# Master Plan

## *Redfield Municipal Airport*
## *Redfield, South Dakota*

FAA AIP # 3-46-0049-010-2016
HELMS PROJECT #A-6302

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# TABLE OF CONTENTS

# LIST OF FIGURES, TABLES, AND PHOTOS

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# ACRONYMS

| | |
|---|---|
| AC | Advisory Circular |
| AC-FT | Acre-Feet |
| ACN | Aircraft Classification Number |
| ADO | Airports District Office |
| AIP | Airport Improvement Program |
| ALP | Airport Layout Plan |
| ARC | Archaeology Research Center |
| ARFF | Airport Rescue Fire Fighting |
| ASOS | Automated Surface Observing System |
| BMPs | Best Management Practices |
| CATEX | Categorical Exclusion |
| CEQ | Council on Environmental Quality |
| CFS | Cubic Feet per Second |
| CY | Cubic Yards |
| DNL | Day/Night average sound Level |
| dB | Decibels |
| DENR | Department of Environment and Natural Resources |
| DME | Distance Measuring Equipment |
| EA | Environmental Assessment |
| EIS | Environmental Impact Statement |
| EO | Executive Order |
| EPA | Environmental Protection Agency |
| $^{o}$F | Fahrenheit |
| FAA | Federal Aviation Administration |
| FBO | Fixed Base Operator |
| FEMA | Federal Emergency Management Agency |
| FIRM | Flood Insurance Rate Maps |
| GA | General Aviation |
| IFR | Instrument Flight Rules |
| ILS | Instrument Landing System |
| MIRL | Medium Intensity Runway Lighting |
| MITL | Medium Intensity Taxiway Lighting |
| NAAQS | National Ambient Air Quality Standards |
| NEPA | National Environmental Policy Act |
| NFIP | National Flood Insurance Programs |
| NHPA | National Historic Preservation Act |
| NPDES | National Pollutant Discharge Elimination System |
| NPIAS | National Plan of Integrated Airport Systems |
| NRHP | National Register of Historic Places |
| NTSB | National Transportation Safety Board |
| NRCS | Natural Resources Conservation Service |
| NDB | Non-Directional Radio Homing Beacon |
| NOI | Notice of Intent |
| NWI | National Wetlands Inventory |

| | |
|---|---|
| NWS | National Weather Service |
| PCN | Pavement Classification Number |
| PAPI | Precision Approach Path Indicators |
| ROFA | Runway Object Free Area |
| ROFZ | Runway Obstacle Free Zone |
| RSA | Runway Safety Area |
| RPZ | Runway Protection Zone |
| SD | South Dakota |
| SD DENR | South Dakota Department of Environment and Natural Resources |
| SD DOT | South Dakota Department of Transportation |
| SD GF&P | South Dakota Department of Game, Fish, and Parks |
| SHPO | State Historic Preservation Officer |
| SPONSOR | City of Redfield |
| SRE | Snow Removal Equipment |
| SWPPP | Storm Water Pollution Prevention Plan |
| TACAN | Tactical Air Navigation Aid |
| T&E | Threatened and Endangered |
| THPO | Tribal Historic Preservation Officer |
| US ACOE | United States Army Corps of Engineers |
| USDA | United States Department of Agriculture |
| USFWS | United States Fish and Wildlife Service |
| VOR | Very High Frequency Omni Directional Range |
| VASI | Visual Approach Slope Indicator |
| WHA | Wildlife Hazard Assessment |
| WHMP | Wildlife Hazard Management Plan |

# Applicable Regulations, Policy, and Guidance

FAA A/C 150/5190-4, A Model Zoning Ordinance to Limit Height of Objects Around Airports

FAA A/C 150/5200-33, Hazardous Wildlife Attractants on or Near Airports

FAA A/C 150/5300-13A, Airport Design

FAA A/C 150/5300-16, General Guidance and Specifications for Aeronautical Surveys

FAA A/C 150/5300-18, General Guidance and Specifications for Submission of Aeronautical Surveys to NGS: Field Data Collection and Geographic Information System (GIS) Standards

FAA A/C 150/5320-6, Airport Pavement Design and Evaluation

FAA A/C 150/5325-4, Runway Length Requirements for Airport Design

FAA A/C 150/5335-5, Standardized Method of Reporting Airport Pavement Strength - PCN

FAA A/C 150/5340-1, Standards for Airport Markings

FAA A/C 150/5340-30, Design and Installation Details for Airport Visual Aids

FAA Order 5050.4B, National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions

FAA Order 5100.38C, Airport Improvement Program Handbook

FAA Order 5200.8, Runway Safety Area Program

FAA Order 5200.11, FAA Airports (ARP) Safety Management System

FAA Order 5300.1, Modifications to Agency Airport Design, Construction, and Equipment Standards

FAA Joint Order JO 7400.2, Procedures for Handling Airspace Matters

FAA Order 8260.19, Flight Procedures and Airspace

14 CFR 77, Safe, Efficient Use, And Preservation of the Navigable Airspace

# Executive Summary

The City of Redfield, in recognizing the need for a comprehensive plan for the future development of its airport, contracted with Helms and Associates to complete a Master Plan. Elements included in the Master Plan include a current inventory of the airport facilities, aviation forecasts, facility requirements, alternative development, alternative implementation, environmental considerations, and an Airport Layout Plan (ALP).

The overall objective of this airport Master Plan is to provide a tool for the airport sponsor that can be used in long term planning and as a reference for current operations of the airport. This is accomplished by examining the existing conditions of the airport and community and providing for future growth and expansion of both. The plan must be reasonable with enough flexibility to allow adaptation to unforeseen future events and developments.

An ALP is a graphical representation of the current layout, along with a staged development to accommodate growth within the Federal Aviation Administration (FAA) standards. The ALP will be provided to the airport sponsor. Accompanying the ALP is the Master Plan which describes the ALP and clarifies some of the issues shown on the ALP. The Master Plan also gives the background for the decision-making process used to produce the ALP.

Inventory

The airport was activated in 1945 as a public use airport for the City of Redfield and the surrounding community. The airport is located southwest of Redfield with a single asphalt runway, Runway 17/35 (3,500' x 75'). Runway 17/35 has non precision marking with a jug-handle turnaround on the 35 end. Other infrastructure on the airport includes a General Aviation Terminal/Snow Removal Equipment building and private hangars. Redfield Municipal Airport (1D8) is not regularly attended. Access to the airfield is provided by US Highway 281, to the asphalt access road, which leads to the private hangar access and the SRE building.

Forecasts

Forecasts of airport activity are critical to future development to ensure the proper type and size of planned facilities are implemented. Through the use of relative literature, airport personnel, and professional experience, credible forecasts for aircraft operations were established. Though the airport has had a variation in number of based aircraft. The airport currently has 10 based aircraft which include 9 single engine and 1 multi engine. Small general aviation traffic, B-I (approach speeds of <91 knots, wingspans <49 feet, and tail height <20 feet) and B-II (approach speeds of 91 – 121 knots, wingspans 49 < 79 feet, and tail height 20 – 30 feet) report an estimated 4,000 operations per year.

Future projections for aircraft operations includes increases in local small general aviation and general utility aviation aircraft. The total operations are projected to reach 5,500 with 17 based aircraft. The critical design group of aircraft for the existing, future, and ultimate conditions for Runway 17/35 are B-II small aircraft. The critical taxiway design group for the airport is II.

Facility Requirements

The ALP kept flexibility a key component in addressing overall improvements at the airport. A number of FAA guidelines were applied to ensure compatible use of the airfield space. The FAA's airport design requirements are based solely on wind data, approach speed, and wingspan of the aircraft anticipated to use the airport. The ultimate primary runway is designed to handle 100% of the fleet of aircraft requiring greater than a 3,500' runway length at sea level, specifically B-II aircraft. It is recommended to extend the length to 4,800' in the future. A crosswind runway has been identified as a need at the airport.

Planned Development

A number of items were considered for improvements in the current use of the airport and to improve overall safety of the airfield.

- Acquisition of an AWOS III
- Construction of 10' Wildlife Fence
- Construction of Parallel Taxiway
- Reconstruction of Apron and Hangar Taxilanes
- Expansion of Apron, Hangar Taxilanes, and Hangar Areas
- Construct Crosswind Runway

The above referenced projects are planned over a 10 to 20 year time frame to factor in available funding, future demand, and length of time needed for planning, environmental review, and construction. Funding for the Redfield Municipal Airport comes from local city funds, South Dakota Aeronautic Trust Fund, and FAA Airport Improvement Program (AIP) grants. Previously, the FAA grants were set at a 90% federal, and include 5% local and 5% state share match. However, recently (September, 2019) the South Dakota Aeronautics Commission passed a motion adjusting the state share to 3.5% and the local share to 6.5%.

Environmental Overview

In order to make improvements on an airport, three forms of the environmental review process to be considered are Categorical Exclusion (CATEX), Environmental Assessment (EA), and the Environmental Impact Statement (EIS). Depending on the areas affected by the proposed improvements, one or all three of these processes will be required and eventually broken down into impact categories. These categories are from the FAA Environmental Desk Reference and should be considered in the environmental document prior to receiving funding for each project.

# Preface

## *Introduction*

The Federal Aviation Administration (FAA) has developed the master planning process to assist all airports in the preparation for future growth and improvement plans to meet aviation demand and safety concerns. The Master Plan for the Redfield Municipal Airport (1D8) will provide development and expansion framework for a 5-year, 10-year, and 15-year planning period starting from base year 2018.

This Master Plan follows the guidance in FAA Advisory Circular (AC) 150/5070-6B, which provides flexible guidance to the approach of master planning that devotes resources and attention to critical issues.

The preparation of this document was supported, in part, with financial assistance through the Airport Improvement Program from the Federal Aviation Administration (Project Number AIP 3-46-0049-010-2016 as provided under Title 49 U.S.C., Section 47104. The contents do not necessarily reflect the official views or policies of the FAA. Acceptance of this report by the FAA does not in any way constitute a commitment on the part of the United States to participate in any development depicted herein.

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# Chapter One – Current Airport Facility

This chapter will discuss the background and airfield data of the airport (ALP Sheet 2 & 3). These include the airside facilities such as the runway, taxiways, navigational aids, aprons; and the landside facilities such as the access road, hangars, parking, fencing, etc.

## *1.1 Background*

The Redfield Municipal Airport (1D8) is located on approximately 180 acres on the southwest edge of the City of Redfield in Spink County, SD. The Redfield Municipal Airport serves the City of Redfield and the surrounding area. It has two major highways through town, US Highway 281 runs north and south and US Highway 212 runs east and west.

### *1.1.1 Airport Role*

Redfield Municipal Airport is part of the National Plan of Integrated Airport Systems (NPIAS). This system provides federal aid to the airport on condition that all criteria are met. The airport must be used for public purposes on publicly owned land. Depending on the level of service, the airport can receive additional funding to maintain operations and functions at the airfield.

- Commercial Service – publicly owned airport that enplane 2,500 or more passengers annually and receive scheduled passenger aircraft service
    - Primary – airport that enplanes more than 10,000 passengers annually
    - Non-primary - enplanes between 2,500 and 10,000 passengers annually

- General Aviation (GA) – airports not classified as commercial service
    - Reliever – airport having a function that relieves a commercial service airport and provides more GA access to local community (may include privately owned airports)
    - Privately owned public-use – enplanes 2,500 or more passengers annually and receives scheduled passenger service, but are classified as GA because they are not publicly owned
    - Other GA – intended to serve the needs of GA users

The criteria for Redfield to be part of the NPIAS includes an airport that has remained in current compliance with a previous Airport Improvement Program (AIP) grant. The airport must also be included in an accepted State Airport System Plan (SASP) with at least 10 based aircraft and serve a community located 30 minutes or more ground travel time from the nearest existing or proposed NPIAS airport. The proposed airport located 30 minutes or more average ground time travel may be included if there is at least 10 based aircraft at the airport within the first year of operation. 1D8 has continued to meet these requirements and annually receives $150,000 in AIP entitlement. Entitlements funds may be saved up to four years before the airport loses those dollars. Funds may also be transferred between airports as the FAA and the South Dakota Office of Aeronautics determine which airports have the most immediate need. The NPIAS and AIP are further discussed in Section 1.1.5.

### *1.1.2 Socioeconomic Factors*

The socioeconomic features of Redfield will influence future development at the airport. In order to determine positive and/or negative effects, characteristics of Redfield including employment, demographic patterns, and income were investigated. By examining these factors, forecasts can be developed more accurately in regards to the aviation industry and the direction it may be going.

*Locale*

The City of Redfield was first settled in 1878 and the name "Redfield" adopted in 1881 after J.B. Redfield, a railroad conductor. Redfield flourished due to its status a railroad center served by the Chicago and North Western Railway and the Milwaukee Road Railroad. Redfield College was established in 1885 and operated until 1932. The college had four departments: College of Arts & Science, German Department, Music Department, and the academy. The short life of the college was due to financial hardships and was later merged with Yankton College in Yankton, SD.

In 1908, the Chinese Ringneck Pheasant was released just north of Redfield, and ever since this small town has been known as the "Pheasant Capital of the World ®." In addition to outstanding hunting, Redfield Lake is located on the west side of the City on Turtle Creek. One of the best fishing spots in the region is located on Mud Lake, six miles south of Redfield. Fisher Grove State Park just eight miles east of Redfield on the James River is right next to the Fisher Grove Country Club that boasts nine exceptional holes of golf. The City Park has an outdoor swimming pool with 103' water slide and wading pool. The Park and Rec department sponsors multiple year round recreation programs including swimming, golf, tennis, bowling, softball, baseball, T-ball, track and field.

The Redfield School District classes are attended by more than 600 students. In 2016, voters approved a $16 million bond issue to build a new school. The existing school is 100 years old and in need of replacement to comply with ADA accessibility, improve safety and security, and provide a modern living environment. Construction began in 2017 and will last approximately two years.

The Community Memorial Hospital and Redfield Clinic Avera is a 25 bed facility that provides three doctors and five physician's assistants. The City of Redfield has two nursing homes with a total of 117 beds and an assisted living with 22 beds. Two dentists, one optometrist, and one chiropractor also provide services in the area. The Spink County ambulance covers approximately 1800 square miles.

*Population*

The population for the City of Redfield has been steadily declining since its peak population in 1980 at 3,027 to its estimated population in 2017 at 2,295. Spink County population has also decreased from its peak of 11,136 in 1920 to an estimated 6,415 in 2018. Table 1 shows a considerable decrease in population from 2000 to the 2010 census. However, South Dakota population has shown a considerable increase and is expected to continue growing.

**Table 1: Population Trends from 2000 and 2010 Census**

| Location | 2000 | 2010 | 2017 (Estimated) | Annual Growth Rate (2000 – 2010) |
|---|---|---|---|---|
| Redfield, South Dakota | 2,897 | 2,333 | 2,295 | (19.4%) |
| Spink County | 7,454 | 6,415 | 6,410 | (13.9%) |
| South Dakota | 754,844 | 814,180 | 869,686 | 7.9% |

*Employment*

The South Dakota Development Center is the largest employer in Redfield with 425 employees. The SDDC provides developmental disability care, human services, and mental health services. The Community Memorial Hospital has 140 employees, Redfield Public School has 100 employees, and Avantara employs 70. Spink County employs approximately 60 individuals.

*Income*

According to the 2016 American Community Survey, the median household income for South Dakota is $52,078 and the median household income for Redfield is $41,364. From the 2010 census the average household size was 2.22 for Redfield and 2.13 for South Dakota. The percentage of individuals below the poverty line is 13.4% for Redfield and 15.5% for South Dakota.

## *1.1.3 Climatic Conditions*

Weather plays a vital role in the planning efforts of an airport. Runway design depends on the prevailing winds and temperature to determine orientation and length requirements. If the area experiences low visibility conditions for long periods of time, that airport may require instrument approach procedures. Those approaches also entail a greater airspace and imaginary surface requirements. Precipitation in any form impacts the airport whether it be visibility issues or maintenance equipment needed to ensure safety of aircraft planning to use the airport.

*Redfield Weather*

According to U.S. Climate Data, Redfield experiences its highest average temperature in July at 85°. June has the highest amount of rainfall at an average of 3.5 inches. The average annual rainfall for the County is 21.84 inches. Average snowfall for the area is 37 inches during the winter months.

## *1.1.4 Adjacent Airports*

1D8 is centrally located between three commercial service airports: Aberdeen Regional Airport is 36 nautical miles north, Watertown Regional Airport is 59 nautical-miles east and Pierre Regional Airport is 75 nautical miles west. There is no need for airline services. Table 2 lists five nearby airports with instrument procedures and includes the flying distance, primary runway length, and number of based aircraft. Figure 1 shows an aerial image of the location of the airport in relation to the City and surrounding area.

