota Army National Guard Area (SDARNG)

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AIRFIELD FACILITIES & FUNCTIONAL AREAS

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FIGURE 1-5

1.3.2 Runways

Runway 3/21 is considered the primary runway. The runway is 9,000 feet long and 150 feet wide. Runway 3/21 has a RDC of D-IV-1600 as the Runway 21 approach is capable of accommodating operations when visibility minimums are lower than ½ mile but not lower than ¼ mile. A blast pad is located beyond each runway end for erosion protection from jet blast. Arresting systems are installed near each end for F-16 emergency landings. Reconstruction of a majority of the runway occurred in 2021.

Runway 15/33 is the main crosswind runway. The runway is 8,000 feet long and 150 feet wide. Runway 15/33 is designed to meet D-IV standards and has a RDC of D-IV-5000 as both runways have non-precision instrument approach procedures with 1-mile approach visibility minimums. Runway 15/33 also has a blast pad located beyond each runway end and arresting systems near each end.

Runway 9/27 is a smaller crosswind runway utilized by smaller general aviation aircraft. The runway is 3,151 feet long and 75 feet wide. Runway 9/27 is designed to meet B-II standards and has a B-II-5000 RDC as its non-precision instrument approach procedures have 1-mile approach visibility minimums. **Table 1-2** summarizes FSD's three runways.

Table 1-2 FSD Runways

Criteria	Runway		
	3/21	15/33	9/27
Runway Length (feet)	9,000	8,000	3,151
Runway Width (feet)	150	150	75
Runway Design Code	D/IV/1600	D/IV/5000	B/II/5000
Surface Type	Concrete (Grooved)	Concrete (Grooved)	Concrete
Weight Bearing Capacity	S – 200,000 lbs. D – 200,000 lbs. 2D – 444,000 lbs.	S – 100,000 lbs. D – 180,000 lbs. 2D – 400,000 lbs.	S – 30,000 lbs.

Sources: 5010 Data and 2016 ALP
Notes: S: Single-wheel type landing gear; D: Dual-wheel type landing gear; 2D: Dual-Tandem

1.3.3 Helipad

Helipad H1 is located approximately 1,200 feet east of the intersection of Runways 3/21 and 15/33. The helipad is 50 feet by 50 feet and has pavement markings, perimeter lighting, and approach and departure paths oriented north and south.

1.3.4 Taxiways and Taxilanes

FSD taxiways facilitate the movement of aircraft from the runway environment to other airport facilities (i.e., aprons, hangars, etc.). Locations are identified in **Figure 1-5: Airfield Facilities and Functional Areas** and depicted on the airport diagram provided in **Figure 1-6: Airport Diagram**. Major taxiways are labeled A through M while connector taxiways have a numeric character added (i.e., A1, A2, etc.).

Taxiways

- **Taxiway A** is a 75-foot-wide, full-length parallel taxiway to Runway 15/33. The taxiway centerline is 400 feet from the adjacent runway centerline. Four connecting taxiways designated A1 through A4 provide entry and exit from the runway. Taxiway A also provides access to the air carrier apron.
- **Taxiway B** is a 75-foot-wide, full-length parallel taxiway to Runway 3/21. This taxiway centerline varies in distance from the adjacent runway centerline. The taxiway centerline is 660 feet from the runway centerline at the 21 (north) end, and 560 feet from the centerline at the 3 (south) end. Five connecting taxiways designated B1 through B5 provide entry and exit from the runway. Taxiway B provides access to the cargo apron and access to the west side of the SDANG apron.
- **Taxiway C** was a parallel taxiway for Runway 9/27 but is only available for military use to access the SDANG apron.
- **Taxiways D and E** are 50 feet wide and provide access to the east general aviation apron from Taxiway A.
- **Taxiway F** is 50 feet wide and provides access to the east general aviation apron from Taxiway B.
- **Taxiways G, H, and J** are short connector taxiways from Taxiway B to the east cargo apron. These connectors vary in width (80-140 feet).
- **Taxiway K** is 50 feet wide and provides access to the west cargo and general aviation ramps connecting with Taxiway L.
- **Taxiway L** is 50 feet wide and serves as a partial parallel taxiway located on the west side of Runway 21. Taxiway L connects Taxiway K with Taxiway A and provides access to the west cargo and general aviation ramps.
- **Taxiway M** is 75 feet wide and connects Taxiway B with the air carrier apron.

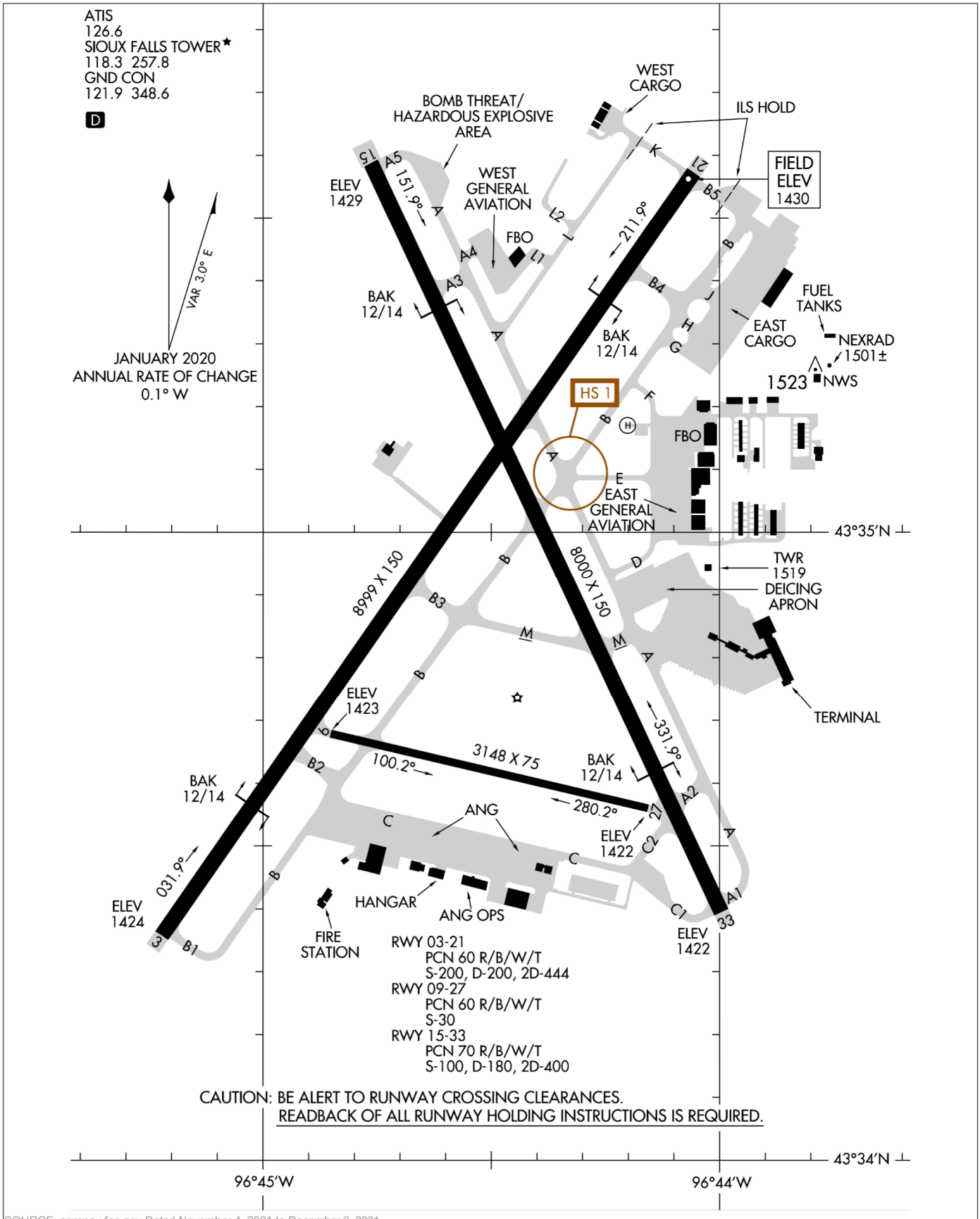
Aircraft holding bays are located near the Runway 15 and 21 ends. Holding bays allow air traffic to hold for FAA Air Traffic Control (ATC) clearances while minimizing disruption to taxiway flow. An arm/de-arm pad utilized by SDANG is located just northwest of the Runway 33 end.

Taxilanes

Taxilanes are designed for and associated with access through aprons, gate areas, and aircraft storage/hangar areas. Airplane taxiing speeds in these areas seldom exceed 20 miles per hour (mph) and typically fall in the range of 5 to 15 mph. In comparison, taxiways are designed for unrestricted taxiing operations where aircraft speeds routinely exceed 20 mph. Numerous taxilanes provide access through aprons and to hangar areas at FSD. Apron taxilane striping helps delineate taxi areas from parking areas.

Hot Spot 1

The intersection of Taxiway E with Taxiways A and B east of the Runways 15/33 and 3/21 intersection is identified as a hot spot (**Figure 1-6**) by the FAA due to the complexity of the intersection and proximity to runways. Taxiway E is planned to be removed in 2022.



SOURCE: aeronav.faa.gov Dated November 4, 2021 to December 2, 2021

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AIRPORT DIAGRAM

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FIGURE 1-6

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X:\2890700\210946.01\TECHREPORTS\1 - INVENTORY\FIGURE 1-6 AIRPORT DIAGRAM.DWG

1.3.5 Aprons

Aprons provide an area for aircraft to exit the airside environment and circulate to their desired location. Seven apron areas serve FSD users by accommodating loading, unloading, deicing, and parking needs for commercial airlines, air cargo, general aviation, and military operators.

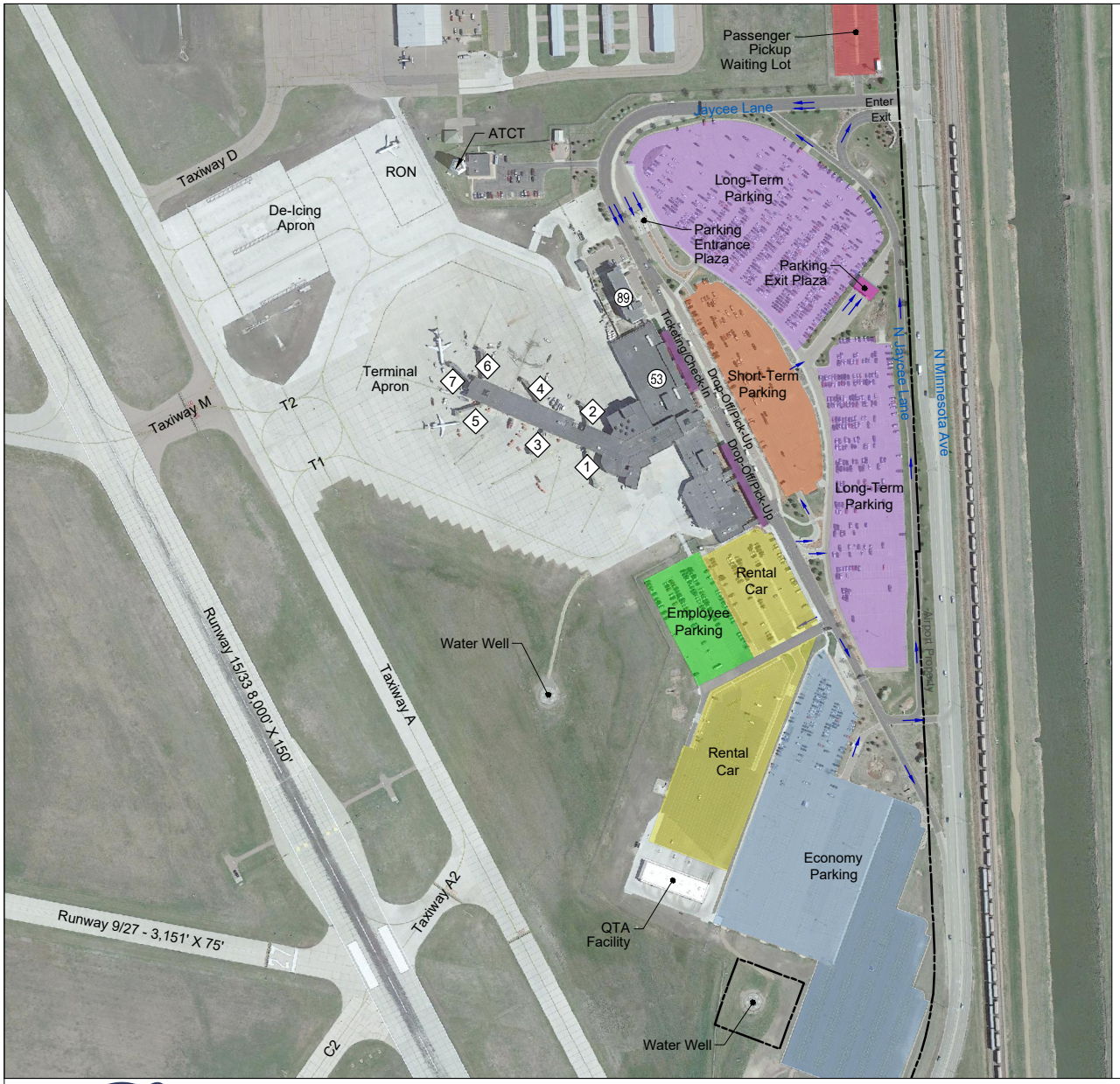
Passenger Terminal Apron and De-icing/Remain Overnight (RON) Apron

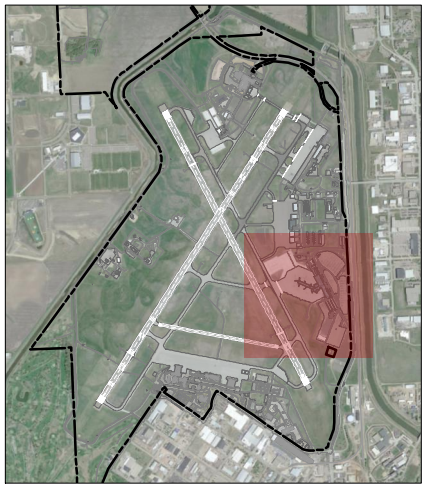
The passenger terminal apron serves commercial aircraft around the terminal building. Dual entrance taxilanes (T1 & T2) provide access from Taxiway A to the terminal concourse and its 7 gates / 11 aircraft parking stand positions (**Figure 1-7: Terminal Area**). The concrete apron encompasses approximately 80,000 square yards. The main terminal apron also supports deicing and accommodates ground support vehicles serving parked aircraft.