**Table 2: Nearby Airports**

| Airport | Flying Distance from 8D7 (miles) | Primary Runway Length | Based Aircraft |
|---|---|---|---|
| Redfield Municipal (1D8) | -- | 3,500’ | |
| Huron Regional (HON) | 27 nm SE | 7,201’ | 27 |
| Aberdeen Regional (ABR) | 36 nm N | 6,901’ | 66 |
| Watertown Regional (ATY) | 59 nm E | 6,898’ | 54 |
| Mitchell Municipal (MHE) | 68 nm SE | 6,700’ | 31 |
| Pierre Regional (PIR) | 75 nm W | 6,900’ | 62 |

**Figure 1: Redfield Municipal Airport Map (2019)**

### *1.1.5 Airport Improvement Program (AIP) and Grant History*

According to faa.gov, a brief history of Federal airport funding programs is identified below:

- The Federal-Aid Airport Program (FAAP) was established with the Federal Airport Act of 1946. These grants were used for airport development.
- The Airport and Airway Development Act of 1970 was enacted in May, 1970 and expired in September, 1981. This act provided grants for planning and development of airports out of the Airport and Airway Trust Fund. The fund was established through aviation user taxes on items such as airline fares, airfreight, and aviation fuels.
- The Airport and Airway Improvement Act of 1982 was enacted in September 1982. It established the Airport Improvement Program (AIP). The program provides assistance for planning and development with user taxes for the Airport and Airway Trust Fund.
- The Airport and Airway Safety and Capacity Expansion Act of 1987 was enacted in December, 1987 and authorized more than $1 billion for each fiscal year into 1992.
- The Aviation Safety and Capacity Expansion Act of 1990 was enacted in November, 1990 and allowed passenger facility charges to enplaning passengers using the airport.
- The Airport and Airway Safety, Capacity, Noise Improvement and Intermodal Transportation Act of 1992 was enacted in October, 1992 and expanded the AIP program requiring projects to comply with the Americans with Disabilities Act of 1990, the Clean Air Act, and the Federal Water Pollution Control Act.
- The AIP Temporary Extension Act of 1994 was enacted in May, 1994 adjusted percentage of AIP fund that must be set aside for reliever airports, commercial service nonprimary airports, and system planning projects.
- The Codification of Certain U.S. Transportation Law at Title 49 U.S.C. was enacted in July, 1994 and repealed the Airport and Airway Improvement Act of 1982 and the Aviation Safety and Noise Abatement Act of 1979.
- The Federal Aviation Administration Authorization Act of 1994 was enacted in August, 1994. This act imposed a requirement for a number of actions by FAA.
- The Federal Aviation Reauthorization Act of 1996 was enacted in October, 1996. This act changed the formula computation of primary and cargo entitlements, State Apportionment, and discretionary set-asides.
- There were 16 AIP Extensions that occurred between 2008 and 2011.
- The FAA Modernization and Reform Act of 2012 was enacted in February, 2012 and extended the AIP program through FY 2015. Extensive changes and clarifications were included in that act.
- The FAA Extension, Safety, and Security Act of 2016 was enacted in July, 2016 and authorized extensions of the AIP program through FY 2017.
- The FAA Reauthorization Act of 2018 reauthorized the FAA till the end of fiscal year 2023.

The AIP provides grants to public agencies for the planning and development of public-use airports that are included in the National Plan of Integrated Airport Systems (NPIAS). The NPIAS identifies 3,328 airports within the 5 year period covered by the report. See the following figure from the 2019-2023 NPIAS Report to Congress for the identification of airports.

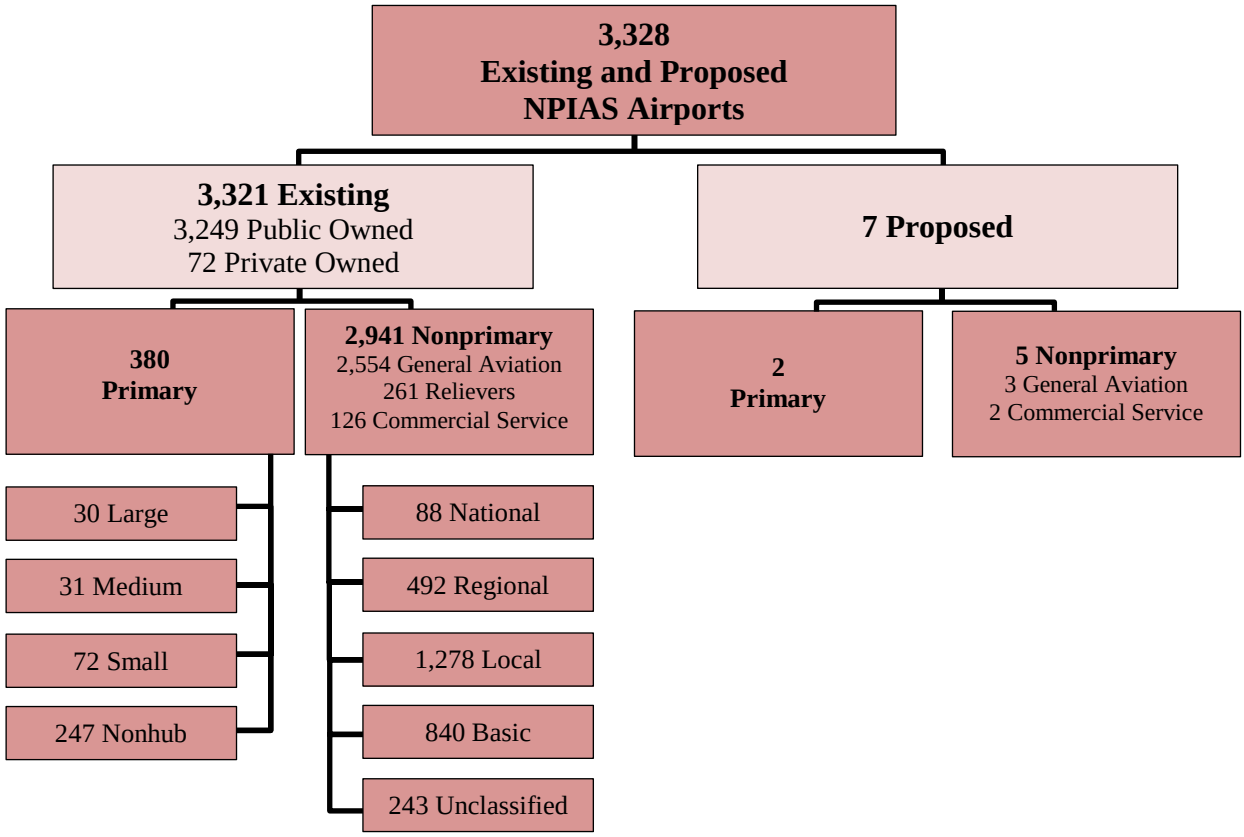



**Figure 2: NPIAS Airports by Category and Role (Report to Congress National Plan of Integrated Airport Systems, 2019-2023)**

Primary airports are the airports that account for 99 percent of passenger enplanements throughout the US. The primary airports are then categorized into Large, Medium, Small, and Nonhub. South Dakota contains 1 Small Primary Airport (Sioux Falls Regional Airport) and 2 Nonhub Primary Airports (Aberdeen Regional Airport and Rapid City Regional Airport).

Nonprimary airports primarily support general aviation aircraft. Nonprimary Commercial Service airports receive scheduled passenger service between 2,500 and 9,999 annual enplaned passengers. A reliever airport relieves congestions at a commercial service airport to provide general aviation access to the community. The remaining Nonprimary airports are for general aviation use. The Nonprimary airports are classified as National, Regional, Local, Basic, or Unclassified. The National Nonprimary airports have very high levels of aviation activity with many jets and multiengine propeller aircraft. The Regional Nonprimary airports are located in Metropolitan Statistical Areas and have high levels of activity. Local Nonprimary airports are publicly owned with 15 or more based aircraft and 2,500 or more annual operations. Basic Nonprimary airports are publicly owned with 10 or more based aircraft, are 30 miles or more from the nearest NPIAS airport, or are owned or serve a Native American community. Unclassified Nonprimary airports are currently in the NPIAS but do not meet any of the criteria for the other types and are anticipated to be reclassified in the next published NPIAS. The Redfield Municipal Airport is considered a Local Nonprimary airport.

The Redfield Municipal Airport is listed in the NPIAS and is therefore eligible to receive AIP funding. Currently, the City of Redfield is eligible to use entitlement funds from the FAA for a 90% match on projects at the airport. The entitlement funds are designated for 1D8 at $150,000 annually and can be saved for 4 years for a total of $600,000 to be used for a project. The State of South Dakota through the Aeronautics Trust Fund has been able to contribute to projects, also. Barring any changes to the AIP and the SD Aeronautics Trust Fund, the typical funding for projects have been 90% Federal, 5% State, and 5% local funding. However, recently the South Dakota Aeronautics Commission passed a motion adjusting the state share to 3.5% and the local share to 6.5%. If a project requires more than the designated entitlement funds, additional sources of funding are available. Please see Section 5.3 for additional discussion on funding.

FAA Order 5100.38D is the FAA Airport Improvement Program Handbook. This document sets policy and procedures used by the FAA in the administration of the AIP. In order for NPIAS Airports to receive Federal funding for a project, the project must be eligible according to the AIP Handbook and justified. The projects must also be on airport property, shown on the airport layout plan, and environmentally cleared.

Chapter 3 of the Handbook discusses all of the requirements for a project to receive funding. All 16 requirements must be met in order to receive an AIP grant. The first two requirements are that the project is eligible and justified. Section 2 of that chapter discusses project eligibility. If a project is not listed in this section, then the eligibility must be determined through the Suspension and Debarment Official for AIP. Section 3 discusses project justification. An example of a project not meeting the basic justification tests from the Handbook is as follows:

> A sponsor would like to build a runway extension to attract a new class of aircraft or for marketing purposes. In this case, the need is speculative and not based on documented future need. Therefore, the project is not justified because the actual need does not exist.

The City of Redfield has received grants for planning or improvements in the past. The list of grant history is provided in Table 3.

**Table 3: Project History**

| Year | Federal Grant Number | Description |
|---|---|---|
| 1987 | 3-46-0049-01-87 | Reconstruct runway 13/31; taxiways; apron; construct 400' extension |
| 1997 | 3-46-0049-02-97 | Rehabilitate runway, apron, taxiway; apron expansion; hangar area taxiways; marking |
| 2001 | 3-4600-01-2001 | Rehabilitate runway, apron, taxiway |
| 2004 | 3-4600-06-2004 | Pavement Maintenance |
| 2005 | 3-46-0049-02-2005 | Acquire card reader for fuel system |
| 2006 | 3-46-0049-04-2006 | ALP Update; Mini Master Plan |
| 2008 | 3-46-4600-10-2008 | Pavement Maintenance |
| 2008 | 3-46-0009-05-2008 | Conduct environmental assessment for future runway improvements |
| 2009 | DOT Pavement Marking | Pavement Marking Improvements – State 75%/25% |
| 2010 | 3-46-0049-06-2010 | Phase II Environmental Assessment; Wildlife Assessment |
| 2012 | 3-46-0049-07-2012 | Design and Construction Engineering for SRE/GA Terminal Building |
| 2014 | 3-46-0049-08-2014 | Design for Runway Realignment (17/35), turnarounds, connector taxiway, lighting, wetland mitigation, obliteration of existing Runway 13/31 |
| 2016 | 3-46-0049-009-2016 | Acquire land (2.25 acres and 80.3 acres) for phase II of runway construction; conduct Wildlife Hazard Site Visit and Wildlife Hazard Management Plan per federal grant dated 8/16/2016 |
| 2016 | 3-46-0009-010-2016 | Master Plan update with GIS survey & RPZ analysis |
| 2017 | 3-46-0049-011-2017 | Bidding, construction admin & engineering, wetland mitigation, easement acquisition, tribal monitoring, PAPI flight check, construction of Runway 17/35 |

## *1.2 Airside Facilities*

The airport facilities include all the infrastructure of the airport that allows aircraft to land, taxi, park, load, unload, and move their cargo or passengers to ground transportation. Each of these items and its current condition will be described below. These items can also be found on the ALP.

### *1.2.1 Runway 17/35*

In 2017, a project was bid to construct a new runway, Runway 17/35 at 3,500' x 75', and eliminate the existing runways at the airport. Therefore, as part of that project, Runway 1/19 and 13/31 were removed. It is assumed that the existing conditions of the airport include only Runway 17/35 for the sake of this document.

In order to complete the project, 83 acres of land was acquired to comply with FAA land ownership requirements and reduce wildlife hazards. The airport has complete control over the activities and structures placed on the land within the new RPZ's. Critical wetlands were filled

for the construction of Runway 17/35 and preparation for a 10' high wildlife fence has been scheduled in the capital improvement plan.

When designing the runway, the standards are related to aircraft approach speed, aircraft wingspan, and designated or planned approach visibility minimums. The Aircraft Approach Category (AAC) and the Airplane Design Group (ADG) combine to form the Runway Design Code (RDC) of the runway. The AAC relates to the aircraft approach speed and the ADG relates to either the aircraft wingspan or tail height, whichever provides more limitations.

The Aircraft Approach Categories (AAC) for this runway are A (speed ≤ 91 knots) & B (speed 91 knots or more but ≤ 121 knots). The Airplane Design Group (ADG) is II: wingspans of 49 feet but ≤ 79 feet and/or tail height of 20 feet but not > 30 feet. The Runway Design Code (RDC) has design strength of less than 12,500 lbs with asphalt surfacing in good condition. The visibility minimums for the runway are not lower than 1 mile. Table 4 lists the existing standards of Runway 17/35.

**Table 4: Design Standards for Runway 17/35**

| Design Standard | Runway 17/35 |
|---|---|
| Runway Design Code (RDC) | <12,500 lbs |
| Aircraft Approach Category (AAC) | A & B: speed <91 knots & speed >91 knots but < 121 knots |
| Airplane Design Group (ADG) | II: wingspans 49 feet but < 79 feet and tail height 20 feet but < 30 feet |
| Visibility Minimums | Not Lower Than 1 mile |

The runway was constructed in 2018 and consists of

- 12" of Compacted Subgrade
- Geotextile Separator Fabric
- 6" of SP-1 Asphalt/Base Material
- 21" of P-154 Subbase Course
- 6" of P-208 Granular Base Course
- P-603 Bituminous Prime Coat
- 1.5" of P-401 Bituminous Base Course
- P-602 Bituminous tack coat
- 1.5" of P-401 Bituminous Surface Course

The runway has non-precision markings with centerline and threshold markings. The runway has Medium Intensity Runway Lights (MIRL) that are pilot controlled through the Unicom frequency of 122.8, 2-light Precision Approach Path Indicators (PAPIs) on each runway end.

## *1.2.2 Taxiways*

Connector Taxiways

Off the Runway 17 end is a 35’ wide by 960’ long connector and partial parallel taxiway. The taxiway has a centerline stripe and hold position markings. This portion of pavement was also constructed in 2018 and consists of the same material as the Runway.

The other connector taxiway connected to the Runway and partial parallel taxiway was also constructed in 2018 at 35’ wide and 860’ in length. This taxiway also has a yellow centerline stripe and holding position markings.

Hangar Taxilane

1D8 has three hangar taxilanes at 25’ wide and 410’ in length. They were constructed in 1998 and consists of 6” of P-152, 11” P-208, and 2 ½” of P-401 covering an area approximately 37,130 SF.

**Figure 3: Photo of Hangar Taxilane**

## *1.2.3 Aprons*

The apron at 1D8 has three tie down locations for aircraft and provides access to the general aviation terminal for passengers. Constructed in 1998, the northern most apron consists of 6” of P-152, 11” P-208, and 2 ½” of P-401 covering an area of approximately 16,735 SF. The southern apron was also constructed in 1998 and consists of 9 ½” of P-208 and 2 ½” of P-401 covering an area of approximately 40,025 SF.

Spray operator’s also have a section of pavement approximately 3,000 SF that was constructed in 1998 and has asphalt surfacing.

### *1.2.4 Pavement Condition*

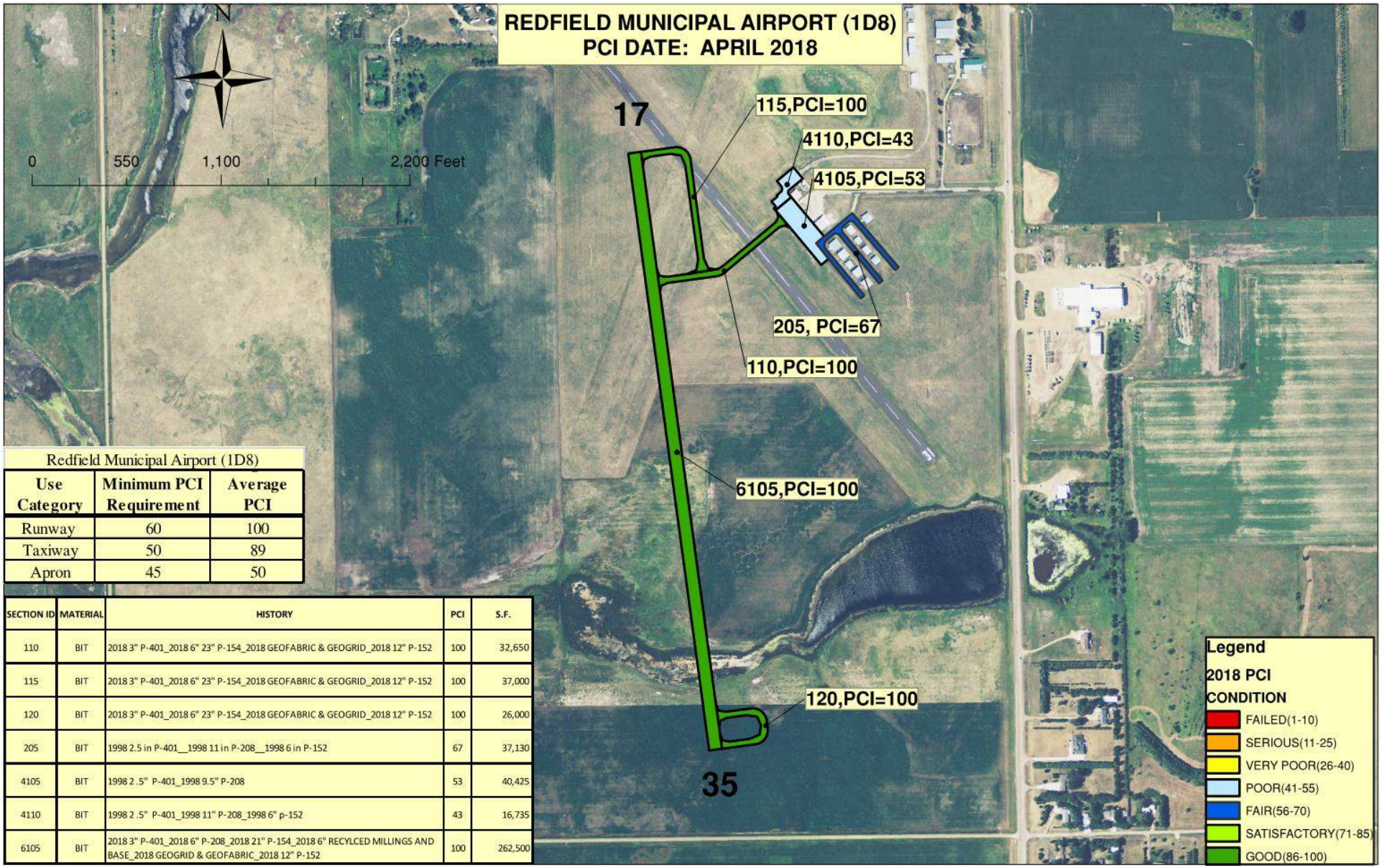
The South Dakota Department of Transportation (SDDOT) completes a Pavement Condition Index (PCI) survey of each of the State's public airports every three years. The pavement inspections are used by the State to evaluate the need for maintenance and rehabilitation on airport pavements in South Dakota. The surveys are conducted in accordance with the American Society for Testing and Materials (ASTM) D-5340-10. The flexible pavement distress types considered include: alligator cracking, bleeding, block cracking, corrugation, depression, jet blast, joint reflection cracking, longitudinal and transverse cracking, oil spillage, patching, polished aggregate, raveling, rutting, and shoving from PCC, slippage cracking, swell, and weathering. Most of the distresses are also rated on low, medium, or high severity depending on width of cracks, depth of depression or corrugation, percent cover of the distress, and potential for foreign object debris (FOD).

The survey results in a PCI value on a scale from 0-100, for each of the pavements at the airport, i.e. runway, taxiways, aprons, hangar taxilanes, turnarounds, etc. Table 5 is a breakdown of each pavement section with its results from 2012 - 2018. Figure 2 is the map produced from the 2018 PCI inspection.

**Table 5: Redfield Municipal Airport PCI Results**

| Branch ID | Section ID | Pavement | | 2012 | | 2015 | | 2018 | |
|---|---|---|---|---|---|---|---|---|---|
| | | Age | Material | PCI | Condition | PCI | Condition | PCI | Condition |
| Taxiway A2 | 110 | 2018 | Asphalt | -- | -- | -- | -- | 100 | Good |
| Taxiway A | 115 | 2018 | Asphalt | -- | -- | -- | -- | 100 | Good |
| Taxiway A3 | 120 | 2018 | Asphalt | -- | -- | -- | -- | 100 | Good |
| Hangar Taxilane | 205 | 1998 | Asphalt | 81 | Satisfactory | 81 | Satisfactory | 67 | Fair |
| Apron | 4105 | 1998 | Asphalt | 76 | Satisfactory | 76 | Satisfactory | 53 | Poor |
| Apron | 4110 | 1998 | Asphalt | 83 | Satisfactory | 75 | Satisfactory | 43 | Poor |
| Runway 17/35 | 6105 | 2018 | Asphalt | -- | -- | -- | -- | 100 | Good |

The connector taxiways and Runway were not inspected during 2018 due to new construction. A PCI of 100 is assumed for the new pavement. The hangar taxilanes had a fair amount of longitudinal and transverse cracking at all levels of severity and low severity alligator cracking. Both sections of apron had considerable longitudinal and transverse cracking at all levels of severity, noticeable oil spillage, minimal weathering, and low severity alligator cracking. Since those areas of pavement were last constructed in 1998, a full depth reconstruction is recommended in the near future.




Redfield Municipal Airport (1D8)

| Use Category | Minimum PCI Requirement | Average PCI |
|---|---|---|
| Runway | 60 | 100 |
| Taxiway | 50 | 89 |
| Apron | 45 | 50 |

| SECTION ID | MATERIAL | HISTORY | PCI | S.F. |
|---|---|---|---|---|
| 110 | BIT | 2018 3" P-401_2018 6" 23" P-154_2018 GEOFABRIC & GEOGRID_2018 12" P-152 | 100 | 32,650 |
| 115 | BIT | 2018 3" P-401_2018 6" 23" P-154_2018 GEOFABRIC & GEOGRID_2018 12" P-152 | 100 | 37,000 |
| 120 | BIT | 2018 3" P-401_2018 6" 23" P-154_2018 GEOFABRIC & GEOGRID_2018 12" P-152 | 100 | 26,000 |
| 205 | BIT | 1998 2.5 in P-401__1998 11 in P-208__1998 6 in P-152 | 67 | 37,130 |
| 4105 | BIT | 1998 2 .5" P-401_1998 9.5" P-208 | 53 | 40,425 |
| 4110 | BIT | 1998 2 .5" P-401_1998 11" P-208_1998 6" p-152 | 43 | 16,735 |
| 6105 | BIT | 2018 3" P-401_2018 6" P-208_2018 21" P-154_2018 6" RECYLCED MILLINGS AND BASE_2018 GEOGRID & GEOFABRIC_2018 12" P-152 | 100 | 262,500 |

**Figure 4: Redfield Municipal Airport PCI Evaluation (2018)**

### *1.2.5 Terminal/SRE Building*

The terminal/SRE building is the furthest north building on airport property and was constructed in 2012 and is shown in Figure 5. The GA terminal portion of the building can be accessed directly from the GA apron and provides a restroom and waiting area for incoming passengers to wait for further transportation. The GA terminal covers an area approximately 670 square feet. The SRE building can be accessed through the GA terminal or from the back of the building through a walk-in or overhead door. The SRE portion has concrete floors, heated by forced air, and measures approximately 1,000 square feet.

**Figure 5: GA Terminal/SRE Building**

### *1.2.6 Public Hangars*

The City does not currently own any hangars for public use.

### *1.2.7 Private/Commercial Hangars*

All hangars are on the airport are for private/commercial use. The following figures (Figure 6 and 7) show the existing hangars on the airfield.

There are a group of hangars that were the first to be constructed on the airfield, (Figure 7) that are a significant distance from the apron and taxiways. According to SDDOT Aircraft Registration records and the FAA Aircraft Registry database, none of the current hangar owners, in that location, house registered aircraft at this time and the type of use of those facilities will be re-evaluated in Section 4.2.


**Figure 6: Existing Hangar Area**


**Figure 7: Existing North Hangar Area**

## *1.2.8 Fueling Facilities*

1D8 has 100LL fuel available 24 hours a day with the use of a credit card, accepting Visa, Master Card, Discover, Dinners Club, JCB, American Express, or Carte Blanch. The airport has tie downs for aircraft parking. Minor airframe services are no longer provided at 1D8 and no Specialized Aviation Service Operator (SASO) reside at the airport.

## *1.3 Landside/Support Facilities*

The facilities of an airport are all the items remaining that are necessary or helpful in the day to day operations of the airport. Items in this section will be anything from the automobile parking lot to perimeter fencing.

### *1.3.1 Ground Vehicle Access*

The airport can be accessed from US Highway 281, which provides entry to the west onto the gravel access road. There is also a separate access point north on 174th Street that allows access for the north hangar owners.

### *1.3.2 Airport Maintenance*

The City of Redfield is responsible for monitoring the condition of the pavements, maintaining grass heights, and snow removal. In 2011, the airport had a rising need for SRE due to the use of City equipment, and crews having to plow streets first. The airport has an adequate SRE building, but still have no equipment owned by the airport.

The City of Redfield is also responsible for the maintenance of the pavements at the airport. The SDDOT completes a PCI survey of all pavements on the Redfield Municipal Airport every three years. The survey results aid the airport in their maintenance monitoring. The SDDOT also completes an annual Pavement Maintenance Project with several airports across the state of South Dakota. The Redfield Municipal Airport has participated in this project several times in the past and will continue to participate into the future.

### *1.3.3 Security*

The airport is surrounded by a 4' barb wire fence. The fencing is in place to deter access to the airfield and is required by SD Administrative Rule 70:02:04:13, Airports required to control access.

## *1.4 Airfield Lighting, NAVAIDS, & Weather Facilities*

### *1.4.1 Airfield Lighting*

The lighting at 1D8 aids in the landing and taxiing at an airport. The lighting system consists of a rotating beacon and lighted windcone, medium intensity runway lighting (MIRL) system, medium intensity taxiway lights (MITL), and precision approach path indicators (PAPI's) on both runway ends. The MIRL, MITL, and PAPI's were all installed new in 2018.

The runway edge lights are within 10 feet of the pavement edge and spaced at approximately 200 foot increments on both sides of the runway. The lights emit white light except in the caution zone which is the last 1,800 feet of runway. Those lights in the caution zone emit a yellow light in the direction facing the instrument approach threshold and white light in the opposite direction. The runway threshold lights emit green light outward from the runway and red light toward the runway to mark the ends of the runway. They are located within 10 feet of the edge of the runway end perpendicular to the runway centerline and are in two groups of four lights.

Taxiway lights are all medium intensity LED and are located within 10 feet of the edge of the pavement and spaced variably along the edge of either connector taxiway. The remaining partial parallel taxiway has reflective markers spaced along the taxiway.

### *1.4.2 Navigational Aids*

A navigational aid (NAVAID) is any visual or electronic device, airborne or on the surface, which provides point-to-point guidance information or position data to aircraft flight. The Redfield Municipal Airport has no existing NAVAIDS. Aberdeen Regional Airport (ABR) and Huron Regional Airport (HON) have the nearest NAVAIDS, a VHF Omni Directional Range Radio (VOR). The VOR sends out one stationary master signal and one rotating variable signal. The aircraft VOR antenna, usually located on the tail, picks up the signals emitted by the VOR and transfers it to the receiver in the cockpit. The aircraft receiver compares the data from the VOR and determines the aircraft's radial from the station.

### *1.4.3 Airfield Signage*

Safety is enhanced by a standardized system of signs at all airports. Reflectorized holding position signs are located on all taxiways that provide access to a runway.

### *1.4.4 Weather Facilities*

The Redfield Municipal Airport does not have an Automated Weather Observing System (AWOS). An AWOS system includes features that read wind speed and direction, altimeter, relative humidity/dew point, air temperature, precipitation type and amount, visibility, cloud height and density, and lightning detection. A certified AWOS III would benefit the airport users. HON and ABR both possess an Automated Surface Observing System (ASOS) that provides sky condition, visibility, type and intensity of rain, snow, and freezing rain, obstructions to vision, altimeter setting, ambient temperature, wind characteristics, and precipitation accumulation. The ASOS at HON can be accessed at frequency 118.125 and ABR's can be accessed at 125.875.

## *1.5 Airspace & Land Use*

### *1.5.1 Airspace*

The Redfield Municipal Airport does not have an air traffic controller onsite and users are required to use the radio for communication. Figure 8 shows the surrounding airspace according to VFR maps. The airport is in the process of obtaining Instrument Flight Procedures. Once published, 1D8 will be classified as class E airspace which extends up to 1,200 feet above ground level (AGL) up to but not including 18,000 feet. No air traffic control clearance or radio communication is required for class E airspace.

Part 77 of the Federal Aviation Regulations (FAR) covers how obstructions to aviation are determined and the notification requirements of developers who are proposing a structure. These surfaces are evaluated as part of the ALP to make the airport aware of any existing obstructions to allow for proper action. The imaginary surfaces also show where possible future development either through on airport expansion or off airport development may create an obstruction. Part

77 defines the following surfaces; horizontal, conical, primary, approach, and transitional. Each of these surfaces protects a different phase or area of air traffic. Figure 9 graphically depicts each of the FAR Part 77 Surfaces. Further discussion the FAR Part 77 surfaces at 1D8 follow in Section 4.5.

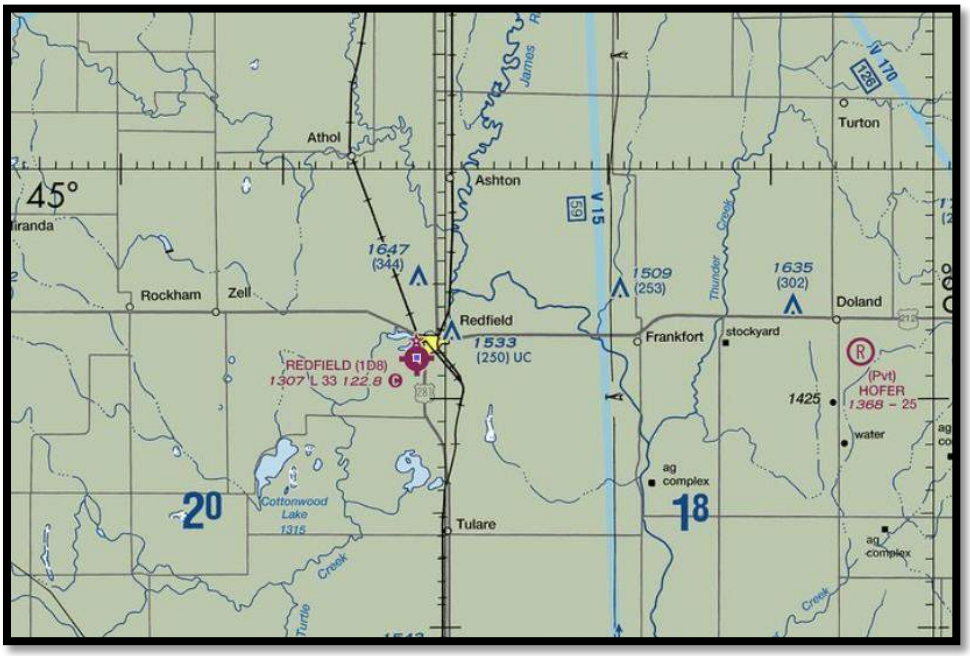



**Figure 8: Surrounding Airspace (vfrmaps.com)**

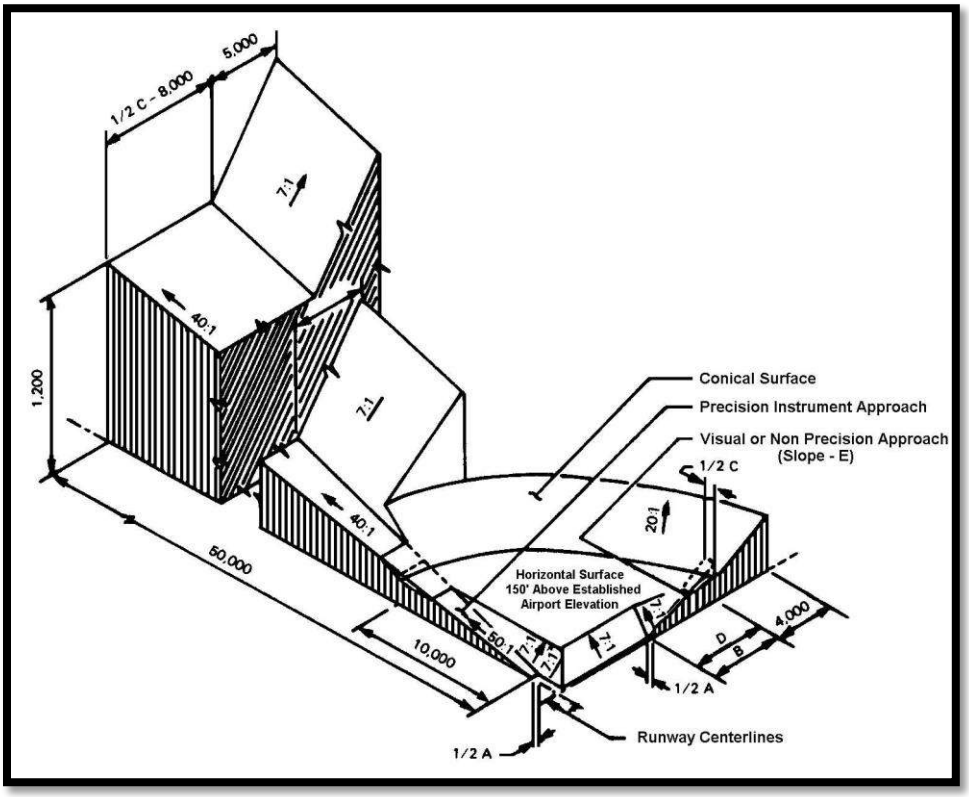



**Figure 9: 3D Diagram of FAR Part-77 Surfaces (ngs.noaa.gov)**

### *1.5.2 Land Use Background*

The FAA recommends that appropriate actions be taken, to the extent reasonable, to restrict the use of land adjacent to or in the immediate vicinity of the airport to activities or purposes compatible with normal airport operations.