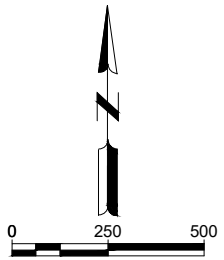
The De-icing/RON apron is located on the northwest edge of the terminal apron and is approximately 30,000 square yards. This apron expansion occurred in 2020 and allows two aircraft to be deiced simultaneously. The apron also has a designated area that can be utilized for RON parking east of the de-icing area.

South Dakota Air National Guard (SDANG) Apron

The SDANG apron is located south of Runway 9/27, between Runway 15/33 and 3/21, and supports Air National Guard F-16 operations. The apron is not available for use by civilian aircraft and is under the control of the Department of Defense. The SDANG apron is concrete, approximately 90,000 square yards in size, and has numerous parking positions for military aircraft.







Existing Buildings/Facilities	
53	Terminal Building
89	AeroStay Hotel
1	Gates 1-7

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TERMINAL AREA

FIGURE 1-7

West General Aviation Apron and West Cargo Apron

The west general aviation apron, located at the intersection of Taxiway A and L, currently serves Maverick Air Center, a second FBO, and Sanford Air. The apron is concrete and approximately 35,000 square yards. Fourteen tie-down parking spaces are available for aircraft.

The west cargo apron is concrete, covering approximately 5,000 square yards located at the end of Taxiway K. The apron was once used for air cargo operations but is currently used by Satnan Avionics for aircraft maneuvering and parking. (Satnan Avionics repairs and installs aviation communications and navigational equipment.)

Figure 1-8: West General Aviation Area provides the location and layout of the West General Aviation Apron and the West Cargo Apron.

East Cargo Apron

The east cargo apron provides air cargo operators with space for aircraft parking, loading and unloading, and sorting operations and accommodates ground handling vehicles and cargo equipment storage. The apron is located east of Runway 3/21 along Taxiway B, north of the east General Aviation area, as shown in **Figure 1-9: East Cargo Area**. The cargo apron is accessed from Taxiway B through connector Taxiways G, H, and J. The apron encompasses approximately 70,000 square yards and is primarily concrete with a pavement design similar to the runways. A paved asphalt surface approximately 100 feet wide on the east edge of the apron area is intended to serve ground operations but can accommodate aircraft parking when all UPS aircraft are present. The asphalt pavement has reduced strength. The cargo apron accommodates aircraft as large as Design Group IV.

East General Aviation Apron

The east general aviation apron serves multiple operators including Signature Flight Support, a full-service FBO. The apron is located east of the intersection of Runway 15/33 and 3/21. **Figure 1-10: East General Aviation Area** shows the location and layout of the apron. The apron is accessed via Taxiways D, E, and F. The east general aviation apron is asphalt and approximately 70,000 square yards. The north-south taxilane is designed for Group I aircraft; however, Group II aircraft regularly utilize the apron. This apron also encompasses an on-airport well located in the middle of the south apron section.

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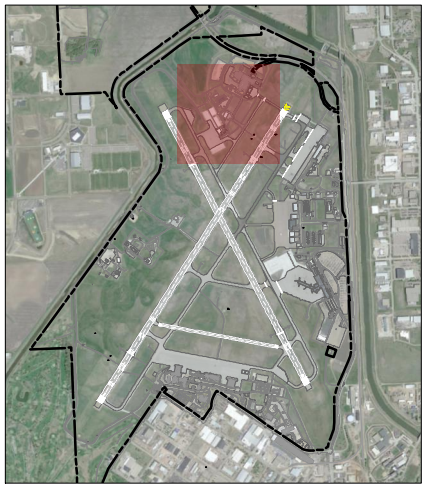
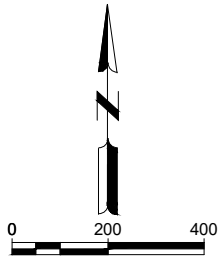
X:\2890700\210946.01\TECH\REPORTS\1 - INVENTORY\FIGURE 1-10 EAST GENERAL AVIATION AREA.DWG





Existing Buildings/Facilities	
60	Airport Snow Removal Equipment and Maintenance Facility
70	Hangar/Satnan Avionics
71	Hangar/Satnan Avionics
72	Hangar/Satnan Avionics
73	Hangar/Satnan Avionics
74	Hangar/Satnan Avionics
81	Maverick Air Center
82	Sanford Air Center Hangar
83	Billion Auto Hangar
84	Billion Auto Hangar
803	Army National Guard Facilities

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WEST GENERAL AVIATION AREA

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FIGURE 1-8

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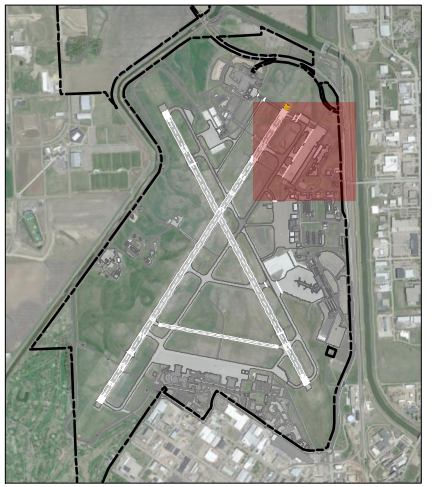
X:\2890700\210946.01\TECH\REPORTS\1 - INVENTORY\FIGURE 1-10 EAST GENERAL AVIATION AREA.DWG



Existing Buildings/Facilities	
38	Signature Facility (Leased To UPS)
39	Maverick Air Facility (Leased to Charter First)
40	U.S. Customs And Border Patrol/Cargo Support
41	Airport Storage
42	Airport Maintenance Building
43	Airport Maintenance Building
44	Airport Maintenance Building
45	Airport Maintenance Building
46	Same Day Express Facility
47	FedEx Facility
48	National Weather Service (NOAA)
49	Signature Flight Support Storage Facility
99	Maverick Air Fuel Storage Facility

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EAST CARGO AREA

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FIGURE 1-9

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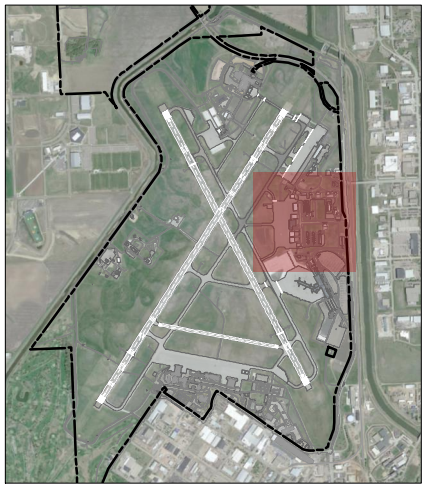
X:\2890700\210946.01\TECH\REPORTS\1 - INVENTORY\FIGURE 1-10 EAST GENERAL AVIATION AREA.DWG



Existing Buildings/Facilities	
1	Signature Flight Support Hangar/Offices
2A	Signature Facility (Leased To Avera)
2B	Signature Facility (Leased To Poet)
3	Signature Facility (Leased to Alpine Air Cargo)
4	Signature Facility (Leased to Encore Air Cargo)
5	Hangar
6	Hangar
7	Hangar
16	Hangar
22	Hangar
28	Office/Hangar
31	Hangar
32	Hangar
33	Hangar
35	Hangar
37	Hangar
38	Signature Facility (Leased To UPS)
39	Maverick Air Facility (Leased to Charter First)
40	U.S. Customs And Border Patrol/Cargo Support
50	Vault
51	Air Traffic Control Tower
T1	T-Hangar
T2	T-Hangar (Airport)
T3	T-Hangar (Airport)
T4	T-Hangar (Sports Promotion)
T5	T-Hangar (Signature)

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EAST GENERAL AVIATION AREA

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FIGURE 1-10

1.3.6 Design Standards

Airport design standards provide basic guidelines for a safe, efficient, and economic airport system. While Chapter 3 will provide expanded analysis of the standards and surfaces applicable to airport design, Runway Safety Areas (RSA), Runway Object Free Areas (ROFA), Runway Obstacle Free Zones (OFZ), Runway Protection Zones (RPZ), and FAA Approach Surfaces (commonly referred to as Threshold Siting Surfaces) are discussed below. Each standard is intended to provide safe areas that prevent or minimize personal injury and property damage. These standards are applied to the runways at FSD based on existing design aircraft and runway approach capabilities. RSAs, ROFAs, RPZs, and approach surfaces are shown on **Figure 1-11: Runway Design Surfaces**.

RSAs

The RSA is a rectangular area designed to enhance the safety of an aircraft that may undershoot, overrun, or veer off the runway while providing greater accessibility for firefighting and rescue equipment during such circumstances. The RSA is centered on the runway centerline and extends out equally on either side of the centerline and beyond the runway ends. The RSA enhances the safety of aircraft which undershoot, overrun, or veer off the runway, and it provides greater accessibility for firefighting and rescue equipment during such incidents. RSAs are intended to be capable under normal (dry) conditions of supporting aircraft without causing structural damage to the aircraft or injury to their occupants. Only objects that have a certain function, composition, and/or height are allowed in RSAs; this is commonly referred to as *fixed-by-function*. Additionally, objects fixed-by-function must be mounted on a frangible coupling, or one that is designed to break away easily to minimize the impact to aircraft that encounter them.

RSAs for Runways 3/21 and 15/33 are 500 feet wide and extend 1,000 feet beyond departure ends of runways and begin 600 feet prior to runway thresholds. The RSA for Runway 9/27 is 150 feet wide and extends 300 feet beyond departure ends of runways and begins 300 feet prior to runway thresholds.

ROFAs

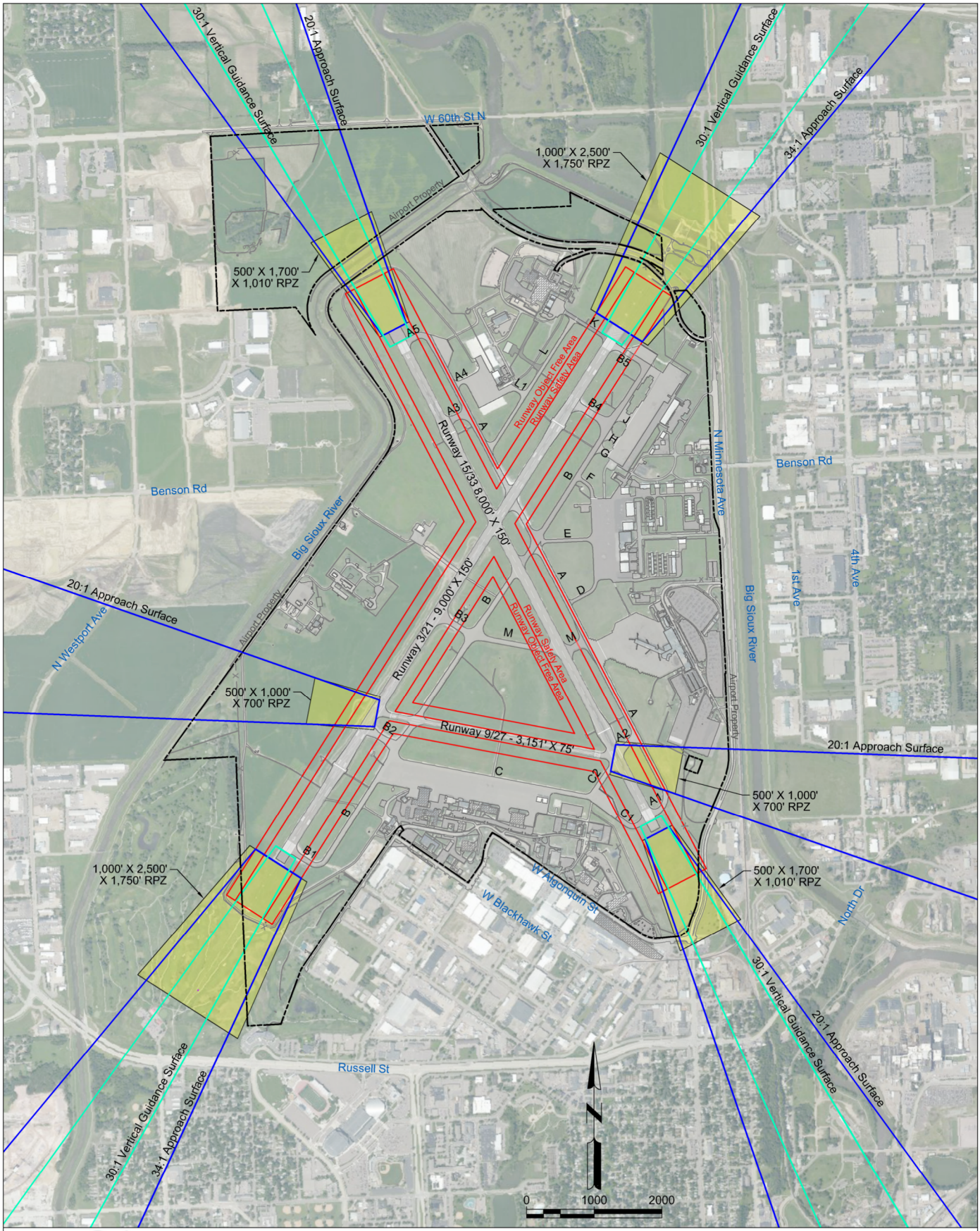
The ROFA is a larger rectangular area that requires clearing the ROFA of above-ground objects protruding above the nearest point of the RSA. Navigational aids (NAVAIDs), which must be placed in the ROFA to properly function, are allowed.

ROFA for Runways 3/21 and 15/33 are 800 feet wide and extend 1,000 feet beyond departure ends of runways and begin 600 feet prior to runway thresholds. The ROFA for Runway 9/27 is 500 feet wide and extends 300 feet beyond departure ends of runways and begins 300 feet prior to runway thresholds.

Airport fencing and Minnesota Avenue are located within the southeast corner of the Runway 33 ROFA. Subsequent chapters will evaluate options to eliminate or mitigate protrusions to the ROFA.

RPZs

The RPZ is a trapezoidal area located 200 feet beyond the runway ends in the approach and departure area. The function of an RPZ is to protect people and property on the ground. Airports are encouraged



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RUNWAY DESIGN SURFACES

FIGURE 1-11

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X:\2890700\210946.01\TECHREPORTS\1 - INVENTORY\FIGURE 1-11 RUNWAY DESIGN SURFACES.DWG

to own the property within the RPZ whenever possible and to keep the RPZ clear of incompatible objects and activities. The FAA identifies specific incompatible activities in the FAA Memorandum *Interim Guidance on Land Uses Within a Runway Protection Zone*, dated September 27, 2012. Uses that are typically considered incompatible include buildings, public roads, and other uses that result in assemblies of people.

There are RPZs applicable to both approach and departure operations. RPZs for all runways begin 200 feet beyond runway thresholds or conversely departure ends of runways. The largest RPZs applicable to Runway 3/21 are 1,000 feet wide at the start of the zone, 2,500 feet in length, and 1,750 feet wide at the end of the zone. The RPZs applicable to Runway 15/33 start 500 feet wide, extend 1,700 feet and end 1,010 feet wide. The RPZs applicable to Runway 09/27 start 500 feet wide, extend 1,000 feet and end 700 feet wide.

Elmwood Golf Course is located within the Runway 3 RPZ. Public roadways and buildings are located within the Runway 21 RPZ. Public Roadways are located within the Runway 33 RPZ.

OFZs

OFZ clearing standards precludes aircraft and other object penetrations, except for frangible NAVAIDs that need to be located in the OFZ because of their function. The Runway OFZ (ROFZ) and, when applicable, the Precision OFZ (POFZ), the inner-approach OFZ, and the inner-transitional OFZ compose the OFZ.

The OFZ is a design surface but is also an operational surface and must be kept clear during operations. Its shape is dependent on the approach minimums for the runway end and the aircraft on approach, and for that reason, the OFZ for a particular operation may not be the same as what's used for design purposes.

The ROFZ for all runways at FSD are 400 feet wide and extend 200 feet beyond each runway end. If an approach lighting system is installed, a clear inner-approach and inner-transitional OFZ is necessary. The inner-approach OFZ for Runway 3 and 21 is a 50:1 sloped surface beginning 200 feet from the runway threshold and extends 200 feet beyond the last approach light. The inner-transitional OFZ airspace surface is along the sides of the runway OFZ. If a precision instrument approach is established (below ¾-mile visibility), a Precision Obstacle Free Zone (POFZ) surface exists. The POFZ for Runway 3 and 21 begins at the runway threshold as a flat surface 800 feet wide centered on the runway centerline and extends 200 feet to connect to the inner-approach OFZ.

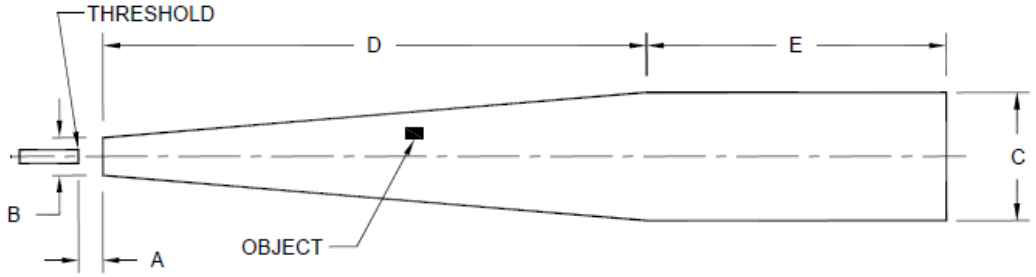
Approach Surfaces

Approach surfaces are designed to protect the use of the runway in both visual and instrument meteorological conditions near the airport. Runway thresholds need to be located so that there are no obstacle penetrations to the appropriate runway approach surface. Approach surfaces have a trapezoidal shape that extends away from the runway along the centerline and at a specific slope. For example, a 20:1 slope rises one foot vertically for every 20 feet horizontally. The specific size, slope and starting point of the surface depends upon the visibility minimums and the type of procedure associated

with the runway end as detailed in **Table 1-3: FAA Runway Approach Surfaces**. Runway Type 5 and 6 approaches surfaces are applicable to both ends of Runway 3/21. Runway Type 4 and 6 approaches surfaces are applicable to both ends of Runway 15/33. Runway Type 4 approaches are applicable to both ends of Runway 9/27. There are no known obstructions to FAA Approach Surfaces.

Table 1-3 FAA Runway Approach Surfaces

Runway Type		DIMENSIONAL STANDARDS* Feet (Meters)					Slope
		A	B	C	D	E	
1	Approach end of runways expected to serve small airplanes with approach speeds less than 50 knots. (Visual runways only, day/night).	0 (0)	120 (37)	300 (91)	500 (152)	2,500 (762)	15:1
2	Approach end of runways expected to serve small airplanes with approach speeds of 50 knots or more. (Visual runways only, day/night).	0 (0)	250 (76)	700 (213)	2,250 (686)	2,750 (838)	20:1
3	Approach end of runway expected to serve large airplanes. (Visual runways only, day/night).	0 (0)	400 (122)	1,000 (305)	1,500 (457)	8,500 (2591)	20:1
4	Approach end of runways expected to accommodate instrument approaches having visibility greater than or equal to 3/4 statute mile. [3]	200 (61)	400 (122)	3,400 (1036)	10,000 [4] (3048)	0 (0)	20:1
5	Approach end of runways expected to accommodate instrument approaches having visibility minimums less than 3/4 statute mile.	200 (61)	800 (244)	3,400 (1036)	10,000[4] (3048)	0	34:1
6 [5]	Approach end of runways expected to accommodate instrument approaches with vertical guidance.	0 (0)	Runway Width + 200 (61)	1520 (463)	10,000 [4] (3048)	0 (0)	30:1

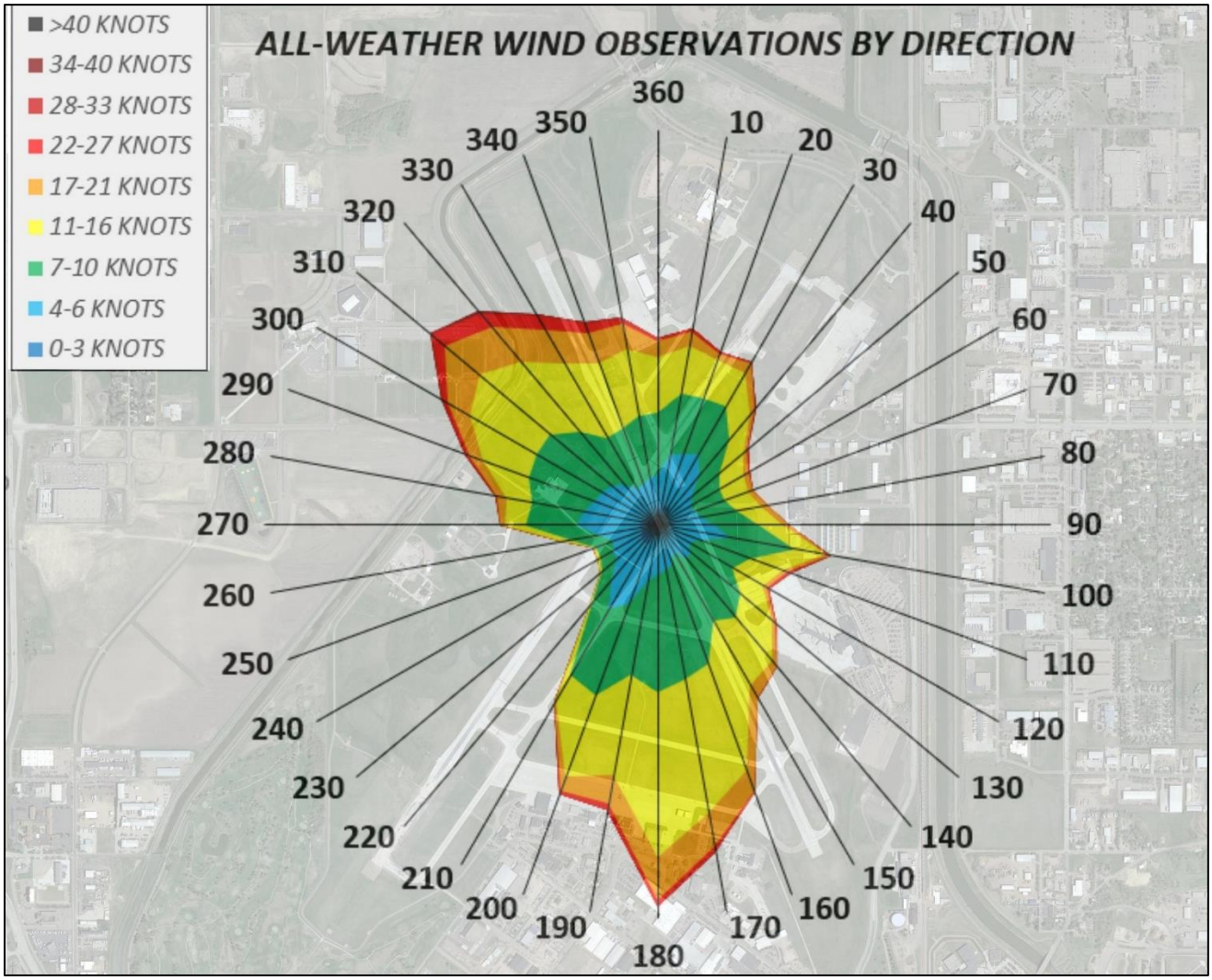


Sources: Advisory Circular 150/5300-13A, *Airport Design*; FAA Engineering Brief #99A

1.3.7 Wind Coverage

Crosswinds are winds that do not align with the orientation of the runway. Ideally, a runway should be aligned with the prevailing wind. Wind conditions affect all airplanes in varying degrees. Generally, the smaller the airplane, the more it is affected by wind, particularly crosswinds. Prevailing winds are from the northwest and south as depicted in **Figure 1-12: Prevailing Winds**.

Figure 1-12 Prevailing Winds



The FAA provides limitations on crosswind components for aircraft. The allowable crosswind component used to compute the wind coverage for a runway or combination of runways is based on the RDC, as shown in **Table 1-4**.

Table 1-4 Crosswind Limitations per RDC

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

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

Wind coverage is the percent of time crosswind components are below an acceptable velocity. The desirable wind coverage for an airport is 95 percent, based on the total numbers of weather observations. If a single runway cannot provide 95 percent wind coverage, a crosswind runway may be eligible for FAA funding. To determine crosswind coverage at a specific airport, it is preferable to use 10 years of historical wind data. The Airport's Automated Surface Observing System (ASOS) was utilized for wind coverage analysis. **Table 1-5** provides runway wind coverage using historical data collected by the ASOS for the period 2011-2020.

Table 1-5 Wind Coverage

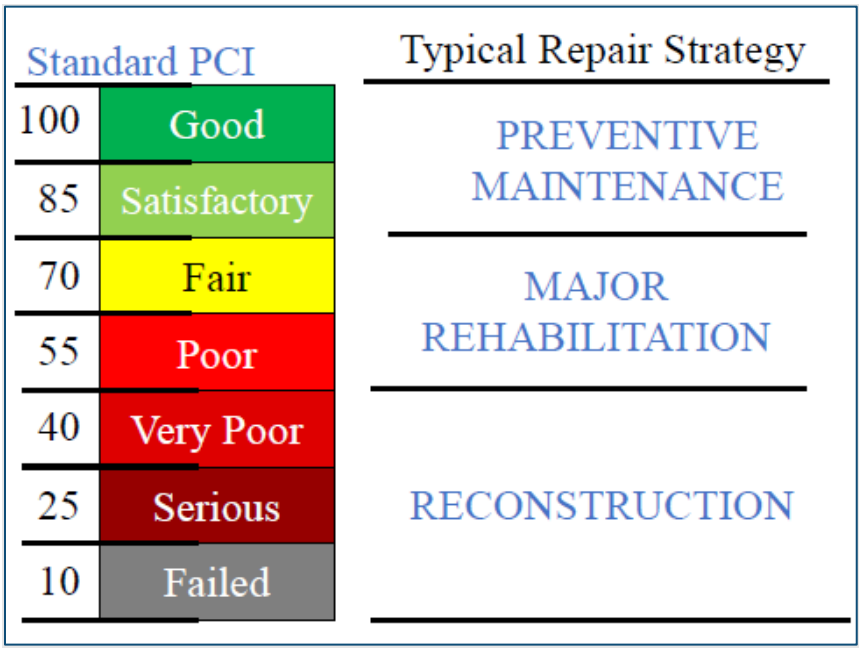
Crosswind Component	Rwy 3/21	Rwy 15/33	Rwy 9/27	All Rwys	*3/21 & 15/33*
10.5 knots	80.32%	91.52%	79.54%	99.73%	*96.79%*
13 knots	87.83%	95.84%	87.46%	99.96%	*98.88%*
16 knots	94.67%	98.63%	NA	99.69%	*99.69%*
20 knots	98.29%	99.62%	NA	99.95%	*99.95%*

Source: FSD ASOS, 2011-2020 (Accessed via FAA's Airport Data and Information Portal [ADIP])

1.3.8 Pavement Conditions

According to FAA AC 150/5380-7B, *Airport Pavement Management Program (PMP)*, maintaining a pavement in good condition over its life cycle is four to five times less expensive than periodically rehabilitating a pavement in poor condition. Based upon a visual inspection by experienced engineers, a pavement condition index (PCI) rating is assigned to each pavement section on an airport but does not necessarily reflect its structural integrity. The PCI rating is scored on a scale of 1 to 100. A score of 100 indicates the pavement is in perfect condition while a score of 60 or lower typically indicates that rehabilitation or reconstruction is needed. PCI values for FSD's airfield pavements are provided in **Appendix A: 2021 PCI Study**. PCI values and associated repair strategies from the 2021 SDDOT PCI study is depicted on **Figure 1-13**. Information from the 2021 study does not include recently completed construction projects.

Figure 1-13: Pavement Repair Strategies



Source: FSD Airport Summary from 2021 South Dakota Airport Pavement Condition Index (PCI) Study

1.3.9 Navigational Aids (NAVAIDs)

NAVAIDs are visual and electronic devices that provide navigational data to pilots. NAVAIDs help FSD accommodate arriving and departing aircraft. NAVAID locations are depicted on **Figure 1-14: Navigational Aids**.

Visual NAVAIDs

Visual NAVAIDs rely on pilots being able to directly see and visually interpret the source information instead of relying on instruments. Various types of visual NAVAIDs at FSD are discussed below.

Rotating Beacon

The rotating beacon helps pilots locate and identify FSD during nighttime hours and poor visibility conditions. The beacon alternates green and white while rotating 360 degrees, which is standard for civilian airports. The beacon for FSD is located near the center of the airfield.

Visual Glideslope Indicators

At FSD, Precision Approach Path Indicators (PAPIs) aid pilots in making necessary height corrections when on approach to a runway. PAPIs use four parallel lights that are intended to be seen up to 5 miles during the day and 20 miles at night. PAPIs are typically comprised of a two- or four-light unit in which combinations of the lights indicate if an aircraft is above, below, or on path with the correct glide slope. Runways 3, 15, and 33 are currently equipped with four-box PAPI lights installed on the left side of the runways. Runway 21 is currently equipped with a four-box Visual Approach Slope Indicator lights, but the system will be replaced by PAPIs in the near future.

REIL

Runway End Identifier Lights (REIL) consist of a synchronized pair of flashing lights. REILs are particularly helpful when artificial light in the vicinity may confuse the pilot and during poor visibility conditions. REILs are installed on both ends of Runway 15/33.