The tables of existing property, avigation easements, concurrent uses, released property, and future property to be released can be found on the Exhibit A sheets at the end of the ALP.

### *1.5.3 Existing & Planned Land Uses Compatibility*

Throughout the process of gathering the data for the Exhibit A of the ALP, it was discovered that the City is leasing a portion of Airport property to the Spink County Fair Board. The City of Redfield should request a concurrent non-aeronautical use of that property from the FAA.

The north hangars identified in Section 1.2.7 will be further evaluated in Chapter 4, Facility Requirements. According to SDDOT Aircraft Registration records and the FAA Aircraft Registry database, none of the current hangar owners, in that location, house registered aircraft at this time and the type of use of those facilities will be re-evaluated.

The City has zoning ordinances in place throughout the City limits, relevant ordinances and the current zoning map for the City of Redfield can be found in Appendix D.

## *1.6 Communications*

The Common Traffic Advisory Frequency (CTAF) is the radio frequency used at the airport for communications. The pilots and crews on the ground use CTAF frequency of 122.8 to broadcast arrivals and departures and their positions on the airfield. The medium intensity lights on Runway 17/35 are controlled by the same frequency. Once the IFP's are published, Minneapolis Center (Air Route Traffic Control Center (ARTCC)) will be responsible for sequencing and separation of overflights, arrivals, and departures in order to provide flow of aircraft under instrument flight rules (IFR).

# Chapter Two – Aviation Forecasts

## *2.1 Aviation Trends*

The following sections will review the national, state, and local trends based on the FAA Aerospace Forecasts.

Redfield's location in the state of South Dakota provides unique proximity to recreational opportunities. As previously mentioned, the City of Redfield is a pheasant hunter's paradise. Redfield is also located in a community that has a heavy agricultural influence, it is largely surrounded by farmland that requires a chemical spray service. Over the years, technology has advanced agricultural spraying giving farmers more precise outcomes and increasing their desire for the service. The airport is also in a location that provides an adequate runway length to allow fixed wing medical flights.

In view of this, the ALP and Master Plan were developed by keeping future flexibility as one of the key components. If all other things were equal when considering alternatives for addressing a problem, and one alternative gave us more flexibility for future growth, we chose that alternative.

### *2.1.1 National Trends*

The national trends are discussed based on the FAA Aerospace Forecast Fiscal Years 2015-2035. The recession of 2007-2009 marked a fundamental change in the operations and finance of U.S. airlines. The recovery from that time period was slow and has since picked up speed. Over the medium and long term, the FAA forecasts that aviation will continue to grow. Short term is more greatly affected by the economy.

General aviation flight hours have declined since 2010. Student pilots, which are vital to general aviation, were on the decline for many years. However, because of a rule change in 2010 the number of student pilots has been growing since then. Commercial air traffic fell for the sixth time in seven years in 2014. On May 1, 2017 BasicMed became effective, which reformed the third class medical for the general aviation community. Now pilots will be able to visit any state-licensed physician at least once every four years and take the aeromedical factors online course every two years (available for free on AOPA website). Figure 10 shows the millions of operations for non-commercial and commercial aircraft from 2000 to 2016.

It is forecasted that aviation (both general and commercial aviation) will grow in the long term. According to the FAA Aerospace Forecast, Fiscal Years 2017-2037, the active general aviation fleet is anticipated to grow by 0.1% annually, with the piston powered fleet anticipated to decline by 0.9% annually, the turbine-powered fleet is anticipated to grow by 1.9 percent annually, and the Rotorcraft, experimental, and sport aircraft are all anticipated to grow by 1.6%, 1.0%, and 4.1%, respectively.

Figure 11 shows the number of active general aviation aircraft in the U.S. from 2000 to 2016. The trend in active aircraft has varied from a peak 231,606 total active general aviation aircraft

in 2007 to a low of 199,927 active general aviation aircraft in 2013. The trend has shown an increase for the last three years and is anticipated to grow slowly to 213,420 in 2037.

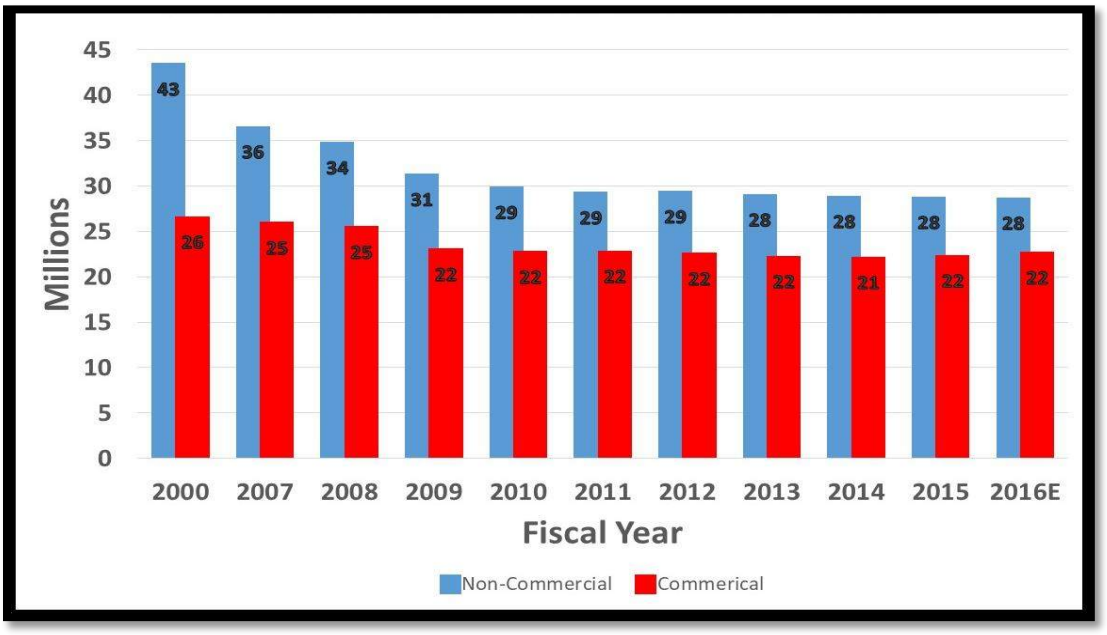



**Figure 10: Aircraft Activity (FAA Aerospace Forecast Fiscal years 2000-2016)**

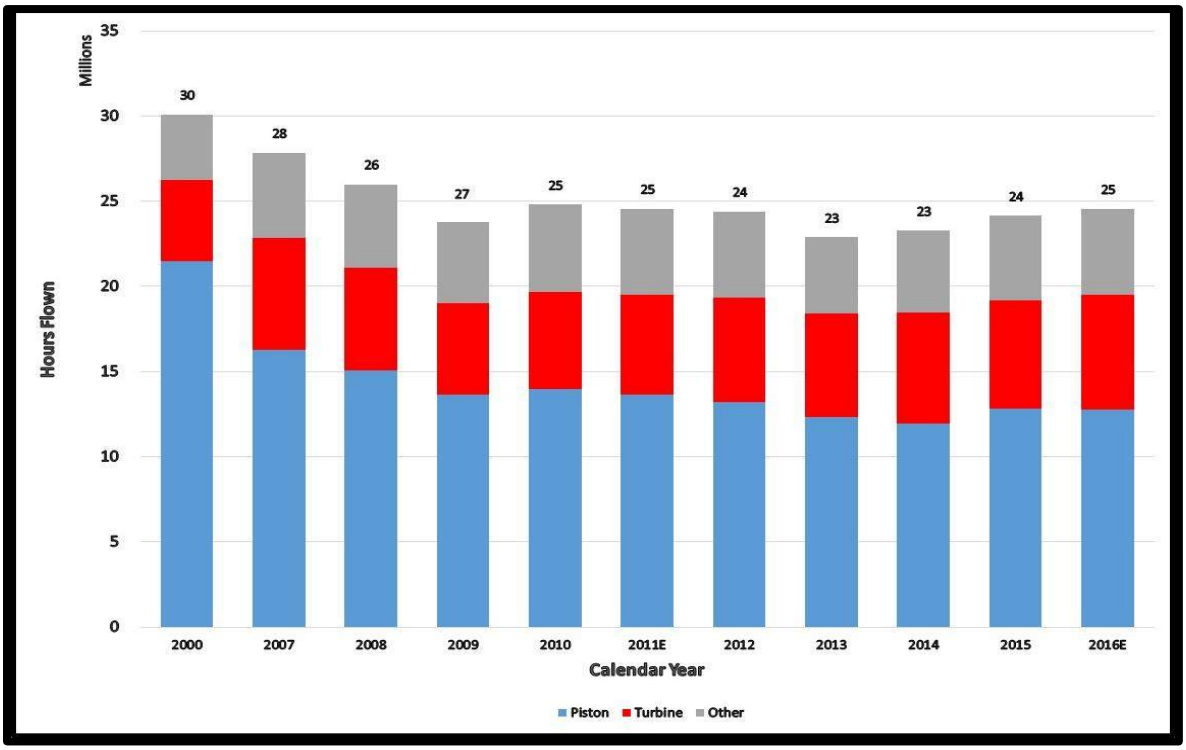



**Figure 11: U.S. General Aviation Aircraft (FAA Aerospace Forecasts)**

### *2.1.2 State Trends*

The South Dakota State Aviation System Plan 2010-2030 discusses anticipated forecasts for South Dakota. The report assumed that commercial service was to continue at each of the commercial service airports. The forecast for the state sees a trend of 1.3 percent increase of enplanements annually. The GA based aircraft have experienced increases as well as sharp declines following the 2007-2009 recession. The GA market is anticipated to increase in South Dakota with a 0.9 percent increase in active GA aircraft and a 1 percent increase in based aircraft annually.

### *2.1.3 Local Trends*

General Aviation has fluctuated in Redfield in recent years. The Terminal Area Forecast (TAF) has shown that the based aircraft have varied since the 1990's. The based aircraft count was at 18 in 1990 and again in 2016. During this time frame, there was a low of 11 based aircraft in 2011. The fluctuations have occurred because of purchases/sales of aircraft, deregistration, and relocation of the aircraft. The latest count identified 10 based aircraft at 1D8.

In conversations with Ag operators, it is not uncommon for more than 50,000 acres of farmland to be sprayed out of the airport. Depending on what is being sprayed, 2-4 gallons per acre is applied and the spray planes using the airport have a capacity of 300-800 gallons. If only the largest capacity aircraft are used to spray an average of 3 gallons per acre, this would amount to 376 annual operations. Whereas, if half of the operations are done by the 300 gallon capacity aircraft, this would amount to 688 operations. Many factors are unable to be quantified, such as which aircraft are used most often and how often the full capacity of the tanks are utilized. When the weather is good for spraying, the airport is extremely busy and more than 12-15 aircraft may be using the airport. Therefore, it can be assumed that at the current time, a minimum of 1,000 Ag operations occur at the Redfield Municipal Airport annually.

The airport is home to several enthusiastic general aviation pilots and they will continue to use the airport on a regular basis, especially in the spring, summer, and fall months.

### *2.1.4 Summary of Trends*

Table 6 shows the historic based aircraft, operations, and enplanements for the United States, South Dakota, and Redfield based on the TAF issued in January of 2018 by the FAA. In the 1990's, 1D8 had up to 18 based aircraft and the TAF shows that there are currently 18 based aircraft. However as stated previously, there are currently 10 based aircraft. The history of the fluctuating based aircraft Wilbur Ellis Air LLC and AgTegra have a few based aircraft; however, there are several of their aircraft that also frequent the airport. The number of based aircraft from those companies varies on an annual basis depending on where the aircraft are being used the most and where they are stored. AgTegra, also uses the airport but does not have any based aircraft. Two additional registrations have been put on hold reducing the current based aircraft by two.

**Table 6: Aviation Trends (TAF)**

| Year | United States | | | South Dakota | | | Redfield | | |
|---|---|---|---|---|---|---|---|---|---|
| | BA | Op | En | BA | Op | En | BA | Op | En |
| 1990 | 162,130 | 105,286,317 | 495,244,518 | 830 | 521,444 | 453,745 | 18 | 6,014 | 0 |
| 1995 | 157,731 | 108,978,447 | 581,731,246 | 805 | 570,223 | 513,066 | 17 | 6,000 | 0 |
| 2000 | 179,675 | 121,800,951 | 704,829,175 | 1,017 | 653,760 | 600,875 | 13 | 6,000 | 0 |
| 2005 | 197,155 | 115,357,496 | 733,403,888 | 1,128 | 681,085 | 651,368 | 13 | 8,300 | 0 |
| 2010 | 165,441 | 101,234,952 | 702,818,621 | 1,141 | 635,736 | 672,230 | 12 | 5,200 | 0 |
| 2015 | 163,973 | 97,612,712 | 780,384,586 | 1,226 | 470,197 | 794,839 | 12 | 3,200 | 0 |
| Trend | 0.04% | (0.3%) | 1.4% | 1.2% | (0.4%) | 1.7% | (1.9%) | (3.4%) | N/A |

## *2.2 Aviation Forecasts*

The time periods considered for forecasts are 0-5 years, 6-10 years, 11-15 years. Using 2017 as year 0, forecasting will look at the short-term (2018-2023), medium-term (2024-2028), and long-term (2029-2033). Table 7 is the forecast based on the TAF.

**Table 7: FAA Terminal Area Forecast (TAF)**

| Year | United States | | | South Dakota | | | Redfield | | |
|---|---|---|---|---|---|---|---|---|---|
| | BA | Op | En | BA | Op | En | BA | Op | En |
| 2018 | 176,766 | 98,769,999 | 890,291,834 | 1,416 | 482,841 | 911,380 | 18 | 4,000 | 0 |
| 2023 | 184,031 | 101,324,356 | 997,975,531 | 1,460 | 491,522 | 1,032,707 | 18 | 4,000 | 0 |
| 2028 | 191,109 | 104,647,580 | 1,100,425,276 | 1,495 | 503,111 | 1,159,356 | 18 | 4,000 | 0 |
| 2033 | 198,427 | 108,258,635 | 1,210,889,703 | 1,530 | 515,420 | 1,295,286 | 18 | 4,000 | 0 |
| Trend | 0.7% | 0.6% | 1.5% | 0.5% | 0.4% | 1.7% | 0.0% | 0.0% | N/A |

Notes: Based Aircraft (BA), Operations (Op), and Enplanements (En)
Trend indicates annual growth rate

### *2.2.1 Based Aircraft*

According to the TAF provided by the FAA, the based aircraft is not anticipated to grow. However, with the recently extended and realigned runway, the potential for additional based aircraft has increased exponentially. According to the TAF, the based aircraft are anticipated to follow a trend of 0.7% increase, and a 0.5% increase annually through the study period at the national and state (SD) levels, respectively.

There are currently 10 based aircraft at 1D8. By 2023, it is anticipated that the based aircraft will reach 15, with 16 based aircraft by 2028. Beyond that, it is anticipated that there will be 17 based aircraft by 2033

### *2.2.2 Annual Operations*

According to the TAF provided by the FAA, the annual operations are not anticipated to grow. However, with the longer and wider runway, B-II aircraft can frequent the airport. According to the TAF, the operations are anticipated to follow a trend of 0.7% increase and a 0.4% increase annually through 2032 at the national and state levels, respectively. With the busy general aviation population and Ag spraying operations, it is anticipated that the growth will continue at a greater rate than the state and national levels.

It is anticipated that operations steadily increase at 1D8. By 2023, it is anticipated that operations will reach 4,300 and 4,500 by 2027. Ultimately, it is anticipated that operations will reach 5,000 annually. When IFP's are published in the near future, it may result in more operations due to the accessibility in Instrument Meteorological Conditions (IMC).

### *2.2.3 Critical Aircraft*

The Critical Design Aircraft Data Table is listed on Sheet 2 of the ALP.

The existing critical design aircraft is a B II small aircraft, the aircraft models using the airport are the King Air 200, and Air Tractor 502 and 602. Additional A-I small aircraft using the airport are the Cessna 150, Cessna 172, Cessna Skyhawk, Piper Malibu, Piper Club, Piper Cherokee, Piper Seminole, and Thrush Spray Planes.

The critical taxiway design group is TDG 2.

It is not anticipated that the future/ultimate design aircraft models for the A & B II aircraft will change beyond what is already existing, although additional similar models may increase. Therefore the critical design aircraft for 1D8 is a B-II small aircraft.

Table 8 provides the anticipated future trends at 1D8 for critical aircraft, based aircraft, and operations.

**Table 8: Redfield Municipal Airport Forecast**

| | Year | Airport Forecast | TAF | AF/TAF %Difference |
|---|---|---|---|---|
| **Total Operations** | | | | |
| Base Year | 2018 | 4,000 | 4,000 | - |
| Base Year + 5yrs | 2023 | 4,300 | 4,000 | 7.5% |
| Base Year + 10yrs | 2028 | 4,500 | 4,000 | 12.5% |
| Base Year + 20yrs | 2038 | 5,000 | 4,000 | 25.0% |
| **Based Aircraft** | | | | |
| Base Year | 2018 | 10 | 18 | -44.4% |
| Base Year + 5yrs | 2023 | 15 | 18 | -16.7% |
| Base Year + 10yrs | 2028 | 16 | 18 | -11.1% |
| Base Year + 20yrs | 2038 | 17 | 18 | -5.6% |

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# Chapter Three – Facility Requirements

In this chapter we will identify the areas of need for the airport and ways to address those needs in the future. The areas include current problems and future needs as the activity and airport grow.