Edge Lighting

Lighting along the edge of runways and taxiways helps to demarcate pavement edges, particularly during night and poor visibility conditions. The color of the lighting also serves as a position indicator to pilots. Taxiway edge lighting is blue while runways are white until the final 3,000 feet where the lights change to yellow then red to inform pilots of the end of the runway. Runway threshold lights are green when approaching the runway and red when viewed from the opposite end of the runway. Runways 3/21 and 15/33 each have High Intensity Runway Lighting (HIRL) while Runway 9/27 is equipped with Medium Intensity Runway Lighting (MIRL). Runways 3/21 and 15/33 are equipped with pilot-controlled lighting systems activated using aircraft radio that allow adjustments to brightness when the air traffic control tower is closed.

Legend

ASR	Airport Surveillance Radar
ATCT	Air Traffic Control Tower
MASLR	Medium-Intensity Approach Lighting System With Runway Alignment Indicator
ASOS	Automated Surface Observing System
LLWAS	Low Level Windshear Alert System
PAPI	Precision Approach Path Indicator
REIL	Runway End Identifier Lights
VASI	Visual Approach Slope Indicator
RVR	Runway Visual Range
	High Intensity Runway Lighting
	Medium Intensity Runway Lighting
	Medium Intensity Taxiway Lighting
	Runway Centerline Lighting
	Touchdown Zone Lighting

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NAVIGATIONAL AIDS

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FIGURE 1-14

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X:\2890700\210946.01\TECHREPORTS\1 - INVENTORY\FIGURE 1-10 EAST GENERAL AVIATION AREA.DWG

In-pavement Lighting

Runway 3/21 is equipped with in-pavement Centerline Lighting that identify the runway centerline at 50-foot intervals. Runway 21 also has Touchdown Zone Lighting that provide white lights identifying the runway threshold landing zone for the first 3,000 feet.

Pavement Markings

Although not always considered NAVAIDs, pavement markings provide orientation and identification of runway and taxiway surfaces. Runway 9/27 is equipped with basic runway markings that identify runway designation (runway end number) and runway centerline. Runway 15/33 has non-precision markings that expand on basic markings by including runway threshold and aiming point markings. Runways with precision instrument approaches like Runway 3/21 have additional markings to serve as visual cues for pilots on approach. These additional markings include touchdown zone and edge markings. Taxiway markings typically include centerline striping to assist with navigation and providing necessary clearance from fixed objects. Runway hold position markings identify the setbacks required from active runways.

Approach Lighting System

Approach lighting systems provide visual confirmation of the runway centerline for pilots on approach to the runway. These systems are especially helpful for pilots transitioning from instrument flight to visual flight for landing in poor visibility conditions. There are many types of lighting systems and different configuration options. Both ends of Runway 3/21 are equipped with a Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR). MALSRs consist of a combination of steady burning light bars and flashers that provide pilot's visual information on runway alignment, height perception, roll guidance, and horizontal references to support the visual portion of an instrument approach. The system extends 2,400 feet beyond the runway thresholds.

Wind Indicators

Wind indicators aid pilots by indicating wind speed and direction. A segmented circle coupled with wind indicators provides additional guidance regarding traffic pattern and/or runway alignment information. The segmented circle at FSD is located near the center of the airfield, south of Taxiway M. Supplemental wind cones are located throughout the airport, including near the landing thresholds to Runway 15/33 and Runway 3/21 (**Figure 1-14**).

Electronic NAVAIDs

Electronic NAVAIDs emit an electronic signal that is either received by special equipment on the aircraft or that provide information about the location of the aircraft for FAA ATC service. Electronic NAVAIDs often provide guidance in conjunction with instrument approach procedures.

Weather Observation Equipment

FSD has an on-field Automated Surface Observing System (ASOS) located west of the Runway 3 landing threshold. The ASOS is operational 24 hours a day, 365 days a year and reports temperature, precipitation, dew point, wind speed and direction, visibility, cloud coverage, ceiling, and other information to the FAA Flight Service Station and National Oceanic and Atmospheric Administration.

Real-time weather reports are available to the public via radio and telephone. FSD also has a Low-Level Windshear Alert System (LLWAS) installed. There are eight sensors installed in the vicinity of the airport that transmit information to air traffic controllers about wind conditions that could be hazardous to aircraft.

Instrument Landing System (ILS)

An ILS provides lateral and vertical guidance for landing aircraft. Although other types of approaches may offer vertical guidance, the ILS is the only approach considered a true precision approach by the FAA. An ILS consists of four components: a localizer antenna array, glide slope antenna, marker beacon, and approach lights. Runway 3/21 has ILS to both runway ends (**Table 1-6**).

Global Positioning System (GPS)

GPS is a satellite-based navigational system that transmits location signals to properly equipped aircraft so that location, altitude, direction of travel, and speed can be determined. GPS enables aircraft to conduct non-precision approaches to runways that are not equipped with ground-based navigational equipment. At FSD, Area Navigation (RNAV) GPS approaches are available to all six runway ends although visibility and ceiling limitations vary.

Very High Frequency Omni-directional Radio Range (VOR)

The VOR is the primary NAVAID used by civil aviation within the national airspace system (NAS) aside from GPS. VORs are often paired with distance measuring equipment (DME). DME provides pilots with a measurement of distance to the runway in nautical miles. A VOR is located four miles northwest of FSD.

Table 1-6 Instrument Approach Procedures

Approach Procedure	Type	Threshold Crossing Height	Decision Height	Visibility Minimum (statute mi.)
HI-ILS or LOC RWY 03	ILS	54	250	½
ILS or LOC RWY 03	ILS	54	250	½
RNAV (GPS) RWY 03	LPV	54	250	½
HI-ILS or LOC RWY 21	ILS	49	250	½
ILS or LOC RWY 21	ILS	49	200	½
RNAV (GPS) RWY 21	LPV	49	200	½
RNAV (GPS) RWY 15	LPV	48	410	1 3/8
VOR or TACAN RWY 15	VOR	46	491	1
HI-TACAN RWY 15	VOR	46	491	1
RNAV (GPS) RWY 33	LPV	45	496	1
VOR or TACAN RWY 33	VOR	42	516	1
RNAV (GPS) RWY 09	LPV	49	200	½
RNAV (GPS) RWY 27	LPV	40	536	1

Source: FAA (https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dtpp/)
Notes: ILS – Instrument Landing System; LOC – Localizer

1.3.10 Airport Security and Perimeter Fence

The airfield at FSD is encompassed by a perimeter fence to prevent unauthorized access to the airport and to prevent wildlife from entering the airfield and creating safety hazards.

1.4 Landside Facilities

This section summarizes the landside facilities at the Airport, which are those that provide transition between ground and air transportation modes. Landside facilities are necessary for the movement of passengers and automobiles and the storage of aircraft. Landside facilities typically include the terminal complex, access system, and any other areas within the Airport's property boundaries that are not considered airside facilities (**Figure 1-15: Facility Overview**). At FSD, landside facilities include the following:

- **Passenger terminal building**
- **Rental car facilities**
- **South Dakota Air National Guard and Army National Guard facilities**
- **Fixed-base operator (FBO) facilities**
- **Air med operator facilities**
- **Aircraft hangars**
- **Air cargo facilities**
- **Fuel farms**
- **Maintenance/equipment storage buildings and a snow removal equipment (SRE) building**
- **Aircraft Rescue and Firefighting (ARFF) facility**
- **Air Traffic Control Tower (ATCT)**
- **Parking lots, access roads and circulation areas.**

1.4.1 Passenger Terminal Complex

The FSD passenger terminal complex includes the terminal building, rental car facilities, on-airport hotel, and ground access, circulation, and parking infrastructure. The passenger terminal complex is located southeast of the intersection of Runways 3/21 and 15/33 and west of Minnesota Avenue.

Passenger Terminal Building

The two-story terminal building serves as Sioux Falls' gateway to the world and accommodates multiple functions including ticketing, baggage screening, baggage claim, airline and rental car offices, storage space, and the majority of the mechanical, electrical, IT, and building systems on the first floor, with passenger security screening, arrivals and departures, waiting areas, and airport administration on the second floor. The terminal has restrooms, concessions, general circulation space, and additional office space on both levels.

The terminal building's functional areas are depicted on the first and second floor terminal layouts shown in **Figures 1-16** and **1-17**. The terminal building features a spacious, open two-story lobby with vertical circulation provided by a central set of stairs flanked by escalators leading up to the security screening checkpoint, waiting area, and airport administration offices. An elevator is located on the

Existing Buildings/Facilities					
1	Signature Flight Support Hangar/Offices	39	Maverick Air Facility (Leased to Charter First)	72	Hangar/Satnan Avionics
2A	Signature Facility (Leased To Avera)	40	U.S. Customs And Border Patrol/Cargo Support	73	Hangar/Satnan Avionics
2B	Signature Facility (Leased To Poet)	41	Airport Storage	74	Hangar/Satnan Avionics
3	Signature Facility (Leased to Alpine Air Cargo)	42	Airport Maintenance Building	81	Maverick Air Center
4	Signature Facility (Leased to Encore Air Cargo)	43	Airport Maintenance Building	82	Sanford Air Center Hangar
5	Hangar	44	Airport Maintenance Building	83	Billion Auto Hangar
6	Hangar	45	Airport Maintenance Building	84	Billion Auto Hangar
7	Hangar	46	Same Day Express Facility	89	AeroStay Hotel
16	Hangar	47	FedEx Facility	99	Maverick Air Fuel Storage Facility
22	Hangar	48	National Weather Service (NOAA)	216	Aircraft Rescue and Fire Fighting (ARFF) Facility
28	Office/Hangar	49	Signature Flight Support Storage Facility	803	Army National Guard Facilities
31	Hangar	50	Vault	T1	T-Hangar
32	Hangar	51	Air Traffic Control Tower	T2	T-Hangar (Airport)
33	Hangar	53	Terminal Building	T3	T-Hangar (Airport)
35	Hangar	60	Airport Snow Removal Equipment and Maintenance Facility	T4	T-Hangar (Sports Promotion)
37	Hangar	70	Hangar/Satnan Avionics	T5	T-Hangar (Signature)
38	Signature Facility (Leased To UPS)	71	Hangar/Satnan Avionics		

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FSD
SIOUX FALLS REGIONAL AIRPORT

SIOUX FALLS
REGIONAL AIRPORT
JOE FOSS FIELD

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FACILITY OVERVIEW

Mead & Hunt

FIGURE 1-15

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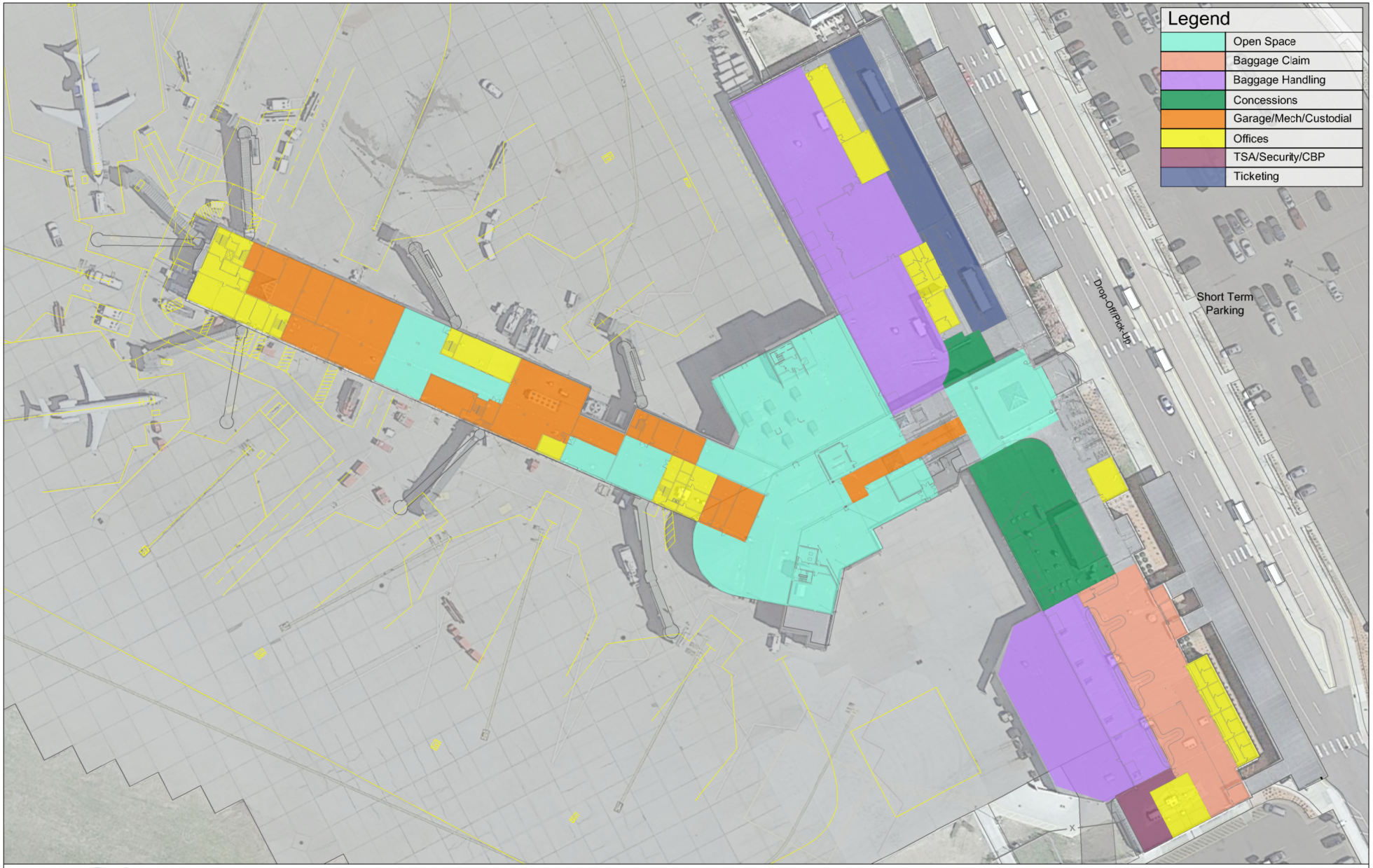
X:\2890700\210946.01\TECHREPORT\S1 - INVENTORY\FIGURE 1-10 EAST GENERAL AVIATION AREA.DWG

2/24/2022 5:05:36 PM
X:\2890700\210946.01\TECH\REPORTS\1 - INVENTORY\FIGUFE 1-16 TERMINAL LAYOUT - FIRST FLOOR.DWG



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TERMINAL LAYOUT - FIRST FLOOR

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FIGURE 1-16

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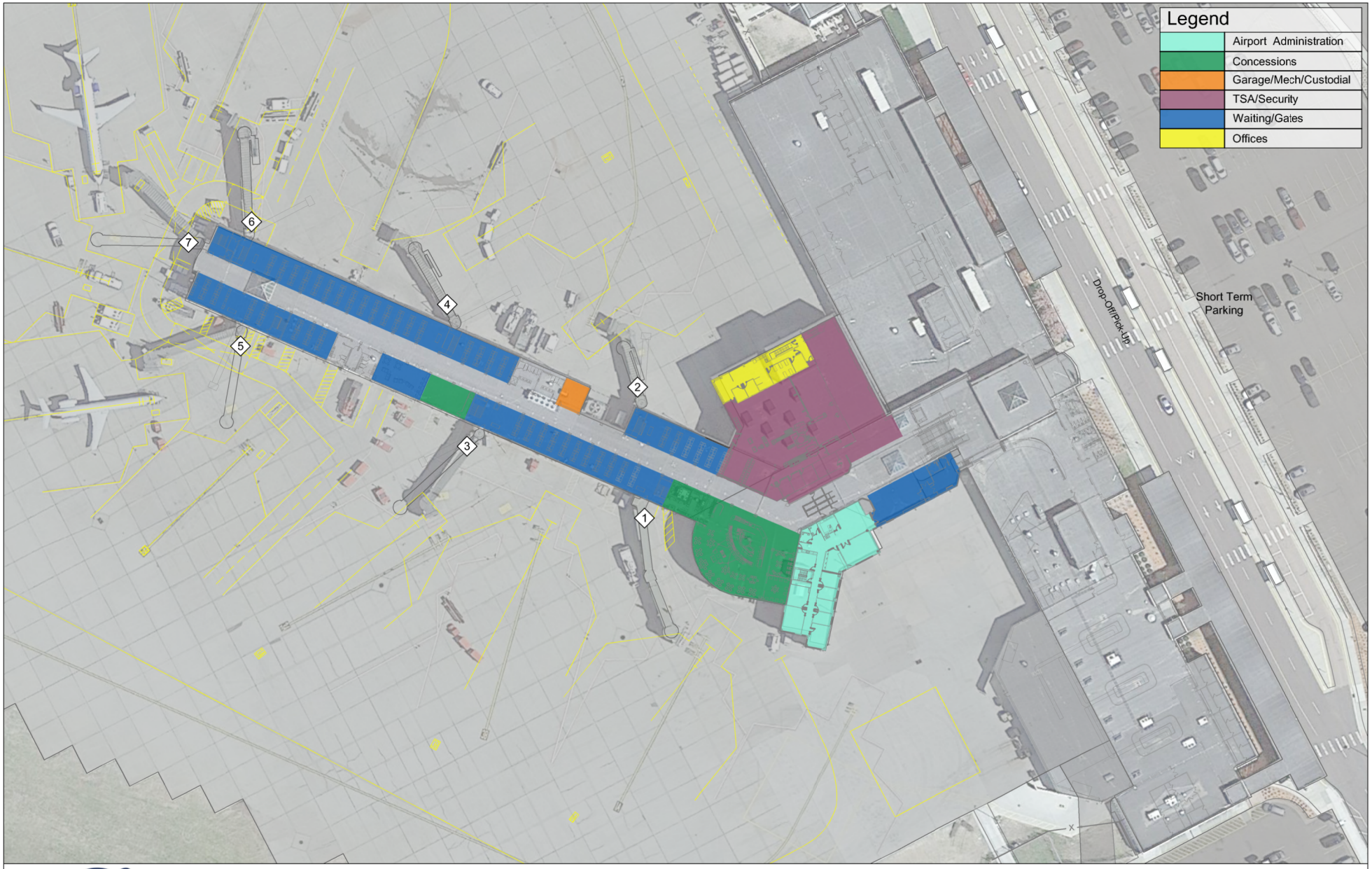

FSD
SIOUX FALLS REGIONAL AIRPORT

SIOUX FALLS
REGIONAL AIRPORT
JOE FOSS FIELD

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TERMINAL LAYOUT - SECOND FLOOR

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FIGURE 1-17

north side of the stairs. The terminal currently has seven aircraft gates each with its own passenger boarding bridge located in a single second-floor concourse. The terminal primarily serves five airlines and their affiliates: Allegiant Air, American Airlines, Delta Air Lines, Frontier Airlines, and United Airlines. The terminal also serves several rental car agencies and their affiliates: Avis, Alamo/Enterprise/National, and Hertz. Rental car counters and offices are located on the south side of the first floor in the baggage claim area, near the south passenger terminal exit, which leads to the rental car ready/return lot. Original construction of FSD's existing passenger terminal dates to 1970. The terminal has been renovated and expanded several times since then. Renovations completed since the previous Master Plan focused on enhancing the ease of travel through FSD. The Airport completed an expansion of the security checkpoint to improve throughput, new airport administration offices, and upgrades to the ticketing hall, lobby, and upstairs waiting area in late 2016. In 2018 to 2019, FSD upgraded and expanded the baggage claim area, doubling its size and greatly expanding the volume of bags that could be processed for arriving passengers. The baggage claim area, located on the south side of the first floor, has three baggage carousels. The Airport recently added a business lounge and pet relief area in the concourse and remodeled and expanded the children's play area.

As of November 2021, FSD is starting construction on interior renovations that will modernize and align finishes and features in the concourse with those completed in the lobby and baggage claim areas in recent years. These include new flooring and wall coverings, lighting sconces, gate counters, and standing-height counters in the gate areas for travelers to charge their devices. The concourse renovations include adding a family restroom near Gate 5, which will feature the Airport's first adult-size, or universal, changing table. Renovations to the post-security concessions area and expanded restaurant options in the concourse are also included in the upcoming work.

The Airport's FIS facility is in the southernmost corner of the terminal building, adjacent to the baggage claim area, with direct access to the air carrier apron. FIS provides immigration processing for passengers arriving from abroad. The FIS facility also accommodates the baggage screening and baggage claim functions for international passengers and includes office space for U.S. Customs and Border Protection (CBP). CBP does not currently accept international air carrier or large charter flights at FSD.

Access, Circulation, and Parking

The terminal area is accessed by turning west off Minnesota Avenue on to Jaycee Lane **(Figure 1-7)**. Jaycee Lane is a two-lane, one-way road providing access to the passenger terminal curbside, rental car and parking entrance plaza. Multiple terminal exit points all exit to Minnesota Avenue.

FSD currently provides fee pay public short-term, long-term and economy parking. Public parking options include 300 short-term stalls, approximately 1,400 long-term stalls, and 1,360 economy stalls. The existing access entry plaza consists of a two-lane entrance each for the long and short-term parking. A "waiting lot" with a capacity of 93 parking stalls is located near the intersection of N. Minnesota Avenue and Jaycee Lane. Employee parking is located just south of the terminal and provides approximately 190 stalls.

The rental car ready/return lot is adjacent to the south end of the terminal and has a 170-stall capacity. The rental storage lot is roughly 400 feet south of the terminal and provides approximately 150 parking stalls along with 19 linear parking lanes north of the QTA.

FSD is planning to construct an above-ground parking structure in 2023 that has the potential to increase parking availability by over 800 stalls. The parking garage would be located just east of the main terminal entrance.

Rental Car Quick-Turnaround (QTA) Facility

FSD's rental car QTA opened in 2020 is located on the southwest corner of the rental car return lot south of the terminal building. The QTA enables rental car operators to refuel, wash, and maintain their vehicles in a centralized location quickly and efficiently.

On-Airport Hotel

FSD features an on-airport hotel directly north of and connected to the passenger terminal. The AeroStay Hotel opened in 2015 and has 76 guest rooms as well as multiple conference rooms available for hosting meetings.

1.4.2 Air National Guard and Army National Guard

FSD is home to the 114th Fighter Wing (114 FW) of the South Dakota Air National Guard (SDANG) as well as the 196th Maneuver Enhancement Brigade of the South Dakota Army National Guard (SDARNG). The SDANG and SDARNG are both FSD tenants, and each has planning authority for its own facilities.

The SDANG completed its most recent facilities master plan in late 2014 (*Installation Development Plan)*. The following information was derived in large part from that plan. The 114 FW maintains and flies the F-16 Fighting Falcon aircraft and supports federal and state missions. The SDANG has three long-term, no-cost

leases for three distinct areas of the airfield totaling approximately 215 acres of airport property. The SDANG's Main Cantonment Area occupies approximately 93 acres on the south side of the airfield, south of Runway 9/27 between the thresholds of Runways 3 and 33. Base operations, maintenance, and support functions, including aircraft storage hangars, offices, and the aircraft rescue and firefighting (ARFF) station, which SDANG operates for FSD, are in this area. The lease for this property extends through June 2055. The SDANG also occupies approximately 113 acres located on the west side of the airfield, west of Runway 3/21, known as the Munitions Storage Area (MSA). This area includes SDANG storage facilities, munitions storage, and a hush house (an enclosed, noise-suppressed facility for testing aircraft systems). The MSA lease extends through September 2036.

The 196th Maneuver Enhancement Brigade of the SDARNG provides command and control, as well as supervision, for four battalions consisting of 18 units with nearly 1,400 soldiers throughout South Dakota. The SDARNG facilities are located on the north side of the airfield, adjacent to the West GA area and accessed via West National Guard Drive. SDARNG facilities include a regional training institute, outdoor storage, and an armory.

1.4.3 Fixed-Base Operators (FBOs) and Specialized Aviation Service Operators (SASOs)

FSD has two separate FBOs serving the Airport's GA users: Signature Flight Support (formerly Landmark Aviation) and Maverick Air Center.

Signature is located in the East GA area, north of the passenger terminal and east of the intersection of Runways 3/21 and 15/33. In 2016, BBA Aviation, parent company of Signature Flight Support, completed the acquisition of Landmark Aviation. Signature operates 10 buildings in the East GA area, including an FBO terminal and administration office, which the Airport owns and Signature leases for use. Signature leases out hangars and office space to a variety of users, including air cargo handlers, air med operators, private businesses, and transient pilots.

Maverick Air Center is in the West GA area, north of the intersection of Runways 3/21 and 15/33. In 2015, Sanford Frontiers, a subsidiary of Sanford Health, bought Maverick. Maverick partners with Charter First to provide private aircraft charters and aircraft maintenance services. Maverick leases its FBO terminal, administration office, and hangar, which are the southernmost buildings on the West GA apron, from the Airport. Maverick operates two additional hangars in the West GA area—the one directly north of the FBO/hangar is used for Sanford's air med operation, and the northernmost is another Maverick Air hangar. Maverick also operates a hangar just northeast of the East GA apron, which it leases to Charter First.

Both Signature and Maverick are full-service FBOs, offering many amenities to GA, business, and transient pilots such as:

- **Aircraft fueling (100LL and Jet A)**
- **Aircraft parking and storage**
- **Courtesy crew cars/ground transportation**
- **Oxygen and nitrogen**
- **Ground power units**
- **Deicing and preheating**
- **Helicopter handling**
- **Charter handling**
- **Catering services**

There are two SASOs that operate at FSD. A SASO is a single-service provider or special FBO performing less than full services. Elite Aircraft Services is an aircraft maintenance provider operating from a box hangar in the East GA area on the south side of Hangar Street. Elite maintains and services a wide range of aircraft from light single-engine piston aircraft up to heavy jets. The taxilane along the south side of the East GA apron provides airside access to Elite. Satnan Avionics sells, installs, and repairs aviation communications and navigational equipment, and performs aircraft maintenance services. Located in the West GA area, Satnan operates from four box hangars on the West Cargo Apron, near the intersection of Taxiways K and L, and an office building just outside the airport perimeter fence that is accessible from West National Guard Drive.

1.4.4 Air Med Operators

Two air med or air ambulance operators are based at FSD: Sanford AirMed and Avera Health Careflight. Air medical (air med for short) operators provide rapid emergency air transport services. They typically employ highly skilled critical care flight registered nurses and paramedics to provide advanced lifesaving care to emergency patients. Sanford AirMed operates out of a large box hangar on the West GA apron next to the Maverick FBO. Avera Health Careflight operates out of the southernmost hangar on the East GA apron, which it leases from Signature.

1.4.5 Air Cargo

The past five years have been extraordinarily active for air cargo in the United States. This includes Amazon Air's market entry and impacts related to the ongoing Covid-19 pandemic. Given the rapidly changing environment for air cargo, FSD placed special emphasis on the Master Plan's air cargo elements. While this section provides basic information on air cargo operations and facilities; detailed information and analysis is available in the Air Cargo Master Plan Study located in **Appendix B.**

The major air cargo operators are Federal Express (FedEx) and United Parcel Service (UPS). In 2020, the two integrated express carriers accounted for almost 100 percent of the total air freight handled at the Airport. Both companies have established national and regional hub airports to move goods from origin to destination.

FedEx

On a typical day, two FedEx mainline jet aircraft (including A300Fs, B767Fs and B757Fs) operate between FSD and Memphis, TN (MEM). One flight is an early morning arrival at FSD followed by a mid-

morning departure directly back to MEM. The other flight arrives at FSD early evening and departs mid-evening for MEM. The FedEx jets typically stay on the ground at FSD for 1-2 hours. The FedEx mainline aircraft are complemented by smaller turboprop feeder aircraft that serve smaller airport stations in South Dakota from FSD. Currently, these feeders are operated by FedEx partner airlines flying Cessna Caravans and ATR42s designed to carry cargo. The feeder flight schedules are synchronized with the FedEx mainline jets – often departing FSD within one hour of the morning jet arrival and arriving at FSD within one hour of the evening jet departure to MEM. The FedEx feeders serve the South Dakota markets of Aberdeen, Pierre and Rapid City. On a regular basis, another FedEx partner operates larger turboprop aircraft (ATR72s) between FSD and the FedEx Indianapolis hub.

FedEx shares a cargo facility on the east end of the east cargo apron with Same Day Express and Matheson Flight Extenders. This 40,000 square foot building was constructed by FSD. FedEx leases approximately 20,000 square feet in the building, which includes 18,000 square feet of warehouse space for storing and sorting cargo as well as 2,000 square feet of office space. FedEx's space includes six truck docks and two larger overhead doors. The remaining 20,000 square feet in the building is shared by Same Day Express (7,000 square feet) and Matheson (13,000 square feet).

UPS

UPS operates in a similar manner as FedEx, albeit with a higher level of daily mainline jets (including A300Fs, B767Fs and B757Fs). UPS typically handles three jet aircraft rotations per day – one early morning arrival/departure and two evening arrivals/departures.

UPS also has feeder aircraft flights at FSD which are timed to meet arriving and departing mainline aircraft. The UPS feeders are flown by contracted carriers and serve the South Dakota markets of Aberdeen, Mobridge, Pierre and Rapid City. These aircraft include Fairchild Metroliner IIIs and Cessna turboprops operated by Encore Air Cargo and Beechcraft 1900s operated by Alpine Air Express. Both Encore Air Cargo and Alpine Air Express have maintenance hangars and full-time staff at FSD.