## *3.1 Design Standards & Critical Aircraft*

In the FAA's Advisory Circular on Runway Design, the major considerations include the aircraft planning to use the runway and the wind coverage. Additional details regarding existing aircraft using 1D8 is provided in Appendix B.

## *3.2 Runway & Taxiway Analysis*

### *3.2.1 Wind Coverage*

Runways should be aligned with the prevailing winds. The design standard for wind coverage is 95.0% on the basis of the crosswind component not exceeding the allowable value. Table 10 provides the allowable crosswind component in knots, based on the specified Runway Design Codes (RDC).

The topic of wind coverage for the Redfield Municipal Airport has been discussed with the City on several occasions. The surrounding airports with certified weather are the Huron Regional Airport (31nm), followed by Aberdeen Regional Airport (36 nm), Watertown Regional Airport (59 nm), and Pierre Regional Airport (80 nm). The following tables (Table 9) identify the wind coverages at each of these airports for several different runway alignments and combinations. As Huron is closest, that data is what will be used for 1D8. However, a comparison can be made on the wind coverages for each of those airports and the percentages do not change dramatically.

**Table 9: Windrose Data at Surrounding Airports**

| Aberdeen All Weather Windrose Data | | |
|---|---|---|
| RUNWAY | 10.5 KNOTS | 13 KNOTS |
| 9-27 | 74.76% | 82.84% |
| 11-29 | 78.79% | 86.69% |
| 12-30 | 81.97% | 89.44% |
| 13-31 | 85.52% | 92.09% |
| 14-32 | 88.66% | 94.09% |
| 17-35 | 91.49% | 95.49% |
| Combined 9-27/17-35 | 97.46% | |
| Combined 11-29/17-35 | 97.34% | |
| Combined 12-30/17-35 | 97.04% | N/A |
| Combined 13-31/17/35 | 96.49% | |
| Combined 14-32/17-35 | 95.69% | |

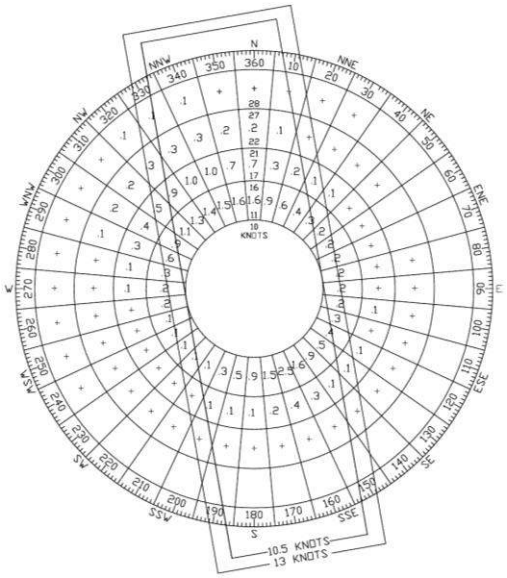
| Huron All Weather Windrose Data | | |
|---|---|---|
| RUNWAY | 10.5 KNOTS | 13 KNOTS |
| 9-27 | 75.07% | 83.66% |
| 11-29 | 81.98% | 89.73% |
| 12-30 | 86.36% | 92.79% |
| 13-31 | 90.16% | 95.13% |
| 14-32 | 92.78% | 96.56% |
| 17-35 | 92.78% | 96.21% |
| Combined 9-27/17-35 | 97.66% | |
| Combined 11-29/17-35 | 98.42% | |
| Combined 12-30/17-35 | 98.39% | N/A |
| Combined 13-31/17/35 | 98.02% | |
| Combined 14-32/17-35 | 97.34% | |

| Pierre All Weather Windrose Data | | |
|---|---|---|
| RUNWAY | 10.5 KNOTS | 13 KNOTS |
| 9-27 | 79.62% | 84.74% |
| 11-29 | 84.06% | 90.58% |
| 12-30 | 87.24% | 92.87% |
| 13-31 | 89.47% | 94.32% |
| 14-32 | 90.43% | 94.98% |
| 17-35 | 84.70% | 91.50% |
| Combined 9-27/17-35 | 94.99% | |
| Combined 11-29/17-35 | 96.68% | |
| Combined 12-30/17-35 | 96.58% | N/A |
| Combined 13-31/17/35 | 95.83% | |
| Combined 14-32/17-35 | 94.40% | |

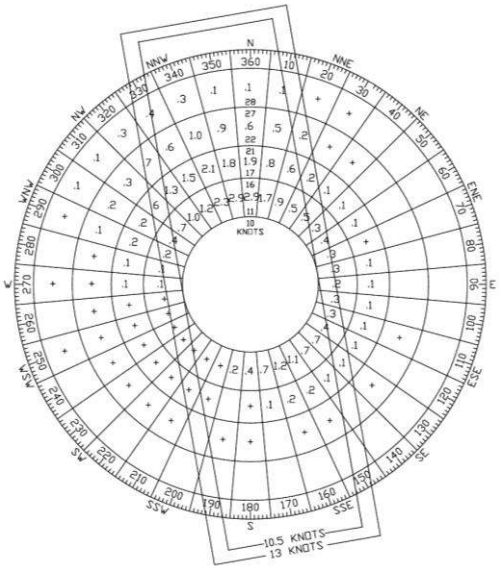
| Watertown All Weather Windrose Data | | |
|---|---|---|
| RUNWAY | 10.5 KNOTS | 13 KNOTS |
| 9-27 | 74.47% | 82.95% |
| 11-29 | 79.20% | 87.14% |
| 12-30 | 82.35% | 89.53% |
| 13-31 | 85.38% | 91.67% |
| 14-32 | 87.87% | 93.31% |
| 17-35 | 89.73% | 94.42% |
| Combined 9-27/17-35 | 97.03% | |
| Combined 11-29/17-35 | 96.91% | |
| Combined 12-30/17-35 | 96.35% | N/A |
| Combined 13-31/17/35 | 95.56% | |
| Combined 14-32/17-35 | 94.57% | |

The RDC for Runway 17/35 is A-II and B-II. Figure 12 shows the wind data tables and the windrose for the Redfield Municipal Airport.

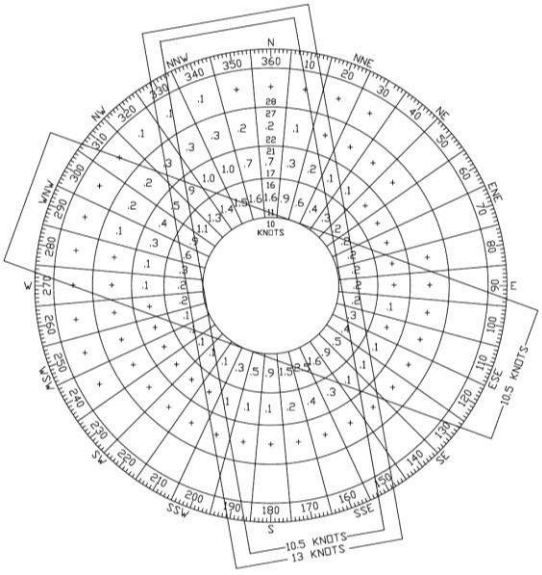
Wind data from the Huron Regional Airport was used. The wind coverage for Runway 17/35 with a 10.5 knot and 13 knot allowable crosswind component is 92.78% and 96.21% respectively, for all weather conditions, as shown on Sheet 4 of the ALP. This coverage decreases to 91.61% and 95.58%, at a 10.5 knot and 13 knot allowable crosswinds, if only weather conditions requiring Instrument Flight Rules (IFR) are considered. To view the data used to generate these percentages please refer to Appendix A.



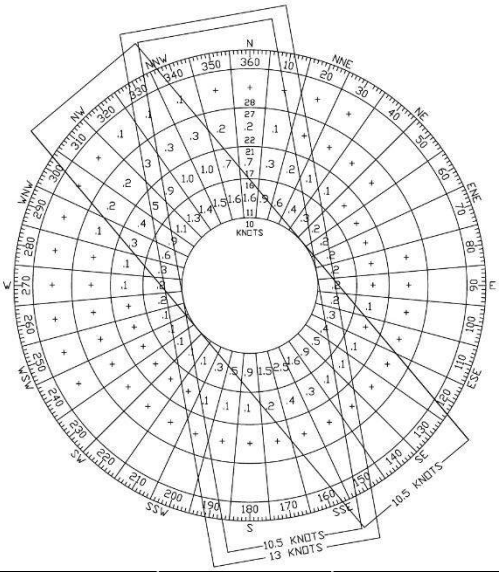

| Existing All Weather Windrose Data Table | | |
|---|---|---|
| **Runway** | **10.5 Knots** | **13 Knots** |
| 17-35 | 92.78% | 96.21% |
| ALL WEATHER - 127093 # OBSERVATIONS | | |
| WIND DATA (STATION #726540) FROM HURON, SD | | |
| WEATHER MO/YR ANNUAL - 2009/2018 MO/YR | | |




| Future IFR Windrose Data Table | | |
|---|---|---|
| **Runway** | **10.5 Knots** | **13 Knots** |
| 17-35 | 91.61% | 95.58% |
| ALL WEATHER - 17608 # OBSERVATIONS | | |
| WIND DATA (STATION #726540) FROM HURON, SD | | |
| WEATHER MO/YR ANNUAL - 2009/2018 MO/YR | | |




| Future All Weather Windrose Data Table | | |
|---|---|---|
| **Runway** | **10.5 Knots** | **13 Knots** |
| 17-35 | 92.78% | 96.21% |
| 11-29 | 81.98% | 89.73% |
| Combined | 98.42% | N/A |
| ALL WEATHER - 127093 # OBSERVATIONS | | |
| WIND DATA (STATION #726540) FROM HURON, SD | | |
| WEATHER MO/YR ANNUAL - 2009/2018 MO/YR | | |




| Future All Weather Windrose Data Table | | |
|---|---|---|
| **Runway** | **10.5 Knots** | **13 Knots** |
| 17-35 | 92.78% | 96.21% |
| 14-32 | 92.78% | 96.56% |
| Combined | 97.34% | N/A |
| ALL WEATHER - 127093 # OBSERVATIONS | | |
| WIND DATA (STATION #726540) FROM HURON, SD | | |
| WEATHER MO/YR ANNUAL - 2009/2018 MO/YR | | |

**Figure 12: Redfield Municipal Airport Windroses**

In order to better accommodate A-I aircraft during adverse conditions, a turf crosswind Runway should be considered. The construction of a crosswind Runway 14/32 will allow the airport to have greater than 95% wind coverage for the A-I aircraft using the airport. This orientation has the greatest individual wind coverage, which happens to be the same as Runway 17/35 (92.78%). Although, this orientation combined with Runway 17/35 is not the greatest percentage of wind coverage, it is within 1.08% of the highest coverage. This orientation and location of the future crosswind runway will allow for the airport to be greater than 95% for wind coverage while reducing the number of future acres to be purchased. The combined coverage for the runways at a 10.5 knot crosswind component is 97.34% for all weather conditions.

Another alternative for a turf crosswind runway is in the 11/29 orientation which is shown on Sheet 6B of the ALP. Although this crosswind runway does not fit into the existing property as well as the previously mentioned Crosswind Runway 14/32, it provides slightly more crosswind protection. When considering both Runway 17/35 and a future Runway 11/29, the combined wind coverage is 98.42% for A-I and B-I aircraft.

With the future construction of Crosswind Runway 14/32 or 11/29, FAA requirements will be met and pilots will be able to use the crosswinds in cases where winds are too strong for 17/35, reducing the possibility of those aircraft veering off the runway.

**Table 10: Allowable Crosswind Component per Runway Design Code**

| RDC | Allowable Crosswind Component |
|---|---|
| A-I and B-1 | 10.5 knots |
| A-II and B-II | 13 knots |
| A-III, B-III,<br>C-I through D-III<br>D-I through D-III | 16 knots |
| A-IV and B-IV,<br>C-IV through C-VI,<br>D-IV through D-VI | 20 knots |
| E-I through E-VI | 20 knots |

### *3.2.2 Runway Length*

FAA AC 150/5325-4B, Runway Length Requirements for Airport Design, provides guidelines for airport designers and planners to determine recommended runway lengths. The procedure for determining the recommended runway length is broken into five steps:

1. Identify the critical design aircraft.
2. Identify the aircraft that will require the longest runway lengths.
3. Identify the method to be used for establishing runway lengths.
4. Select recommended runway lengths.
5. Apply any necessary adjustments to the runway length.

It should be noted that runway length calculations are based on the guidance provided in FAA AC 150/5325-4B and should not be used to replace the responsibilities of the pilot in command. According to Section 91.3 of 14 CFR Part 91 – General Operating and Flight Rules, “The pilot in

command of an aircraft is directly responsible for, and is the final authority as to, the operation of the aircraft." Also according to Section 91.103 – Preflight action, "Each pilot in command shall, before beginning a flight, become familiar with all available information concerning that flight. This information must include –

> (a) For a flight under IFR or a flight not in the vicinity of an airport, weather reports and forecasts, fuel requirements, alternatives available if the planned flight cannot be completed, and any known traffic delays of which the pilot in command has been advised by ATC;
>
> (b) For any flight, runway lengths at airports of intended use, and the following takeoff and landing distance information:
>
> > (1) For civil aircraft for which an approved Airplane or Rotorcraft Flight Manual containing takeoff and landing distance data is required, the takeoff and landing distance data contained therein; and
> >
> > (2) For civil aircraft other than those specified in paragraph (b)(1) of this section, other reliable information appropriate to the aircraft, relating to aircraft performance under expected values of airport elevation and runway slope, aircraft gross weight, and wind and temperature."

### 3.2.2.1 Primary Runway 17/35

As previously determined in this document, the critical design aircraft for the primary runway is a B-II small aircraft (<12,500 pounds). The aircraft using the airport and their minimum runway lengths have been identified in Appendix B. The following table identifies step three.

**Table 11. Table 1-1 from Runway Length Requirements AC for Primary Runway 17/35 Evaluation.**

| **Airplane Weight Category Maximum Certificated Takeoff Weight (MTOW)** | | | **Design Approach** | **Location of Design Guidelines** |
|---|---|---|---|---|
| **12,500 pounds (5,670 kg) or less** | Approach Speeds less than 30 knots | | Family grouping of small airplanes | Chapter 2; Paragraph 203 |
| | Approach Speeds of at least 30 knots but less than 50 knots | | Family grouping of small airplanes | Chapter 2; Paragraph 204 |
| | **Approach Speeds of 50 knots or more** | **With Less than 10 Passengers** | **Family grouping of small airplanes** | **Chapter 2; Paragraph 205 Figure 2-1** |
| | | With 10 or more Passengers | Family grouping of small airplanes | Chapter 2; Paragraph 205 Figure 2-2 |
| Over 12,500 pounds (5,670 kg) but less than 60,000 pounds (27,200 kg) | | | Family grouping of large airplanes | Chapter 3; Figures 3-1 or 3-2 and Tables 3-1 or 3-2 |
| 60,000 pounds (27,200 kg) or more Regional Jets | | | Individual large airplane | Chapter 4; Airplane Manufacturer Websites (Appendix 1) |

In order to use Figure 2-1, the mean daily maximum temperature of the hottest month of the year (July 87˚), the airport elevation (1308.5), and the percentage of fleet (95%) must be determined. According to the AC, the 95 percent of fleet column must be used as the airport is intended to service medium size population communities with a diversity of usage and a greater potential for increased aviation activities. The 100 percent of fleet column is used for communities located on the fringe of metropolitan areas or relatively large population remote from a metropolitan area and is therefore not applicable to Redfield. The recommended runway length is 3,500 feet for Redfield. The current runway length is adequate until larger/jet aircraft begin using the airport.

### 3.2.2.2 Future Crosswind Runway 14/32

As previously determined in this document, the critical design aircraft for the primary runway is a B-II small aircraft (<12,500 pounds), however there is a need to accommodate the small aircraft using the airport. The family of aircraft considered to be accommodated by the future turf crosswind runway are small aircraft with approach speeds of less than 50 knots. Typical aircraft in the family grouping of small aircraft are the Piper Super Cub, Aviat A1-A, Aeronca Champion 7AC, and other similar models. The following table identifies step three in the previously discussed process to determine runway length.