Same Day Express

As mentioned above, Same Day Express is adjacent to FedEx and shares space with Matheson Flight Extenders. Same Day Express handles a variety of goods, including time-sensitive medical samples, auto parts, fresh flowers, specialty components used in manufacturing, and electronics.

Matheson Flight Extenders

Matheson Flight Extenders also operates from the main FSD air cargo building adjacent to the FedEx space. Matheson is a national contractor for the U.S. Postal Service and is involved in the preparation of mail and packages that are tendered to FedEx. Matheson is responsible for transporting mail between FSD and the Postal Service's large regional Processing and Distribution Center located on 4th Avenue, less than two miles from Matheson's facility. Matheson loads and unloads mail on FedEx aircraft containers and notifies FedEx when the containers are ready for the arriving or departing aircraft.

Air cargo facility locations are depicted above in **Figure 1-7: East Cargo Area** and **Figure 1-8: East General Aviation Area.**

1.4.6 Hangars and GA Users

FSD has two distinct general aviation (GA) areas: East and West. Each consists of an apron and a variety of hangars. The East GA area, shown on **Figure 1-10**, is the primary aircraft storage area and includes Signature FBO, FSD's T-hangars, several large corporate hangars, and most of its small corporate hangars. The West GA area, shown on **Figure 1-8**, houses the Maverick FBO and several large corporate hangars.

Within the East GA area, there are five 10-unit nested T-hangars, three of which the Airport owns and leases, with Signature and Sports Promotion leasing the other two. Major tenants leasing the 18 hangars in the East GA area include Avera, Poet, UPS, Encore Air Cargo, Alpine Air Express, Elite Aircraft Services, and Charter First. A network of taxilanes provide airside access to the hangars.

Within the West GA area, there are eight hangars. Satnan Avionics leases four hangars just west of the Runway 21 end along with a small office building outside the fence. Tenants of the larger hangars include Maverick Air Center, Sanford AirMed, and Billion Auto.

1.4.7 Fueling Facilities

Both Maverick Air Center and Signature Flight Support provide fuel sales (100LL and Jet-A) with mobile fueling. Signature's fuel storage facility is located just north of the National Weather Service facility and east of the east cargo apron. Maverick's fuel storage facility is located north of the east cargo area and west of the intersection of National Guard Drive and Minnesota Avenue.

1.4.8 Deicing Facilities

Aircraft operators de-ice aircraft when conditions warrant. De-icing fluids are applied by operators using a boom truck. De-icing fluid is stored in underground holding tanks just south of the ATCT parking lot. Used de-icing fluid cannot be introduced into stormwater runoff; inlets in the de-icing apron direct runoff to underground containment structure for eventual removal to the sanitary sewer system.

1.4.9 Maintenance Facilities and Snow Removal Equipment (SRE)

FSD maintenance facilities are located in the northern section of the Airport. The primary facility is north of the west general aviation area and just south of the SDARNG facilities. The primary facility was constructed in 2007 and provides 27,500 square feet of space for airport maintenance and SRE along with office and circulation space. FSD's equipment list includes airport vehicles, graders, sweepers, snow blowers, snowplows, sander trucks, loaders, tractors, skidsteers, mowers, and a crash fire rescue truck. Secondary maintenance and storage facilities for FSD are located east of the cargo apron and will likely be demolished during the planning period.

1.4.10 Aircraft Rescue and Firefighting (ARFF)

The SDANG owns and operates the ARFF equipment and building. The facility is located east of Runway 3/21 in the southwest corner of the SDANG complex. The ARFF building was constructed in 2000 and later expanded from its original 13,000 square feet to over 17,000 feet. The ARFF building is a five-bay facility and houses ARFF trucks, offices, living quarters and parking. FSD owns one of the trucks (1,500-gallon capacity).

The facilities and equipment meet the current standards for a Federal Aviation Regulation (FAR) Part 139 ARFF Index B, which applies to airports regularly serving air carrier aircraft less than 126 feet long. The ARFF index categories depicted in **Table 1-7** are determined by the length of the largest air carrier aircraft with at least five average daily departures in a single index group.

Table 1-7 ARFF Index Determination

Index	Aircraft Length
A	Less than 90 feet
B	At least 90 feet but less than 126 feet
C	At least 126 feet but less than 159 feet
D	At least 159 feet but less than 200 feet
E	At least 200 feet

Source: Code of Federal Regulations (CFR) 139.315, Aircraft rescue and firefighting: Index determination

1.4.11 Air Traffic Control Tower (ATCT) and Communication Facilities

ATCT controls traffic on the airside movement areas and airspace within five miles of FSD. Movement areas include taxiways, runways, and some apron areas. Non-movement and movement areas are divided by a double line, dashed on one side and solid on the other. FSD's Air Traffic Control Tower is located on the east side of the airport just north of the passenger terminal complex. The ATCT is open from 5 a.m. to 12:00 a.m. every day. The tower is over 50 years old and approaching the end of its useful life.

Terminal Radar Approach Control (TRACON) provides navigational guidance and separation to aircraft within 40 nautical miles of FSD. An Airport Surveillance Radar (ASR) facility that identifies aircraft in the local area is located on the far west side of the airport near the perimeter road.

Weather observations and other relevant airport information are available on the Automatic Terminal Information Service (ATIS) frequency of 126.60 MHz.

1.4.12 Access, Circulation, and Parking

All public airport access roads connect from Minnesota Avenue on the east side of the airfield. No direct public access is available to the north, south or west side of the airfield. SDANG uses controlled access to the southern part of the airfield. A perimeter road outside of the aircraft movement area exists to accommodate authorized vehicle movement to other airside and landside facilities. Information on passenger terminal area access, circulation and parking is provided in the passenger terminal section and depicted on **Figure 1-7: Terminal Area**.

The west general aviation area and SDARNG can be accessed from Minnesota Avenue via National Guard Drive. National Guard Drive loops around the Runway 21 and Runway 33 ends and becomes North Maverick Place after passing the north entrance to the SDARNG. Automobile parking for the west general aviation area is primarily located behind Maverick Air Center and Sanford Air facilities as depicted on **Figure 1-8: West General Aviation Area**.

The east cargo area can be accessed from Minnesota Avenue via North John Orr Drive while the east general aviation area can be accessed from Minnesota Avenue via West Hangar Street. Automobile parking for the east general aviation area is primarily located behind Signature Flight Support facilities as depicted on **Figure 1-10: East General Aviation Area**.

1.4.13 Utilities

This section discusses the utilities at the Airport and service providers when applicable.

Water

The City of Sioux Falls provides water service for domestic use and fire protection for FSD through a water main that loops around the airfield.

Sanitary Sewer

The City of Sioux Falls also provides sanitary sewer. Sewer service runs throughout the developed areas of the airfield except for the east GA t-hangar. Several lift stations throughout the airfield support service due to flat terrain, with the main lift station located near the southwest corner of the terminal building.

Electricity, Gas, and Communications

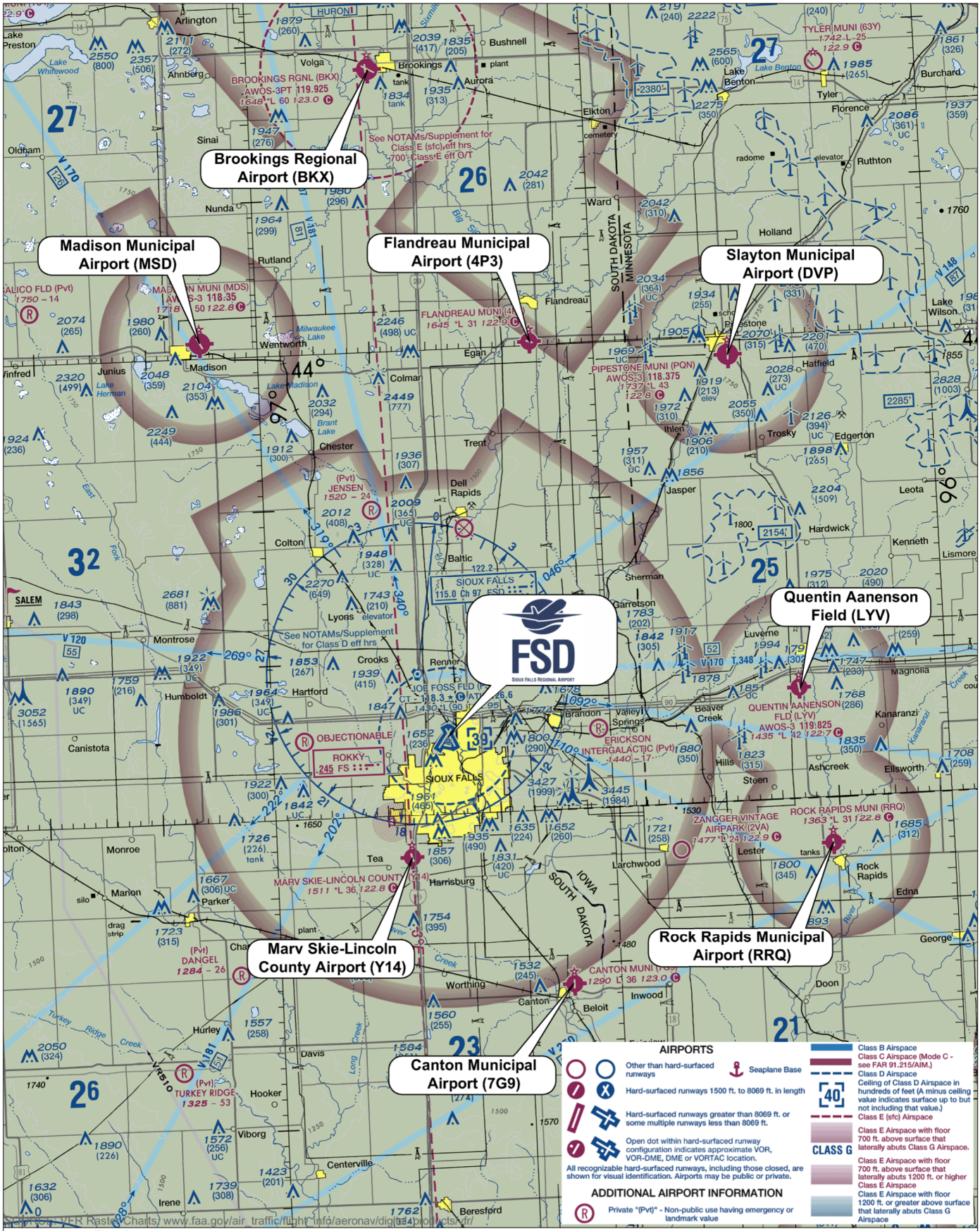
A combination of private and public companies provides services for electricity, gas, and communications. Infrastructure is already in place to serve airport users. Infrastructure to the meter point on each property is typically provided by utility companies and is recovered through monthly user fees.

Storm Sewer

Storm sewer pipe networks serve drainage basins throughout the developed areas on the east side of Airport and most of the airfield. Major storm trunklines for this area discharge to the Big Sioux River Diversion Channel on the east side of Minnesota Avenue. Storm sewer pipes convey drainage at the southwest end of the airfield and the west half of the SDANG and discharge runoff west into the oxbow along the northern edge of Elmwood Golf Course. Facilities on the west side of the airfield drain west and outlet to the Big Sioux River. Storm runoff from the terminal area is routed by inlets and storm pipes through detention ponds before discharging to the storm trunklines that leave the airport property. Numerous open grass areas rely on infiltration into the ground as another storm water management feature.

1.5 Airspace

As surrounding structures and land uses may affect navigable airspace, considering how FSD operations may be impacted by such structures and uses is important. **Figure 1-18: Surrounding Airspace** provides the VFR Sectional Chart for the region depicting different airspace classes as well as nearby airports.



SIOUX FALLS REGIONAL AIRPORT JOE FOSS FIELD

SURROUNDING AIRSPACE

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FIGURE 1-18

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X:\2890700\210946.01\TECHREPORTS\1 - INVENTORY\FIGURE 1-6 AIRPORT DIAGRAM.DWG

1.5.1 Other Airports in the Region

One of the closest airports is Lincoln County Airport in Tea, South Dakota. This airport is approximately 8 miles southwest of Sioux Falls Regional Airport and 2 miles east of the Runway 3 approach. This can be a safety hazard due to the high concentration of small and large aircraft in proximity.

Smaller general aviation aircraft often seek "reliever" airports due the increased traffic, security, procedures and delay at primary airports. The smaller public airports in the vicinity of FSD are constrained and have difficulty accommodating larger general aviation traffic.

The proximity of Lincoln County Airport poses operational challenges, and the FAA is looking into establishing Class C airspace to better control traffic around FSD.

1.5.2 Controlled Airspace

Controlled airspace is a term that covers the different classifications of airspace and defined dimensions within which air traffic control (ATC) service is provided in accordance with the airspace classification; this does not mean that controlled airspace must have a control tower in its immediate vicinity, but instead that some type of ATC authority is extended to the airspace.

Class A Airspace

Class A airspace generally begins at 18,000 feet mean sea level (MSL) up to 60,000 MSL throughout the United States and 12 nautical miles beyond each coast. This airspace requires an IFR flight plan and ATC approval to enter. Due to its beginning altitude, Class A airspace does not have a direct effect on FSD.

Class B Airspace

Class B airspace often surrounds the nation's busiest airports and extends from the surface to 10,000 feet MSL in multiple tiers of various dimensions, often resembling upside-down wedding cakes This classification design is intended to incorporate all instrument approaches into an airport. Class B is one of the most restrictive airspace classifications, requiring additional equipment on the aircraft and express permission from ATC to enter. The nearest class B airspace is located approximately 200 statute miles northeast of FSD and associated with Minneapolis-St. Paul International Airport.

Class C Airspace

Class C airspace is designed for airports with a control tower and radar approach control, but has fewer restrictions than Class B. This airspace generally extends from the surface to 4,000 feet above the airport elevation. The dimensions of Class C airspace are tailored to the specific airport, but usually consist of an inner 5-mile section surrounding the airport with an outer circle that begins at 1,200 feet above the airport elevation with a total diameter of 20 nautical miles. The nearest airport with Class C airspace is Eppley Airfield in Omaha, Nebraska. The airport is approximately 160 statute miles south of FSD. The FAA is reviewing the need to establish Class C airspace out to 20 nautical miles from FSD to control and safely separate traffic in the area.

Class D Airspace

Class D airspace generally extends from the surface to 2,500 feet above the airport elevation and is used for airports with a control tower, but not necessarily radar capacity. Similar to other airspace classes, Class D airspace is usually tailored to accommodate published instrument approaches at an airport. Airspace within 5 miles of FSD and 3,900 feet MSL and lower is Class D airspace. For aircraft to enter Class D airspace, contact must be established and maintained with the controlling agency, which in this case is the ATCT at FSD. TRACON provides clearance beyond the limits of Class D airspace for IFR aircraft and is also available to VFR aircraft.

Class E Airspace

By default, if airspace is controlled but not Class A, B, C, or D, then it is Class E airspace. Class E is unique in that it is a multifaceted airspace used in a variety of situations. Class E often begins at 1,200 feet above the airport elevation, and many of the smaller airports surrounding FSD are within Class E airspace. While the ATCT is in operation, FSD is Class D. While the ATCT is closed from 12:00 a.m. to 5:00 a.m., airspace reverts to Class E.

1.5.3 Uncontrolled Airspace

Uncontrolled airspace is any airspace that is not class A, B, C, D, or E, and is known as Class G airspace. Class G airspace is the only uncontrolled airspace in the NAS. ATC does not have the responsibility or authority to control air traffic in Class G, but there are visual flight rule minimums that apply to pilots operating in this area. Class G is common in low population areas where air traffic is sparse. Airspace Classifications and associated rules and requirements for entry are provided in **Figure 1-19**.

1.5.4 Special Use Airspace

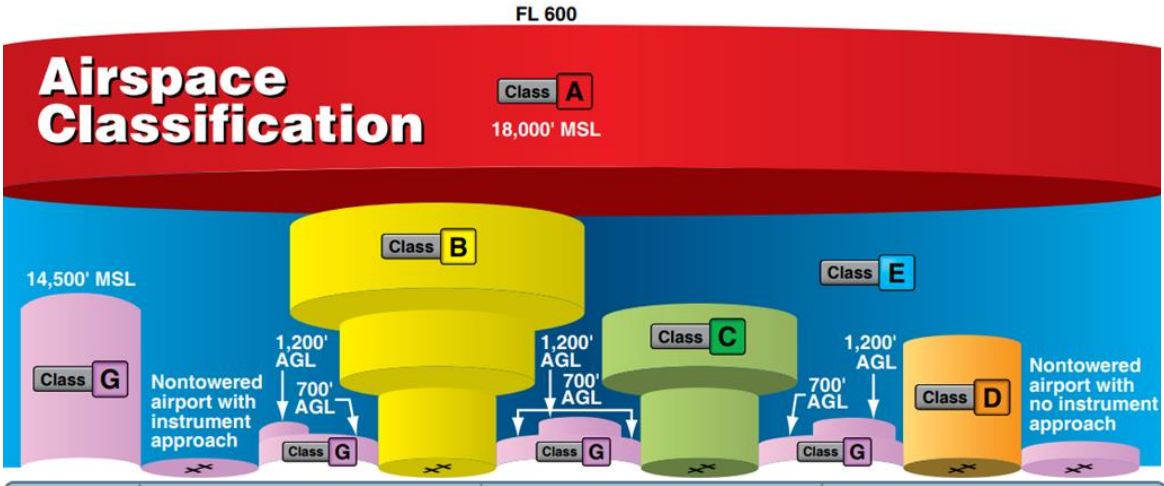
Special use airspace designates areas to which certain activities are confined and where additional limitations may be imposed on entering aircraft. While restrictions in these areas vary according to the use within the airspace, some may present hazards, and pilots are advised to maintain awareness. Although there are several types of special use airspace, only airspace types near FSD are discussed below.

Military Operations Area (MOA)

MOAs are established to separate certain military training activities from civilian IFR traffic. Examples of these activities are air combat tactics, air intercepts, aerobatics, formation training, and low-altitude tactics. When a MOA is active, IFR traffic may be cleared if separation can be provided. Civilian pilots operating under VFR are advised to exercise extreme caution and contact any Flight Service Stations within 100 miles of the area to obtain accurate real-time information concerning the MOA hours of operation.

The Lake Andes MOA is approximately 65 miles west of the airport and begins at 6,000 feet MSL and extends to 17,999 MSL. The MOA standards times of use are 9:30-12:00 p.m. and 2:00-5:00 p.m. Tuesday through Saturday. The Crypt North MOA is approximately 60 miles southeast of the airport and begins at 8,000 feet MSL and extends to 17,999 MSL. The MOA standards times of use are 9:30-11a.m. and 2:00-3:30 p.m. Tuesday through Saturday.

Figure 1-19 Airspace Classification



Class Airspace	Entry Requirements	Equipment*	Minimum Pilot Certificate
Class A	ATC clearance	IFR equipped	Instrument rating
Class B	ATC clearance	Two-way radio, transponder with altitude reporting capability	Private—(However, a student or recreational pilot may operate at other than the primary airport if seeking private pilot certification and if regulatory requirements are met.)
Class C	Two-way radio communications prior to entry	Two-way radio, transponder with altitude reporting capability	No specific requirement
Class D	Two-way radio communications prior to entry	Two-way radio	No specific requirement
Class E	None for VFR	No specific requirement	No specific requirement
Class G	None	No specific requirement	No specific requirement

Source: Pilot's Handbook of Aeronautical Knowledge, FAA-H-8083-25B

1.5.5 FAR Part 77 Surfaces

Federal Regulation Title 14 Part 77 was established to protect aircraft operating in proximity to an airport from obstructions such as towers, buildings, and other tall objects. This is done in part through listing standards used to determine obstructions to air navigation and providing notification. Notification allows the FAA to identify potential aeronautical hazards in advance thus preventing or minimizing the adverse impacts to the safe and efficient use of navigable airspace. FAR Part 77.19 includes five "imaginary surfaces" The surfaces vary in dimension based on the type of aircraft expected to use the runway and type of instrument approaches procedures available to the runway. (**Figure 1-20**).

Primary Surface

The primary surface is centered longitudinally on the runway centerline at the same elevation as the runway and extends 200 feet beyond each end of FSD runways. The primary surface is 1,000 feet wide for Runway 3/21 and 500 feet wide for Runways 15/33 and 9/27.

Approach Surface

The approach surface is centered on the runway centerline and extends longitudinally upward and outward away from the primary surface at each end of a runway. The inner width of the approach surface is the same width as the primary surface and expands uniformly to a width of 16,000 feet for Runway 3/21 and 3,500 feet for Runways 15/33 and 9/27.

Transitional Surface

The transitional surface is centered on the runway centerline and extends outward and upward perpendicularly from the width of the primary surface at a slope of 7:1 until a height of 150 feet above an airport where it intersects with the horizontal surface. Transitional surfaces also extend outward and upward perpendicularly from precision approach surfaces at a slope of 7:1.

Horizontal Surface

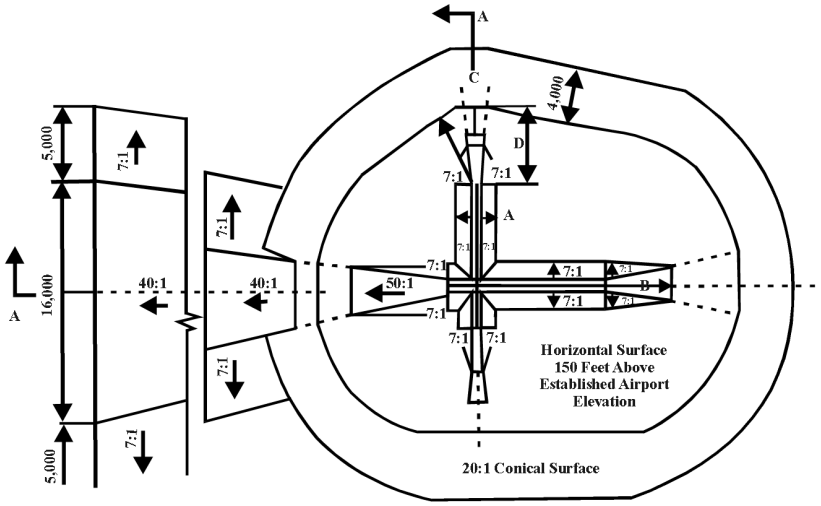
The horizontal surface is a horizontal plane located 150 feet above an airport and intersects with the transitional and conical surfaces. The perimeter of the horizontal surface is formed by lines of tangent from arcs generated from each runway end. The radii of the arcs are 10,000 feet for all runway ends at FSD.

Conical Surface

The conical surface extends outward and upward from the perimeter of the horizontal surface at a slope of 20:1 for a horizontal distance of 4,000 feet. The dimensions of this surface are also the same for all runways, regardless of type of runway, approach, or visibility minimums.

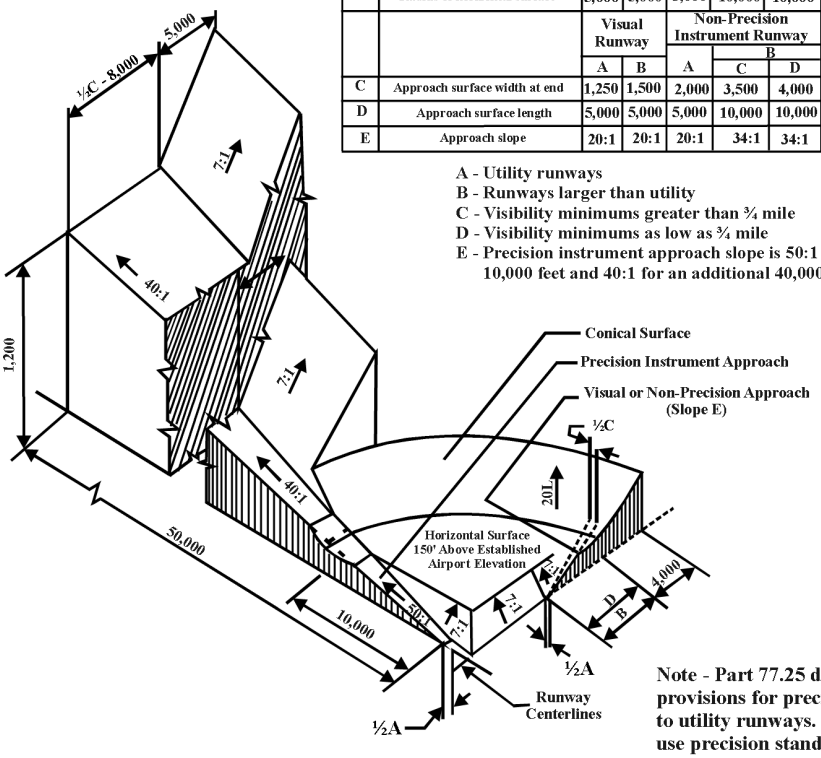
Part 77 surfaces are often relied on when developing land use compatibility policies and zoning for airports.

Figure 1-20 Part 77 Imaginary Surfaces



DIM	ITEM	Dimensional Standards (Feet)					
		Visual Runway		Non-Precision Instrument Runway			Precision Instrument Runway
		A	B	A	B C	B D	
A	Width of primary surface and approach surface width at inner end	250	500	500	500	1,000	1,000
B	Radius of horizontal surface	5,000	5,000	5,000	10,000	10,000	10,000
		Visual Runway		Non-Precision Instrument Runway			Precision Instrument Runway
		A	B	A	B C	B D	
C	Approach surface width at end	1,250	1,500	2,000	3,500	4,000	16,000
D	Approach surface length	5,000	5,000	5,000	10,000	10,000	*
E	Approach slope	20:1	20:1	20:1	34:1	34:1	*

A - Utility runways
B - Runways larger than utility
C - Visibility minimums greater than ¾ mile
D - Visibility minimums as low as ¾ mile
E - Precision instrument approach slope is 50:1 for inner 10,000 feet and 40:1 for an additional 40,000 feet



Note - Part 77.25 does not make provisions for precision approaches to utility runways. In these situations, use precision standards for other than utility runways to develop the primary, approach, and transition surfaces.

1.6 Airport Zoning

This section summarizes the zoning ordinances applicable to the Airport and surrounding environment. While the FAA can provide guidance and funding toward zoning development, the power to adopt, implement and enforce zoning rests with state and local government. When airport sponsors accept federal funds from the FAA, they must agree to certain obligations or assurances. FAA grant assurances 20 and 21 require airports take appropriate action to protect airspace and restrict land uses in the immediate vicinity to those compatible with airport operations.

> ***20. Hazard Removal and Mitigation**. It will take appropriate action to assure that such terminal airspace as is required to protect instrument and visual operations to the airport (including established minimum flight altitudes) will be adequately cleared and protected by removing, lowering, relocating, marking, or lighting or otherwise mitigating existing airport hazards and by preventing the establishment or creation of future airport hazards.*
>
> ***21. Compatible Land Use**. It will take appropriate action, to the extent reasonable, including the adoption of zoning laws, to restrict the use of land adjacent to or in the immediate vicinity of the airport to activities and purposes compatible with normal airport operations, including landing and takeoff of aircraft.*

Zoning authority on airport property rests with both the Sioux Falls Regional Airport Authority as well as the City. Outside of airport property, the City of Sioux Falls and Minnehaha County have primary zoning control over property in the immediate vicinity of FSD.

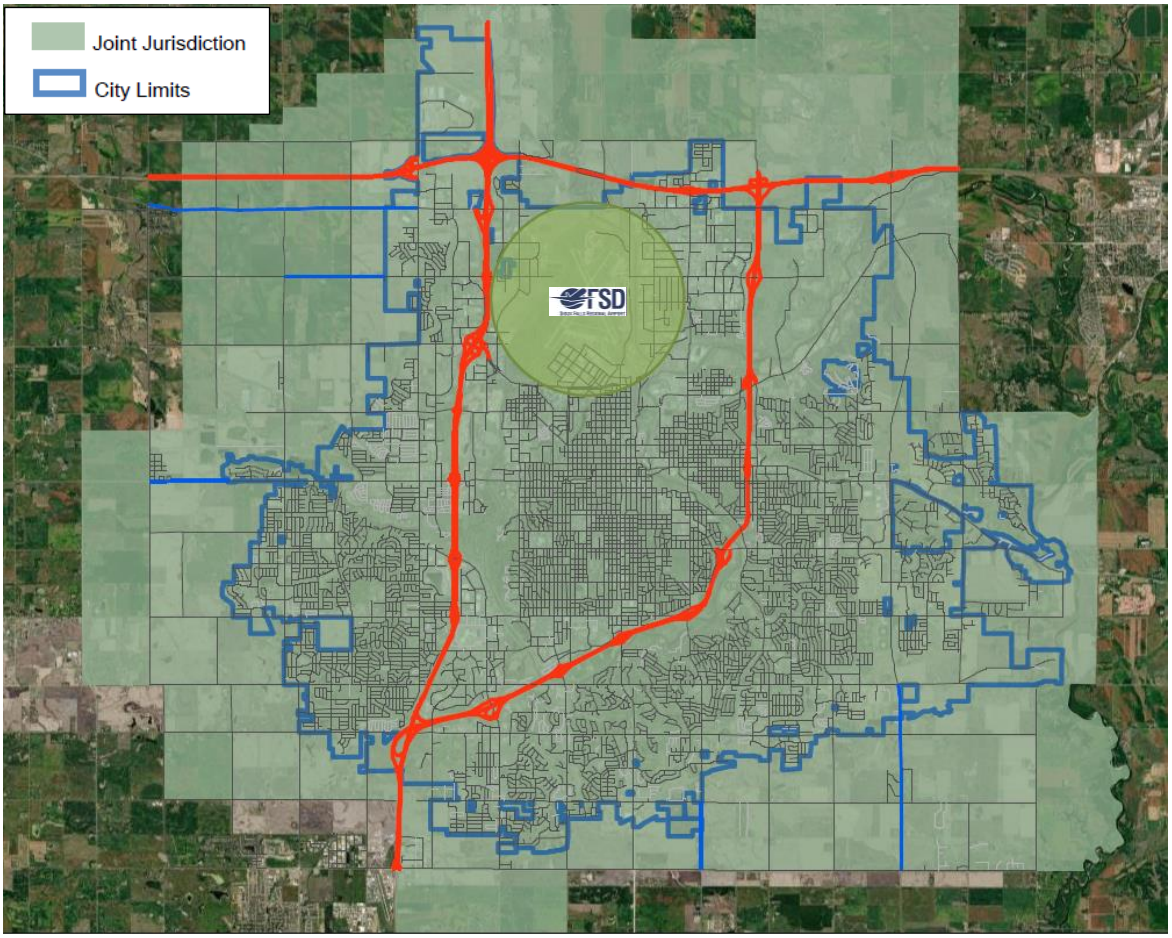
1.6.1 City Zoning

Sioux Falls has airport-specific zoning, including an airport overlay zoning ordinance that regulates the height of buildings, structures, and trees, as well as any other potential hazards to safe aerial navigation in the area around the airport. Additionally, the City's code of ordinances provides the option for the Airport to negotiate conveyance of an avigation easement with a property owner if land within the airport influence overlay district is proposed to be subdivided, substantial construction of a habitable structure is proposed, or a zoning change proposed.