**Table 12. Table 1-1 from Runway Length Requirements AC for Future Crosswind Runway Evaluation.**

| **Airplane Weight Category Maximum Certificated Takeoff Weight (MTOW)** | | | **Design Approach** | **Location of Design Guidelines** |
|---|---|---|---|---|
| **12,500 pounds (5,670 kg) or less** | Approach Speeds less than 30 knots | | Family grouping of small airplanes | Chapter 2; Paragraph 203 |
| | **Approach Speeds of at least 30 knots but less than 50 knots** | | **Family grouping of small airplanes** | **Chapter 2; Paragraph 204** |
| | Approach Speeds of 50 knots or more | With Less than 10 Passengers | Family grouping of small airplanes | Chapter 2; Paragraph 205 Figure 2-1 |
| | | With 10 or more Passengers | Family grouping of small airplanes | Chapter 2; Paragraph 205 Figure 2-2 |
| Over 12,500 pounds (5,670 kg) but less than 60,000 pounds (27,200 kg) | | | Family grouping of large airplanes | Chapter 3; Figures 3-1 or 3-2 and Tables 3-1 or 3-2 |
| 60,000 pounds (27,200 kg) or more Regional Jets | | | Individual large airplane | Chapter 4; Airplane Manufacturer Websites (Appendix 1) |

According to Paragraph 204, the minimum runway length is 800 feet at mean sea level. The runway length above mean sea level should be increased at a rate of 0.08 x airport elevation above mean sea level. Beyond that calculation, AC 150/5300-13A recommends that the distances be increased by a factor of 1.2 for turf runways.

[800 feet + (0.08 x 1308 feet)] x 1.2 = 1,086 feet

The minimum recommended runway length is 1,100 feet. A runway length of 1,935 feet is identified on the ALP. This runway will fit on existing airport property and doesn't require land acquisition. This additional length provides a factor of safety that is relatively inexpensive to obtain.

An ultimate length of 2,500 feet is proposed that will accommodate most aircraft currently using the airport and for planning and protection of potential future airport surfaces. Although this length would be beneficial, the need for the additional length outside of airport property will have to be justified in order to be eligible for AIP funding when the project becomes a priority.

The crosswind runway 14/32 wind data, combined with primary 17/35, provides sufficient wind coverage at 97.34% for a 10.5 knot crosswind. The crosswind runway is proposed be constructed as turf, and will later be paved for approximately 1,500 feet to accommodate the transitions across Runway 17/35, ultimate parallel taxiway, and aerial applicator's connector taxiway.

The crosswind runway 11/29 wind data, combined with primary 17/35, provides sufficient wind coverage at 98.42% for a 10.5 knot crosswind. The crosswind runway is proposed to be constructed initially at 1,229 feet. Then an ultimate runway length of 2,500 feet is shown for the same reasons previously discussed.

The wildlife fence will need to be relocated when the runway is constructed.

**Table 13: Surfaces and Significant Distances for Ultimate Crosswind Runway 14/32**

| | |
|---|---|
| Runway Safety Area | 2,980' x 120' |
| Object Free Area | 2,980' x 250' |
| Object Free Zone | 2,900' x 250' |
| Approach Runway Protection Zone | 1,000' x 250' x 450' |
| Departure Runway Protection Zone | 1,000' x 250' x 450' |
| Primary Surface | 2,500' x 250' |
| Part 77 Approach Surface | 250' x 5,000' x 1,000' @ 20:1 |
| Approach Surface | 250' x 700' x 5,000' |
| Departure Surface | N/A |
| GQS Surface | N/A |
| Takeoff Run Available | 2,500 LF |
| Takeoff Distance Available | 2,500 LF |
| Accelerate Stop Distance Available | 2,500 LF |
| Landing Distance Available | 2,500 LF |

Based on the discussion in Chapter 1 regarding eligibility and justification for projects, this crosswind runway must be eligible and justified in order for the City of Redfield to obtain grants to construct the runway. According to Table G-1 of the AIP Handbook, a crosswind runway is eligible if one of the two criteria are met:

a. For the first crosswind, the wind coverage on the primary runway is less than 95%

b. For more than one crosswind runway, the wind coverage on the primary runway is less than 95% and the existing crosswind runway(s) are operating at 60% or more of their annual capacity.

Since (b) does not apply to 1D8, the discussion on eligibility would be based on (a). Based on the previous section on Wind Coverage, the current primary runway 17/35 does not have 95% coverage for A-I and B-I aircraft (10.5 knots wind coverage for 17/35 is 92.78%). Therefore, the crosswind runway is eligible.

According to the Required Runway Length AC, the threshold of 500 or more annual operations for the critical design airplanes is required. Therefore, in order to fully justify the need for the crosswind runway, the gap in wind coverage for the A-I and B-I aircraft must be 500 or more annual operations. Therefore, to bridge the gap between 92.78% to 95% (500 operations/2.22% = 22,523 operations) 22,523 annual operations at 1D8 would be needed in order for the crosswind runway to be justified for AIP funding. Although, the City of Redfield could consider constructing this crosswind runway without the aid of AIP funding, the environmental process and design standards must still be followed.

### *3.2.3 Runway Width*

Based upon the width required for B-II aircraft that may utilize the Runway for general aviation operations in the near future, a width of 75 feet will accommodate those aircraft.

The future/ultimate crosswind is proposed to accommodate small A-1 aircraft with approach speeds of less than 50 knots, therefore the runway width for the proposed crosswind is 60 feet.

### *3.2.4 Pavement Strength*

FAA AC 150/5335-5C, Standardized Method of Reporting Airport Pavement Strength – PCN provides guidance on the standardized method of reporting the Aircraft Classification Number – Pavement Classification Number (PCN). Using the program COMFAA and the related support spreadsheet, the PCN for 17/35 was determined to be 20/F/D/Y/T. The full PCN technical supporting information can be found in Appendix C.

### *3.2.5 Visibility Minimums*

Instrument approach procedures provide aircraft with electronic guidance to the runway. Redfield Municipal Airport is in the process of obtaining instrument procedures. Non-precision approaches, once obtained, will provide pilots with information regarding their horizontal, but not vertical position in relation to the airport. Once published the IFP's can be accessed at airnav.com.

The visibility minimums for a runway have a significant effect on runway design standards and related infrastructure. A visibility minimum is the minimum visual distance a pilot must have when flying a published instrument approach to a runway. Pilots desire to have lower approach minimums to access the airport during extreme weather conditions. Table 14 provides the current dimensions for 17 and 35 end with visibility minimums not lower than 1 mile.

**Table 14: Summary of Redfield Municipal Runway Design Standard**

| Runway Design | Visibility Minimum: Not Lower than 1 miles |
|---|---|
| Runway Length | 3500 feet |
| Runway Width | 75 feet |
| Shoulder Width | 10 feet |
| Blast Pad Width | 80 feet |
| Blast Pad Length | 75 feet |
| Crosswind Component | 10.5 knots |

The existing, future and ultimate visibility minimums are shown in the following table:

**Table 15: Redfield Municipal Airport Visibility Minimums**

| Runway End | Existing | Future | Ultimate |
|---|---|---|---|
| 17 | 1 Mile | 1 Mile | 1 Mile |
| 35 | 1 Mile | 1 Mile | 1 Mile |
| 13 | N/A | 1 Mile | 1 Mile |
| 31 | N/A | 1 Mile | 1 Mile |

### *3.2.6 Runway Designation*

The runway designator number is the whole number nearest the one-tenth of the magnetic azimuth along the runway centerline when viewed from the direction of approach. For example, the magnetic azimuth along the runway centerline is 173 degrees, the runway designation marking is 17 as in the case for Redfield. The difference between the runway end magnetic azimuths is 180 degrees. For example, the magnetic azimuth along the runway centerline for the Runway 35 end is 353 degrees giving a designation marking of 35 for that end. The turf crosswind runway will have a designation of 11/29 or 14/32.

### *3.2.7 Taxiways*

Taxiways are facilities designed to enable safe and efficient taxiing by airplanes while minimizing excess pavement. Taxiways allow higher speed operations from the apron and hangar areas to the runways. Whereas, taxilanes are lower speed areas through hangar areas.

A parallel taxiway eliminates using the runway for taxiing, thus increasing capacity and protecting the runway under low visibility conditions. A full length parallel taxiway is required for instrument approach procedure minimums below ¾ mile and is recommended for all other conditions. Parallel taxiways are recommended at paved airports with high activity. For this reason, in the future when an approach procedure is acquired, it is recommended that the runway have a full parallel taxiway.

Taxiway design was previously based only on the ADG, however the guidance has changed. Taxiways are now determined by two different methods. Determining the Taxiway Design Group (TDG), which is based on the dimensions of the airplane's undercarriage, controls the taxiway width. The main gear width (MGW) and the cockpit to main gear distance (CMG) are

the undercarriage dimensions used. The ADG is used to determine the taxiway protection, separations, and wingtip clearances.

The most demanding design aircraft for the existing and future conditions is a TDG of 2 (Beechcraft King Air 200) and an ADG of II, further defined in Table 16. Although, future taxiway separations should be designed for ADG II separation, taxiways should initially be constructed to TDG 1A and 1B width standards (25') as all aircraft using the airport currently meet those criteria.

**Table 16: Existing Standards for Taxiway/Taxilanes**

| Taxiway Design | Existing | Design Standard |
|---|---|---|
| **Taxiway/Taxilane Protection** | -- | **ADG I** |
| Taxiway Safety Area (TSA) | 49' | 49' |
| Taxiway Object Free Area (OFA) | 79' | 79' |
| Taxilane Object Free Area (OFA) | 79' | 79' |
| **Taxiway/Taxilane Protection** | -- | **ADG II** |
| Taxiway Safety Area (TSA) | 49' | 49' |
| Taxiway Object Free Area (OFA) | 131' | 131' |
| Taxilane Object Free Area (OFA) | 115' | 115' |
| **Taxiway/Taxilane Separation** | -- | **ADG I** |
| Taxiway centerline to fixed or movable object | 39.5 | 39.5' |
| Taxilane centerline to fixed or movable object | 30-35' | 39.5' |
| **Taxiway/Taxilane Separation** | -- | **ADG II** |
| Taxiway centerline to fixed or movable object | 39.5 | 39.5' |
| Taxilane centerline to fixed or movable object | 30-35' | 39.5' |
| **TDG Standards** | | **TDG 1A-2** |
| Taxiway Width | 25-35' | 2–' - 35' |

## *3.3 Airfield Safety Areas*

### *3.3.1 Runway Safety Area (RSA)*

The RSA enhances the safety of aircraft which undershoot, overrun, or veer off the runway, and it provides greater accessibility for fire-fighting and rescue equipment during such incidents. The current RSA standards are based on 90% of overruns being contained within the RSA. The RSA is centered on the runway centerline and the size corresponds to the Airport Approach Category (AAC) and the Airplane Design Group (ADG). The RSA must be cleared, graded, have no potentially hazardous ruts, humps, depressions, or other surface variations; drained by grading or storm sewers to prevent water accumulation; capable under dry conditions of supporting snow removal equipment, ARFF equipment, and the occasional passage of aircraft without causing damage to the aircraft; and free of objects, except for objects that need to be located in the RSA because of their function.

The RSA for the runway at 1D8 is 150 feet wide centered on the runway and 300 feet beyond each end of the runway. All RSAs are owned by the City of Redfield. The recent 17/35 construction project included grading for the RSA. According to the Design AC, the RSA must be cleared and graded without ruts, drained to prevent water accumulation, capable of supporting snow removal equipment and passage of aircraft, and free of objects except those that need to be located in the RSA. The current RSA meets those standards.

### *3.3.2 Taxiway Safety Area (TSA)*

The TSA's width equals the maximum wingspan of the ADG. The TSA must be cleared, graded, have no potentially hazardous ruts, humps, depressions, or other surface variations; drained by grading or storm sewers to prevent water accumulation; capable under dry conditions of supporting snow removal equipment, ARFF equipment, and the occasional passage of aircraft without causing damage to the aircraft; and free of objects, except for objects that need to be located in the TSA because of their function.

The TSA for the ADG of II is 79 feet wide and runs the length of the taxiway.

### *3.3.3 Obstacle Free Zone (OFZ)*

The OFZ clearing standard precludes aircraft and other penetrations, except for frangible NAVAIDs that need to be located in the OFZ because of their function. The Runway OFZ (ROFZ) extends 200 feet beyond the runway ends and runs 250 feet wide centered on the runway for the length of the runway.

The OFZ is required to be kept clear of objects or any penetrations, except for frangible NAVAIDs that need to located in the OFZ because of their function. The OFZ for Runway 17/35 is clear with the exception of frangible PAPIs.

### *3.3.4 Object Free Area (OFA)*

The OFA clearing standard requires clearing of the OFA of above-ground objects protruding above the nearest point of the RSA. Objects non-essential for air navigation or aircraft ground maneuvering purposes must not be placed in the OFA, which includes parked aircraft and agricultural operations. The Runway OFA (ROFA) extends 300 feet beyond each runway end and is 500 feet wide centered on the runway for the length of the runway.

The Runway 17/35 RSA in Redfield is clear.

### *3.3.5 Runway Visibility Zone*

The runway visibility zone is defined as an area on the airport to be kept clear of permanent objects so that there is an unobstructed line-of-site from any point five feet above the runway centerline to any point five feet above an intersecting runway centerline. The runway line of sight points are located as follows:

1. The end of the runway if the runway end is located within 750 feet of the crossing runway centerline or extension.

2. A point 750 feet from the runway intersection if the end of the runway is located within 1,500 feet of the crossing runway centerline.
3. A point one-half of the distance from the runway intersection if the end of the runway is located at least 1,500 feet from the crossing runway centerline.

The runway ends will stay where they are for the future and ultimate conditions at 1D8, therefore the runway visibility zone will not change. Table 17 provides the existing Runway 17/35 protection dimensions with visibility minimums not lower than 1 mile. The last column of the table identifies if the standard is met.

**Table 17: Summary of Runway 17/35 Protection**

| Runway Protection | | 17/35 Dimension | Standard Met? |
|---|---|---|---|
| Runway Safety Area | Length Beyond Departure End | 300 feet | Yes |
| | Width | 150 feet | Yes |
| Runway Object Free Area | Length Beyond Runway End | 300 feet | Yes |
| | Width | 500 feet | Yes |
| Runway Obstacle Free Zone | Length Beyond Runway End | 200 feet | Yes |
| | Width | 250 feet | Yes |
| Runway Separation – Centerline of runway to: | Holding Position | 125 feet | Yes |
| | Parallel Taxiway/Taxilane Centerline | 300 feet | Yes |
| | Aircraft Parking Area | 250 feet | Yes |

## *3.4 Navigational Aids & Visual Aids*

### *3.4.1 Navigational Aids*

A navigational aid (NAVAID) is any visual or electronic device, airborne or on the surface, which provides point-to-point guidance information or position data to aircraft flight. The airport currently has no existing NAVAIDs.

### *3.4.2 Visual Aids & Lighting*

Visual Aids and Lighting at 1D8 provide additional guidance for airport users and enhance safety through visual guidance to pilots. Visual aids currently at 1D8 are as follows:

- Runway Markings
  Runway 17/35 has non-precision runway markings that includes centerline stripes, threshold markings, and runway designation markings. These markings are sufficient for current and future approaches on this runway.
- Runway Edge Lights
  Runway 17/35 has Medium Intensity Runway Lights (MIRL) and threshold lights at either end, which meets standards for the current and future conditions.
- Taxiway Markings

All taxiways have a standard yellow centerline stripe to identify the center of the taxilane or taxiway and are currently in good condition. The markings should be remarked when necessary in the future.

- Taxiway Edge Lights
  All taxiways have Medium Intensity Taxiway Lights (MITL) on the runway/taxiway radii, which meet current and future needs of the airport. Reflective tubular markers are placed along the remaining edges.
- Lighted Windcones
  There is a single lighted windcone located directly southwest of the hangars and hangar taxilanes in line with the taxiway. The windcone and its location currently meet the needs at 1D8.
- Beacon
  A rotating beacon is the highest point on the airfield. It is located just north of the auto parking lots and access road. The beacon is considered adequate, but should be upgraded as necessary to remain operational at all times.
- Precision Approach Path Indicator Lights (PAPI)
  PAPIs are visual aids that provide guidance information to help pilots maintain the proper approach path to a runway end. There are 2-light systems on the left of each runway end. The current PAPI systems meet the needs at 1D8 and should be upgraded as necessary to remain operational at all times.

## *3.5 Airspace & Obstructions*

Protection of the ends of the runway must be considered as the approach and departure surfaces need to remain clear of obstacles for any operational restrictions pertaining to aircraft operating weights and visibility minimums.

### *3.5.1 FAR PART 77*

Part 77 of the Federal Aviation Regulations (FAR) covers how obstructions to aviation are determined and the notification requirements of developers who are proposing a structure. These surfaces are evaluated as part of the ALP to make the airport aware of any existing obstructions to allow for proper action. The imaginary surfaces also show where possible future development, either through on airport expansion or off airport development, may create an obstruction. Part 77 defines the following surfaces; horizontal, conical, primary, approach, and transitional. Each of these surfaces protects a different phase or area of air traffic. Those surfaces can be found graphically in Figure 8 on page 18.

The airport master record is updated through the Airport Safety Data Program and the most recent one can be found at www.gcr1.com/5010web/. Runway 17/35 is classified as A(V)/A(V) with regard to the FAR Part 77 Category on the current 5010 form. Visual approach A(V) is a utility runway constructed for aircraft of 12,500 pounds or less and an other-than-utility runway is constructed for aircraft larger than 12,500 pounds. Once the approach is published, the Runway will become A(NP)/A(NP) a utility runway with a non-precision approach.

Horizontal Surface

The Horizontal Surface is an imaginary plane 150 feet above the airport elevation in which the perimeter is constructed by swinging arcs of specific radii from the center end of the primary surface of the end of the runway and extending 10,000 feet. This surface is depicted on Sheet 7 of the ALP.