1.6.2 County Zoning

Per South Dakota code, counties and cities can enter into joint planning and zoning agreements. There is joint jurisdiction between City of Sioux Falls and both counties (**Figure 1-21**). Minnehaha County and Lincoln County both have zoning ordinances with airspace controls limiting heights of objects consistent with City of Sioux Falls zoning.

Figure 1-21 Joint Jurisdiction



Source: City of Sioux Falls Parcel Finder

1.6.3 Compatible Land Use Plan

A major component of this planning study is development of a Compatible Land Use Plan (CLUP) to evaluate existing zoning and land use policies and then provide recommendations to better protect FSD in its current and future (planned) layouts. As growth and development continues at the airport as well as in the surrounding communities, it is important growth can occur without disrupting airport operations, compromising the safety of persons on the ground, or significantly impacting economic growth of areas surrounding FSD. The CLUP completed as part of this master plan effort is included in **Appendix I.** The CLUP provides additional information on existing zoning as well as future zoning recommendations.

1.7 Constraints and Opportunities

FSD development options are limited by constraints including the Big Sioux River, Elmwood Golf Course, Minnesota Avenue, railroads, and National Guard facilities. Optimizing the use of airport property for development is critical.

1.7.1 Constraints

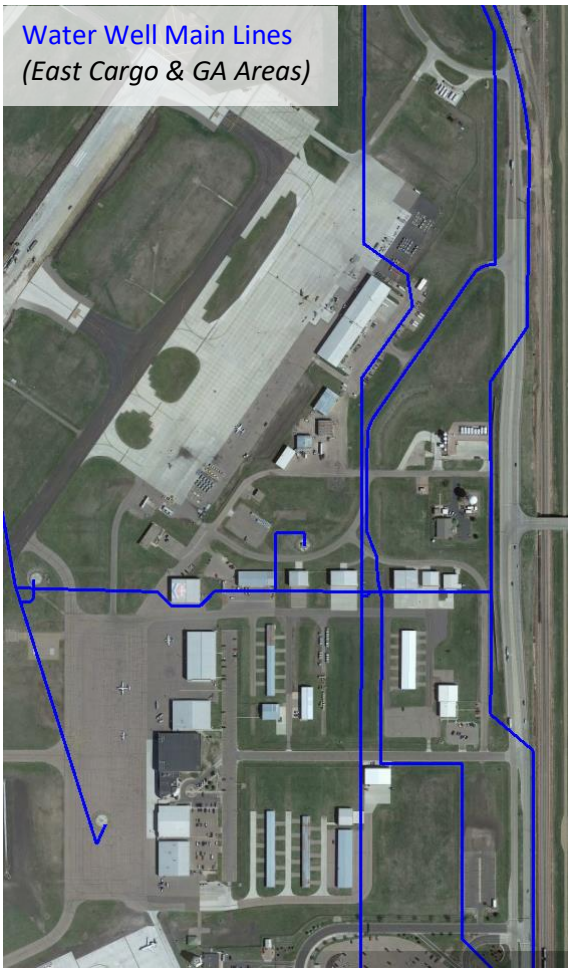
Infrastructure, environmental and other development constraints are listed below.

Access

All Airport access points originate from Minnesota Avenue on the eastern side of the airport. Additional access points from the west or north would improve access efficiency for existing development in the West General Aviation Area and have the potential to open up additional space on the west side of the airfield for development. Bridge construction over the Big Sioux River would be required for new access points on the north and west side of the airfield.

Existing Facilities

Existing facilities in development areas would need to be removed or relocated in order to maximize development potential. FSD support buildings south of the east cargo apron will need to be removed for cargo expansion to extend further south. Also, the radar facility on the west side of the airfield and the ASOS northwest of the Runway 3 end have the potential to limit the type and height of development near the facilities. Numerous water wells and water well main lines are located on the airfield, limiting development capability.



Environmental Considerations

The Airport is surrounded by a diverse ecosystem anchored to the Big Sioux River and the Big Sioux Aquifer. Potential environmental impacts will be factored into alternative evaluation.

Instrument Approach Procedure (IAP) Capability

Limitations on IAP capability diminish FSD's capacity to accommodate aircraft in times of poor visibility. This plan will evaluate alternatives that have the potential to materially improve instrument approach minimums and increase access to the airfield, specifically Runway 15/33. Currently, Runway 15/33 is limited to instrument approaches with 1-mile visibility. Elevated

terrain north and northwest of the Runway 15 end constrains capability for Runway 15. Roadways and structures off the Runway 33 end constrain IAP capability for Runway 33.

1.7.2 Opportunities

Community Growth

Sioux Falls and surrounding communities are growing and thriving. According to 2020 census data, the population of Sioux Falls has increased more than 25 percent over the past decade. Sioux Falls also has an exceptional business climate, resulting in a #1 ranking on Forbes' list of Best Small Cities for Business and Careers. The continued growth and economic health of the region will likely result in increased aviation activity at FSD. The following chapter provides more detail on projected activity growth.

Parking Garage

Construction of a parking garage across from the terminal entrance is expected to begin in 2023. The parking garage will help accommodate parking demands without expanding the parking area footprint.

Air Traffic Control Tower

The existing control tower is over 50 years old and will likely need to be replaced or relocated during this twenty-year planning period. ATCT location is critical to safe and efficient operations and development of the airport. Raising the tower elevation near the existing site or relocating the tower to a different location on the airfield would reduce line-of-sight challenges, allowing future facility expansion to occur without operational impacts to ATC.

Federal Funding

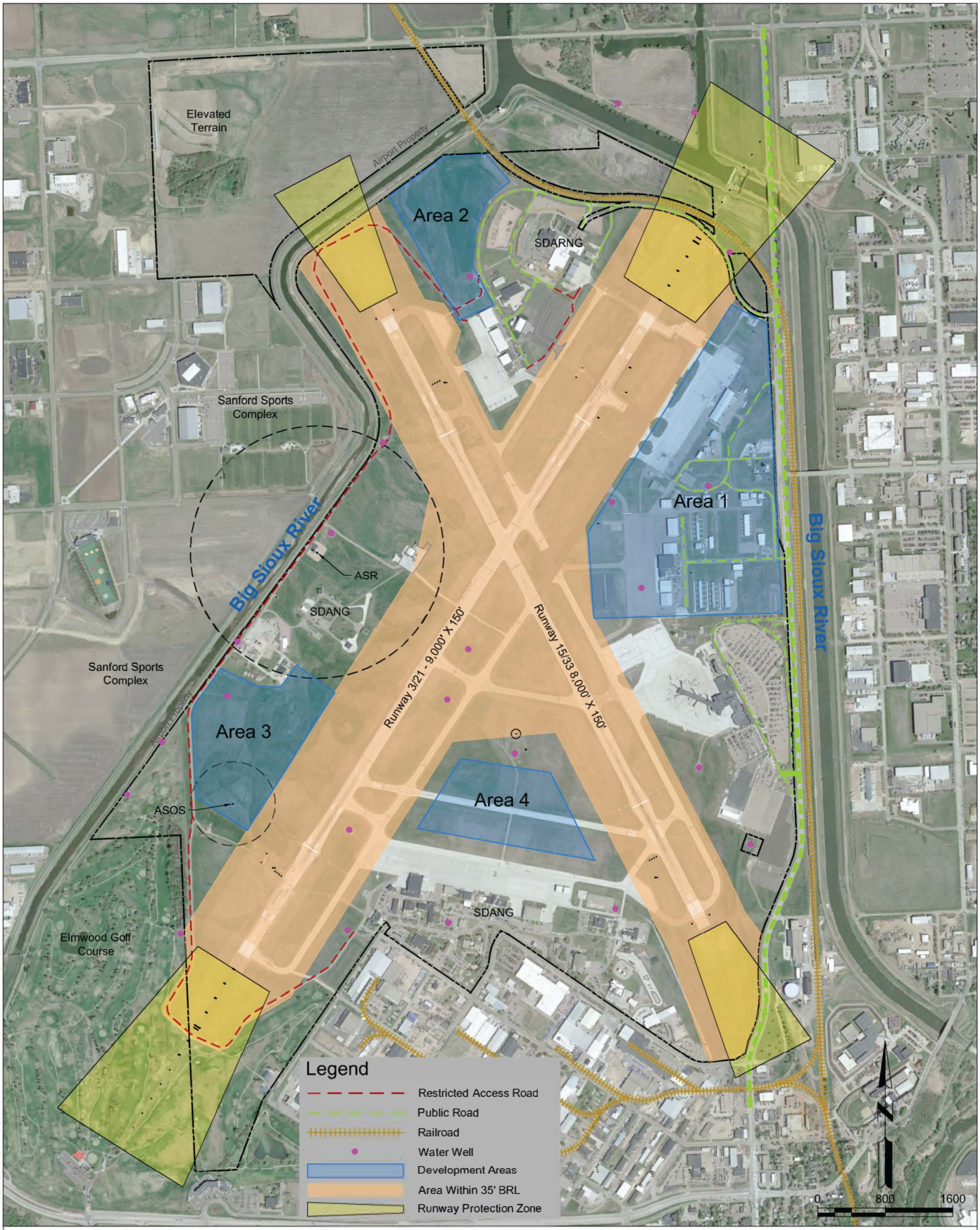
In addition to federal funding sources available to FSD on a typical basis, the 2021 Infrastructure Investment and Jobs Act provides $25 billion in airport infrastructure over five years. This funding includes $5 billion specifically for airport terminals and $5 billion for air traffic facilities and navigational aid upgrades. This funding will likely free up traditional Airport Improvement Program funding, allowing more funding opportunities for other airport development.

Nonaeronautical Development

Airport property that isn't suitable for aeronautical development could potentially be utilized for nonaeronautical purposes. This study will review and evaluate opportunities for nonaeronautical development.

1.7.3 Development Areas

Subsequent chapters evaluate options to maximize the use of space in developable areas and infrastructure needed to render the areas developable. Alternative development considerations will include site constraints, environmental resource categories, highest and best use of available property, utility locations, access, circulation, off-airport development, building height restrictions, and other design standard constraints. Four areas of particular interest for future development or reconfiguration are discussed below and depicted in **Figure 1-22**.



12/2/2021 11:23:43 AM
X:\2890700\210946.01\TECHREPORTS\1 - INVENTORY\FIGURE 1-21 CONSTRAINTS & DEVELOPMENT AREAS.DWG

FSD
SIOUX FALLS REGIONAL AIRPORT

SIOUX FALLS
REGIONAL AIRPORT
JOE FOSS FIELD

2890700-210946.01
DECEMBER 2021

CONSTRAINTS & DEVELOPMENT AREAS

Mead & Hunt

FIGURE 1-22

Area 1

Area 1 includes the East Cargo and East General Aviation Areas. Future reconfiguration of these areas will be necessary to maximize space for hangar development and accommodate additional cargo facility growth. The East General Aviation Apron is currently limited to Design Group II aircraft under 60,000 pounds. East GA hangar access is limited in areas to aircraft with wingspans below 55 feet due to Taxilane Object Free Area (TOFA) separation requirements. As indicated above, numerous water wells and water well main lines exist in this area, limiting current development capability.

Area 2

Area 2 includes undeveloped property north of the Maverick Air Center facilities and west of the SDARNG. Airside connectivity would require construction of a taxilane and/or apron expansion from the West General Aviation Apron. Area 2 development would benefit from construction of a north access point across the Big Sioux River.

Area 3

Area 3 is directly west of the Runway 9 end. It abuts SDANG facilities to the north, the Big Sioux River to the west and Elmwood Golf Course to the southwest. Runway 9/27 is planned to be decommissioned and converted to a taxiway, increasing the amount of developable space in this area. Feasibility of development in this area will be evaluated in subsequent chapters. Additional infrastructure needed for aeronautical development would include:

- **Public access.** A bridge over the Big Sioux River from the Sanford Sports Complex would likely be required to avoid operational impacts and meet FAA Approach Surface and RPZ standards.
- **Runway/taxiway access.** A partial parallel taxiway, or at a minimum, a direct connector to Runway 3/21 would be necessary.
- **Potential ASOS relocation.** To maximize development potential in the area, the ASOS would need to be relocated to avoid impacting ASOS weather sensors.

Area 4

Area 4 is directly north of the SDANG apron. Similar to Area 3, Runway 9/27 would need to be decommissioned for this area to be developable. Providing public access to the area would be difficult and practical development of the area may be limited to expansion of SDANG facilities or relocating FSD or FAA facilities such as the ASOS here to increase development space in other areas. Feasibility of development in this area will evaluated in subsequent chapters.

1.8 Inventory Summary

Information obtained during the inventory effort provides a baseline to evaluate how well existing facilities can accommodate current and future demand. An understanding of infrastructure improvements needed for the Airport to meet the air transportation requirements for the next 20 years and beyond is gained through this evaluation. Alternatives are then developed to address facility requirements, and an implementation plan will evaluate how planned projects will be phased and funded. The Master Plan culminates in development of the Airport Layout Plan, which is a graphical depiction of the existing and future airfield layouts.