Conical Surface

The Conical Surface extends from the horizontal surface a distance of 4,000 feet horizontally and upwards at a 20:1 slope, which means for every 20 feet horizontal it goes up 1 foot so that at the end of the 4,000 feet it will be an additional 200 feet above the airport elevation. This surface is also depicted on Sheet 7 of the ALP. A tower owned by Elm Valley School District penetrates the conical surface by 32.6 feet and has been airspaced and denoted by 1990-AGL-1695-OE.

Primary Surface

The Primary Surface is currently 500 feet wide centered on the runway and extends 200 feet beyond the runway ends at the elevation of the nearest point on the runway centerline.

Approach Surface

The Approach Surface is centered on the extended runway centerline and extends upward and outward from the end of the primary surface. Currently, for Runway 17/35 the approach surface is 500 feet wide at the inner edge and expands to 2,000 feet wide 5,000 feet away from the end of the primary surface. The current approach surface also slopes upward at a 20:1 slope. Runway 17/35 has no existing obstructions to the Part 77 Approach Surface.

Transitional Surface

The Transitional Surface extends outward and upward at right angles to the runway centerline at a slope of 7:1 from the sides of the primary surface and the approach surfaces. Table 18 lists the existing 14 CFR Part 77 Surfaces for Runway 17/35.

**Table 18: 14 CFR Part 77 Imaginary Surfaces**

| Part 77 Surface | Runway 17/35 |
|---|---|
| Primary Surface | 500’ x 3,900’ |
| Approach Surface Dimensions | 500’ x 2,000’ x 5,000’ (RWY 17 & 35) |
| Approach Surface Slope | 20:1 |

### *3.5.2 Approach/Departure Surfaces*

Approach Surface

The Approach Surface (labeled as 150/5300 Approach Surface on the ALP), different from the Part 77 approach surface, is designed for the use of the runway in both visual and instrument meteorological conditions near the airport. In general the Approach Surface starts at the runway end and extends outward and upward from the runway end centered on the extended runway centerline. The GPS approach with a visibility minimum of 1-mile requires the existing approach surface to begin 200 feet from each runway end and extends outward and upward

centered on the extended runway centerline. The trapezoidal approach surface has an inner width of 400 feet, widens to 3,800 feet wide at 10,000 feet out. The approach surface slopes upward at a constant 30 to 1 slope and supports instrument night operations serving approach category A and B aircraft with vertical guidance. Runway 17/35 has no existing obstructions of the Approach Surface.

Departure Surface

The Departure Surface begins at the centered end of the runway and extends outward and upward along the extended runway centerline and allows the pilot to follow standard departure procedures. The surface slopes upward at a 40 to 1 slope from the elevation of the runway centerline at the threshold. The area beginning at the runway end is 1,000 feet wide and widens to 6,466 feet, covering a distance 10,200 feet from the end of the runway. This surface is the same for all runways that have an instrument departure procedure.

Once the approach is published, a departure surface will be required. The 17 end has two existing tree obstructions at 5.4 and 7.4 feet and the 35 end has tree obstructions at 6.3 and 12.8 feet to the Departure Surface. To keep climb rates from being raised for the approaches, the City should work with neighboring land owners to trim the trees.

### *3.5.3 Airport GQS Surfaces*

The Glide Path Qualification Surface (GQS) is intended for Instrument Approaches that extend from the runway threshold to the decision altitude (DA) point. The surface begins on the runway end at 300 feet wide, widens to 1,520 feet at 10,000 feet out, and transitions from a 30:1 slope and must be clear of all obstructions in order to have an approach procedure with positive vertical guidance. Runway 17/35 has no existing Vertical Guidance Approach Surface Obstructions.

## *3.6 Airport Property & Land Use*

### *3.6.1 Airport Zoning*

Airport Grant Assurance #21 states that the airport sponsor will take appropriate action, to the extent practicable, 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.

The Land Use Map can be seen on Sheet 26 of the ALP and the current zoning ordinances and map for the City of Redfield are in Appendix D. The City zoning map shows the Airport property is zoned as Airport. It is surrounded primarily by residential districts, industrial districts, and agricultural property outside of the City limits.

FAA AC 150/5190-4A is the Model Zoning Ordinance to Limit Height of Objects around Airports and is a guide for sponsors in completing the zoning ordinances for areas surrounding the airport. The zoning map should be developed based on the FAR Part 77 surfaces for 1D8.

### *3.6.2 FAA Runway Protection Zones*

The Airport Design AC discusses the need for control over the RPZs. The RPZs function is to enhance the protection of people and property on the ground. This is best achieved through airport owner control over RPZs. Control is preferably exercised through the acquisition of sufficient property interest in the RPZ and includes clearing RPZ areas (and maintaining them clear) of incompatible land objects and activities.

The Runway 17 RPZ is located on airport property. It is controlled through ownership. Approximately the first 300' of the Runway 35 RPZ is located on airport property. The remaining portion is controlled through an easement. The easement prevents planting or growth of trees, prevents uses that may interfere with radio communication or visibility, prevents construction of structures or fuel handling facilities, and allows the right of flight above the property.

In 2012, the FAA issued a Memorandum on the Interim Guidance on Land Uses Within a Runway Protection Zone. The guidance states that an RPZ analysis must be completed when any of the land uses identified in the memorandum would enter the limits of the RPZ due to an airfield project (runway extension or shift), a change in the critical design aircraft that increases the RPZ dimensions, a new or revised instrument approach procedure that increases the RPZ dimensions, or a local development proposal in the RPZ. Those land uses include: buildings and structures, recreational land uses, transportation facilities (railroads, roads, parking lots), fuel storage facilities, hazardous material storage, wastewater treatment facilities, and above-ground utility infrastructure.

Although an RPZ analysis was approved to leave 175$^{th}$ Street in the Runway 35 RPZ, the runway end was raised to keep the departure surface clear of potential vehicle traffic. The future crosswind runways, shown on the ALP, have their RPZs clear of the land uses identified by the Memorandum.

### *3.6.3 Airport Property Interests*

The preparation of appropriate airport zoning and land use controls should be a priority for the Redfield Municipal Airport. The City has done an excellent job to obtain easements with height restrictions for surrounding properties, in addition to the construction of buildings or other structures without the consent of the airport. In the future if the opportunity presents itself, the airport could consider purchasing land within the Runway Protection Zones. If the Runway is extended and purchasing the property is not an economical option, the airport should ensure easements are obtained with the same verbiage as existing easements.

The current property consists of nearly the entire eastern half of the section. In the northeastern corner of the property, the current Spink County 4H grounds are located on airport property. The City has a recurring lease with the County. No concurrent use requests have been submitted to the FAA, therefore, the City should request concurrent use of that property and continue to renew the lease when it comes up to ensure fair market value is being obtained.

Next to that property, there are 7 structures that used to be used as hangars. The current use of those structures is not aeronautical. Therefore, the City should again request concurrent use of that property with the FAA and obtain fair market value for the usage of that property for storage purposes.

## *3.7 Terminal Area Analysis*

Facilities located in the terminal area support operations such as aircraft parking, storage, fueling and other services. Those facilities include aprons, terminal building, tie downs, hangars, and fueling facilities. Other facilities in the terminal area are automobile parking lots, fencing, weather reporting and communications.

### *3.7.1 Aprons*

The apron area consists of the general aviation apron with a total area of 57,160 square feet with three tie down locations.

Future Apron, FBO, and Ag-Spray Areas

The newly constructed connector taxiway from the apron to Runway 17/35 provides ample space for the apron to be extended southeast adjacent to the existing apron. The new apron would provide more area for aircraft parking and a concrete hardstand for larger aircraft to tie down.

### *3.7.2 GA Terminal/SRE Building*

The GA Terminal building meets the needs of the airport with restroom facilities, a lounge area, and work area incoming passengers. The SRE portion of the building is adequate for storage with concrete floors and heat.

### *3.7.3 Hangar Facilities*

There are currently 12 privately-owned hangars at the airport, two are located on the apron and the rest are located adjacent to the hangar taxilanes. Space still exists for the construction of four hangars along the existing hangar taxilanes. With the recent increase in spray operators at the airport and the new B-II Runway, based aircraft and operations at 1D8 are likely to grow. Further expansion of the hangar taxilanes for aircraft owners is recommended. Additional space requirements for spray operators is also anticipated in the near future.

In addition, there are 7 hangars located north of the primary development area. Those hangars have been in this location for years. The access to the apron has always been a dirt/gravel path. In the early 2010's, the closest 500 feet of the path to the apron was re-routed and the access is now to the side of the apron instead of the back. No further expansion of this north hangar area is recommended, as there is room for expansion closer to the existing apron and runway.

### *3.7.4 Automobile Parking*

The automobile parking at the end of the access road covers approximately 14,375 square feet. This parking area generally meets the needs of the airport as most hangar owners use a different

access point and park their vehicles within the vicinity of their own hangar. In the future, with more based aircraft and additional operations, the need for expansion will be necessary

### *3.7.5 Fencing & Security*

The airport has a 4-foot high barb wire fence around a good portion of the airport, along US Highway 281 and on the north edge of the property. New fence was not installed after land was purchased for the construction of the new runway. Within the next 5 years, a 10' high wildlife fence is planned for construction. This will be a great benefit to the airport, with the wetland on the southeast side of the property.

### *3.7.6 Snow Removal Equipment & Storage*

Upon completion of the SRE building in 2012, the City has not yet attained the SRE from previous grant applications due to other projects taking precedence. With the conclusion of the Runway Realignment project, the City should consider obtaining the SRE to maintain all new and existing pavements at the airport.

### *3.7.7 Weather Reporting & Communications*

Redfield Municipal Airport has no weather reporting equipment. Acquisition of an AWOS-III system would enable users to access reports of current altimeter setting, density altitude, temperature, dew point, and wind speed, direction, and gust. In addition the AWOS-III determines visibility, cloud height, and precipitation accumulation. Table 19 provides a summary of facility requirements discussed in Chapter 3.

**Table 19: Existing and Future Facility Summary at 1D8**

| Item | Existing (2018) | 0-5 years | 6-10 years | 11-20 years |
|---|---|---|---|---|
| **Runways** | | | | |
| **17/35** | | | | |
| Runway Design (RDC) | B-II small aircraft | Same as Existing | | |
| Length (ft) | 3,500 | Same as Existing | | |
| Width (ft) | 75 | Same as Existing | | |
| Pavement Strength | Single Wheel <12,500 lbs | Same as Existing | | |
| Lighting | MIRL | Same as Existing | | |
| Markings | Non-precision | Same as Existing | | |
| **Crosswind Runway** | | | **17/35** | |
| Runway Design Code (RDC) | Not Applicable | | A I small aircraft (<50 knots) | |
| Length (ft) | Not Applicable | | 2,500 | |
| Width (ft) | Not Applicable | | 60 | |
| Lighting | Not Applicable | | None | |
| Markings | Not Applicable | | Plastic Black & White Cones | |

| Item | Existing (2018) | 0-5 years | 6-10 years | 11-20 years |
|---|---|---|---|---|
| **Taxiways/Taxilanes** | | | | |
| **Taxiways** | | | | |
| Taxiway Design Group (TDG) | T–G - II | Same as Existing | | |
| Width (ft) | 35 | Same as Existing | | |
| Lighting | MITL | Same as Existing, Maintain | | |
| Marking | Centerline | Same as Existing, Maintain | | |
| **Taxilanes** | | | | |
| Taxiway Design Group (TDG) | TDG I & II | Same as Existing | | |
| Width (ft) | 25’ & 35’ | Future Taxilanes constructed at both widths | | |
| Lighting | Reflectors | Maintain | | |
| Markings | Centerline | Maintain | | |
| **Navigational Aids** | | | | |
| SuperAWOS | None | AWOS-III | | |
| Beacon | Yes | Maintain | | |
| Approaches | In progress | RNAV GPS | | |
| **Visual Aids** | | | | |
| Segmented Circle | Yes | Maintain | | |
| REIL | No | Install | Maintain | |
| PAPI | Yes | Maintain | Move if Runway is Extended | |
| **Hangars** | | | | |
| Ag Operator Hangars (sf) | None | None | 39,000 | |
| Conventional (sf) | 43,100 | 33,200 | 28,200 | 107,300 |
| **Apron** | | | | |
| Tie-down/transient (sf) | 57,160 | 76,350 | | |
| **Vehicle Parking** | | | | |
| Public | 14,375 | Same | | 25,500 |
| Ag Operator | None | None | 88,000 | |
| **Fuel Facility** | | | | |
| Jet A (gal) | 12,000 (Private) | Maintain | | |
| AVGAS (100LL) (gal) | 3,000 | Maintain | Acquire larger tank | |
| Self-fueling/Credit Card Reader | Yes | Maintain | | |
| **Fencing** | | | | |
| Perimeter | Partial 4’ Barb Wire | 10’ High Wildlife Fence | Maintain | |

# Chapter Four – Alternatives

This chapter will discuss and evaluate feasible development alternatives to enable 1D8 to meet the needs outlined in previous sections. The overall objective of the alternatives analysis is to provide the City with an in-place plan to improve the airport as the users, aircraft, and community continues to change and grow. Only alternatives that the City, State, and FAA will reasonably be able to implement were considered.

## *4.1 Airside Improvements*

Airside improvements generally take priority over other improvements on the airfield. This section describes the runway, taxiway, apron, airfield lighting, signage, and any miscellaneous improvements, in order to meet the needs of the facility requirements discussed in Chapter 3.

- Acquisition of an AWOS III
- Design & Construction of Wildlife Fence
- Design & Construct Parallel Taxiway – Phase I
- Design & Construct Parallel Taxiway – Phase II
- Design & Construct Apron & Taxiway Reconstruction
- Design & Construct Crosswind Runway
- Apron Expansion

### *4.1.1 Runway Improvements*

The Runway Realignment project completed in 2018 was a major improvement to the previous Runway 13/31. Runway 17/35 is classified as a B-II and will serve the existing needs of the airport in the near future.

Future improvements for the runways include:

- No Action
- 0-10 years: Pavement Maintenance
- 11-20 years: Construct Crosswind Runway
- 21+ years: Extend Runway 17/35

No Action: This provides no improvements to the Runway or planning for future growth at the airport.

0-10 years: The new asphalt pavement of Runway 17/35 will require maintenance beginning with route and sealing cracks. Rejuvenation may be an option depending on the condition of the pavement, or mill and overlay at approximately 10 years.

11-20 years: In order to provide adequate wind coverage, the airport should construct a new crosswind runway. The smaller aircraft require the crosswind depending on the direction and speed of wind. Aircraft with tundra tires also prefer a turf runway. Recent conversations with local pilots indicated the construction of the crosswind runway as a major priority. The

crosswind runway is initially planned to be turf. Runway orientation should be evaluated environmental approval will be needed. It is anticipated that in the future, a portion will be paved as it will cross an ultimate parallel taxiway and connector taxiway.

Beyond 20 years, The Runway can be extended to accommodate larger aircraft if justified. In order to construct the extension, a road (175th St.) on the south side of the airport property will need to be examined. The 35 end extension will have multiple penetrations to the Approach Surface, tree groves at 24.7, 24.6, and 19.3 feet should be removed or trimmed. A ground penetration of 1.2 feet should be regraded as part of the Runway extension if it comes to fruition. The Part 77 Approach has additional tree grove penetrations at 20.8 and 24.3 feet that should be removed or trimmed and ground penetrations at 1.0 and 2.0 feet requiring runway grading. The Vertical Guidance Approach Surface obstructions include tree groves at 24.9, 30.5, and 31.0 feet and ground penetration at 1.2 feet. The obstructions should be evaluated when the extension becomes a reality.

### *4.1.2 Taxiway/Taxilane Improvements*

Future improvements on the taxiways include:

- No Action
- 0-5 years: Parallel Taxiway Phase I
- 6-10 years: Phase II of Parallel Taxiway & Reconstruct Apron & Hangar Taxilanes
- 11-15 years: Ag Spray Taxiway & Taxilane
- 16-20 years: Maintenance and Expansion of Connector Taxiways
- 21 + years: Extend Parallel Taxiway

No Action: This provides no improvements to either expand the hangar taxilanes or maintain existing pavements.

0-5 years: In order to maintain safe operations at the airport, a parallel taxiway should be constructed. Lengthening the partial parallel taxiway 900’ will extend just past the intersection of the ultimate crosswind runway and Ag spray taxiway. Constructing the parallel taxiway will allow aircraft to taxi to the midway of the Runway and exit without having to be on Runway 17/35 like the majority of small general aviation airports in SD.

6-10 years: Phase II of the parallel taxiway will extend the last 1,620’ to connect with the jug-handle turnaround. Reflective markers will also be added to the edge of the taxiway. The hangar taxilane closest to Runway 17/35 will be in need of reconstruction by this time and is planned for reconstruction as a B-II taxilane. This taxilane would allow 28,000 square feet of hangar space on the southwest side of the hangar taxilane.

11-15 years: The agriculture industry surrounding the City of Redfield will in all likelihood continue to grow and become more technologically advanced. Ample space is in place for the existing hangar taxilanes to be extended further southeast at approximately 230’ on the furthest northeast hangar taxilane and 190’ on the middle taxilane. Once the extended taxilanes have full hangars, a new Ag spray taxilane is planned for construction at 2,090’ from Runway End 17 to an ultimate aerial applicator development area. The aerial applicator taxilane will also connect

to the future apron expansion. An ultimate connector taxiway is planned for construction off the southwest corner of the future apron expansion. The location of this new connector taxiway optimizes the future parking spaces on the newly constructed ramp.

16-20 years: At this time, maintenance on the parallel taxiway, connector taxiways, and hangar taxilanes will need to be completed including a possible mill and overlay or crack sealing. Additional hangar taxilane expansion could also take place at this time.

21+ years: In the distant future, when Runway 17/35 is extended, the parallel taxiway should also be extended. The existing gravel hangar taxilane from the old hangars to the existing apron should be turned to turf as well to prevent rocks from flying around and damaging aircraft.

Many variations of the taxiway/taxilane expansions discussed can be constructed based on the need at the airport at the time.

### *4.1.3 Apron Development*

The existing apron is in poor condition and should be reconstructed within the next decade. An expansion in the future to the west of the existing apron at 200' by 350' would provide three concrete hardstand tie downs and eight tie downs within the asphalt for incoming aircraft. The expansion would allow for more aircraft maneuverability and more parking. In the future, the agricultural operators have ample space to the south of the general aviation hangars to construct their own apron and hangar areas. Once all existing hangar areas are taken, a future expansion to the south is available. An area approximately 1,600,000 square feet is available for expansion of the apron and hangars.

### *4.1.4 Airfield Lighting & Signage Improvements*

In the distant future when Runway 17/35 is extended, the MIRL will also need to be extended. A future runway turnaround will also require MITL along the radius points. The turnaround will also require signage at the hold line for aircraft planning to use the Runway. When the crosswind Runway 14/32 is constructed, signage depicting its orientation will also be essential. The ultimate connector taxiway between Runway 17/35 and the parallel taxiway will require hold position signage and MITL.

### *4.1.5 Hangar Expansion*

The hangar taxilane extensions will provide an additional 49,400 square feet of hangar space on the general aviation side of the airport. The reorientation of the runway provided space for hangars to be built southwest of the existing hangars in the amount of 56,000 square feet. Eight hangars at 100' wide by 70' deep could be constructed adjacent to the existing hangar taxilane and expanded apron. Three larger hangars at 100' by 100' could also be constructed on the southwest side of a newly constructed hangar taxilane further southwest.

The GA pilots have expressed an interest in agriculture applicators operating in a separate area on airport property. Ample space is required for those larger aircraft or Specialized Aviation Service Operators (SASO) which can be developed directly south of the existing hangar area.

Approximately 1,600,000 square feet is available for drive through hangars, apron area, and non-aircraft parking.

### *4.1.6 Revenue Producing Fuel System*

The City owns and operates a 3,000 gallon 100LL fuel tank installed in 1999. Pilots are provided access to fuel 24 hours a day via credit card reader. Wilbur-Ellis Air, LLC owns and operates an aboveground 12,000 gallon Jet A fuel tank originally installed in 2011. As operations at the airport increase, the City of Redfield should consider expanding the 100LL fuel tank to 10,000 gallons. Installation of their own Jet A fuel tank in the future could also increase revenue at the airport.

### *4.1.4 Miscellaneous Airside Improvements*

The airport has also been in the process of obtaining an AWOS III in order to enhance safety at the airport and provide pilots with an onsite weather system. Traffic is a critical factor in obtaining an AWOS III. With the recent shut down of the airport, an adequate representation of traffic could not be represented. Medivac pilots have expressed great interest in an AWOS III in order to safely land and takeoff at 1D8 in emergency situations.

As agricultural applicators continue to increase operations and technological advances, they will require additional acreage to develop. An ultimate access road is planned for construction off US Highway 281 to allow truck traffic carrying chemical to have easy access to those hangars. Approximately 360,000 square feet is available for development directly east of the planned expansion of the aerial applicators site. The airport will have ample space for a fixed base operator (FBO), minor airframe service, or a specialized aviation service operator.

Wilbur Ellis Air, Inc. currently operates out of the larger hangar on the apron. If they decide to construct new in the future, the City could rent out that hangar for temporary storage for incoming pilots. The City receives calls weekly asking if they any available hangars for storage of aircraft. All existing hangars are full. It would be in the City's best interest to consider construction of a revenue producing hangar in the immediate future.

## *4.2 Landside Improvements*

In the event that all airside needs at the airport have been met, the City may then consider airport needs on landside development projects. The landside improvements at 1D8 discuss hangar expansion, a revenue producing fuel system, vehicle parking expansion area, and miscellaneous enhancements.

### *4.2.1 Vehicle Parking Expansion Area*

In the future, approximately 26,000 square feet will be available northeast of the existing parking lot and directly behind the SRE building. The ultimate aerial spray applicator area will also have 87,000 square feet available for parking or other aeronautical development.

### *4.2.2 Miscellaneous Landside Improvements*

The most immediate need at the airport is a 10’ high wildlife fence surrounding the property. The new Runway required a large amount of new acreage necessitating the abandonment of much of the existing 4’ barb wire fence. Instead of erecting new barb wire fence, the airport is planning for construction of the wildlife fence as its next project.

The north hangars have been identified throughout the Master Plan, and of the seven structures, six of the owners have never been pilots. The one remaining owner has not registered an aircraft in the State of South Dakota since 2004. Therefore, the City of Redfield should consider re-evaluating the leases for that area.

If the hangars are not being used for aeronautical uses, the updated leases should designate the area as a non-aeronautical storage use with appropriate rates. Otherwise, if hangar owners still desire the hangar for aeronautical uses, the hangar leases should be similar to the other hangar owners.

It has been acknowledged that many of the leases at the airport have not been updated for several years. It would be beneficial for the City to re-evaluate each lease and update the language to match current FAA and SDDOT guidance or recommendations. The FAA issued its final policy in the Federal Register in 2016 which became effective on July 1, 2017. The policy will be an aid in the establishment of new leases.

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# Chapter Five – Implementation

This chapter describes the improvements and actions to be taken by 1D8 to implement recommendations of the ALP.

## *5.1 Implementation Plan*

Since the ALP/Narrative Report is set up to examine a 10 to 20 year time frame, the overall development of the preferred alternative may take that amount of time. Several factors such as available funding, future demand, and length of time needed for planning, environmental review, and construction play a role in the project schedule. For these reasons, the development will be phased over a 20 year period of time. The future needs and requirements of the airport are simpler to evaluate and satisfy than the ultimate desires. Therefore, the time lines for the three phases are 0-5 years, 6-10 years, and 11-20 years.

## *5.2 Capital Improvement Plan*

The CIP is a fluctuating document that will likely change annually or more depending on the new needs that arise. 1D8 will work with the FAA, SDDOT Office of Air, Rail, and Transit, and Helms and Associates on an annual basis, at a minimum, to adjust the CIP. Table 20 provides project estimates for the next twenty years at 1D8.

**Table 20: Capital Improvement Plan**

| Year | Project | Entitlement Dollars | Apportionment and/or Discretionary Dollars |
|---|---|---|---|
| 2019 | AWOS III Design w/Benefit Cost Analysis | $150,000 | $315,000 |
| | Design Wildlife Fence | | |
| 2020 | Wildlife Fence Construction | $150,000 | $500,000 |
| 2021 | No Project | $150,000 | -- |
| 2022-2023 | Design & Construct Parallel Taxiway - Phase I | $300,000 | $1,000,000 |
| 2024-2028 | Design & Construct Parallel Taxiway – Phase II | $1,000,000 | |
| | Design & Construct Apron and Taxiway Reconstruction | $750,000 | |
| 2029-2039 | Design & Construct Ag Spray Taxiway | $600,000 | |
| | Design & Construct Apron and Taxiway Expansion | $600,000 | |
| | Wetland Filling/Mitigation | $1,500,000 | |
| | Purchase SRE Equipment | $200,000 | |

## *5.3 Potential Funding*

In general, funding for projects at general aviation airports like 1D8 comes from any of three sources: local city funds, South Dakota Aeronautics Trust Fund, and FAA Airport Improvement Program (AIP) grants. Currently, the FAA grants are set at a 90% federal, 5% local and 5% State share level.

The funds for the FAA's share of grants comes from three different types of funds. First are entitlement funds that are designated to an individual airport and are reserved for that airport's use. Currently, Redfield receives $150,000 in FAA AIP entitlement funds per year, but this amount is subject to change with any new legislation by Congress. These funds are dedicated to the airport by the FAA, but do not need to be spent every year. They may be retained for up to four years before the airport would lose them. Second are State apportionment funds, which the FAA sets aside for the State to be used at any airport within the State. The State Aeronautics Commission decides the priority of projects in the State and which projects will receive a share of these funds. Third are FAA discretionary funds, which the FAA uses nationally to sponsor large high priority projects. The FAA on a national level decides which projects to finance with these funds based on a national review.

The State's portion of the funding comes from the State Aviation Trust fund. Typically the State will participate in all projects deemed AIP eligible and funded by the FAA. Currently, the State has been able to keep the trust fund from declining too rapidly at a 5% match for grants, however that number may be lowered in subsequent years to keep the trust fund stable.

Finally, the City's portion of the funding is usually 5% and should be budgeted annually. The City should ensure that lease rates are competitive with surrounding airports. Other sources of income in the future could include fuel sale markup, donations, and third-party support that could include private and/or commercial developers.

# Chapter Six – Environmental

The environmental overview portion of the Master Plan is not a complete review or assessment of the impacts of any of the proposed alternatives. Instead it gives an overview of the environmental review process and looks at what areas may be affected by the proposed improvements.

## *6.1 Environmental Process*

The National Environmental Policy Act (NEPA) of 1969 is the basis for the requirements for environmental review of federally funded projects. To assist airport sponsors in fulfilling these requirements the FAA has published FAA Orders 1050.1F Environmental Impacts: Policies and Procedures and 5050.4B National Environmental Policy Act Implementing Instructions for Airport Actions. The FAA has also published an Environmental Desk Reference to assist with the review.

Typically these reviews take one of three forms. The shortest and simplest is a Categorical Exclusion (CATEX). These are actions that are defined as:

> "…categories of actions that normally do not individually or cumulatively have significant adverse effects on the human environment and which have been found by the federal agency to have no such effect."

Some projects that fit this category are existing runway reconstructions, taxiway reconstructions, ALP approval, fencing improvements, etc.

The next level of review is the Environmental Assessment (EA). This is a concise document that takes a hard look at expected environmental effects of a proposed action. It is performed when the project has the possibility to produce significant impacts. Some examples of projects requiring an EA are land acquisition projects of more than three acres, new runways, runway extensions, filling wetlands, etc.

The final level of review is the Environmental Impact Statement (EIS). These are performed when the project has a significant impact or is controversial in nature. Its primary purpose is to be an action-forcing tool to ensure Federal government programs and actions meet NEPA goals and policies. A project requiring an EIS would be a new commercial service airport in a Metropolitan Statistical Area.

The review used will dictate the level of discussion necessary for the proposed action to specific environmental impact categories, the impacts are broken into the categories as shown in Table 21.

## *6.2 Impact Category Overview*

**Table 21: Environmental Impact Categories (FAA 1050.1F Environmental Desk Reference)**

| ENVIRONMENTAL IMPACT CATEGORY | CHAPTER |
|---|---|
| Air Quality | 1 |
| Biological Resources | 2 |
| Climate | 3 |
| Coastal Resources | 4 |
| Department of Transportation Act, Section 4(f) | 5 |
| Farmlands | 6 |
| Hazardous Materials, Solid Waste, and Pollution Prevention | 7 |
| Historic, Architectural, Archeological, and Cultural Resources | 8 |
| Land Use | 9 |
| Natural Resources and Energy Supply | 10 |
| Noise and Noise-Compatible Land Use | 11 |
| Socioeconomics, Environmental Justice, and Children's Environmental Health and Safety Risks | 12 |
| Visual Effects | 13 |
| Water Resources | 14 |
| Cumulative Impacts | 15 |
| Irreversible and Irretrievable Commitment of Resources | 16 |

### *6.2.1 Air Quality*

The two primary laws relating to air quality are NEPA and the Clean Air Act (CAA). According to FAA guidance, no air quality analysis is required to comply with NEPA as the number of operations and enplanements at the Airport are well below the thresholds for when such an analysis is required. The CAA was initially passed in 1967 with several revisions including the CAA of 1990, which includes a comprehensive strategy to achieve and maintain National Ambient Air Quality Standards (NAAQS) for six common pollutants, which were named "criteria pollutants". States and/or the Environmental Protection Agency (EPA) established plans to meet these standards. The eastern half of SD is in attainment for all "criteria pollutants".

Airport developments will not have a measureable impact on air quality, therefore, any Federal Action taken as a result of this ALP is presumed to conform and no further analysis is necessary.

### *6.2.2 Biological Resources*

Biological resources refer to and are valued for their intrinsic, aesthetic, economic, and recreational qualities. They include fish, wildlife, plants, and their respective habitats. The Bald and Golden Eagle Protection Act, Endangered Species Act, Fish and Wildlife Coordination Act, Magnuson-Stevens Fishery Conservation and Management Act, Marine Mammal Protection Act, Migratory Bird Treaty Act, Executive Order 13112 Invasive Species, Executive Order 13186 Responsibilities of Federal Agencies to Protect Migratory Birds, Council on Environmental Quality (CEQ) Guidance on Incorporating Biodiversity Considerations into Environmental Impact Analysis Under NEPA, and Memorandum of Understanding to Foster the Ecosystem Approach should be considered.

The airport has a wide variety of birds that are commonly found throughout Eastern South Dakota. There are the larger species like hawks, gulls, geese, ducks and pheasants. The waterfowl population levels obviously fluctuate with the seasons and peak during the spring and fall migrations. At those times the snow goose populations moving through the area can reach hundreds of thousands. Although these birds very seldom use the airport itself they are in and around the airspace. Other smaller birds are commonly found on the airport such as Killdeer, Larks, Swallows, blackbirds, grackles and many others that are common to eastern South Dakota.

Several Federal and State regulations on fish and wildlife coordination for environmental review have implications for this project. At the federal level, direction for coordination on fish and wildlife is provided under the policies of the Fish and Wildlife Coordination Act of 1934, as amended (16 USC 661-667e) and the Migratory Bird Treaty Act of 1918, as amended (16 USC 703-712) for projects involving Federal funding. Federal actions under both acts require US F&WS review. At the state level, SD GF&P regulates and manages certain fish and wildlife species including game, non-game, and state Threatened and Endangered (T&E) species. Both federally and state-managed wildlife lands are found in SD including Federal Waterfowl Production Areas (WPAs) and Wildlife Refuges and State game refuges and hunting areas.

According to the information available through the U.S. Fish and Wildlife Service Website, the federally listed threatened, endangered, proposed, or candidate species in Spink County are the Whooping Crane, Red Knot, Topeka Shiner, and the Northern Long-Eared Bat.

The Whooping crane is only known to migrate through South Dakota twice per year. A cautionary note built into a large construction project that all work would cease if any are spotted in the area, until the crane migration moved on. The Red Knot is also known to migrate through South Dakota and a similar clause could be built into a large construction project on avoidance. The Topeka Shiner is a small fish found in moving bodies of water, therefore it will not be impacted by any of the development projects moving forward. The Northern Long-Eared Bat is generally found in caves or crevices of live or dead trees. There will be no impact to trees in the development projects therefore there is no concern for impacting the northern long-eared bat.

The proposed developments are not anticipated to have significant impacts on biological resources. However, during the environmental review, 1D8 shall work with the FAA on a determination on potential impacts to listed species or critical habitat.

### *6.2.3 Climate*

According to the FAA Desk Reference, the Intergovernmental Panel on Climate Change (IPCC) estimates that aviation accounted for 4.1% percent of global transportation GHG emissions. In the United States, U.S. Environmental Protection Agency (EPA) data indicate that commercial aviation contributed 6.6% percent of total CO2 emissions in 2013, compared with other sources, including the remainder of the transportation sector (20.7 percent), industry (28.8 percent), commercial (16.9 percent), residential (16.9 percent), agricultural (9.7 percent) and U.S. territories (.05 percent). Therefore, climate change is a global concern that can have local impacts and should be considered in an environmental review.

The Clean Air Act, Executive Order 13514 Federal Leadership in Environmental Energy and Economic Performance, Executive Order 13653 Preparing the United States for the Impacts of Climate Change, and Executive Order 13693 Planning for Federal Sustainability should be considered in the environmental analysis.

As Green House Gas (GHG) emissions are not anticipated for any of the planned construction projects and affects to climate aren't relevant to any proposed actions, no further analysis should be needed in the environmental review.

### *6.2.4 Coastal Resources*

The Coastal Barrier Resources Act, Coastal Zone Management Act, National Marine Sanctuaries Act, Executive Order 13089 Coral Reef Protection, and Executive Order 13547 Stewardship of the Ocean, Our Coasts, and the Great Lakes are the regulations that need to be considered in an environmental analysis.

HON is not in or near a Coastal Zone or within a Coastal Barrier Resources System (CBRS) since it is inland and over 1,000 miles from the nearest coast. Therefore, there is no concern for impact on coastal resources.

### *6.2.5 Department of Transportation Act, Section 4(f)*

Section 4(f) states, in part, that "It is the policy of the United States Government that special effort be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites" (49 USC 303). Section 4(f) requires that United States Departments of Transportation determine whether a proposed airport project would adversely affect a Section 4(f) resource. If a project would affect a Section 4(f) resource, all feasible and prudent ways of avoiding this impact must be evaluated. Section 4(f) resources are as follows:

- Public recreation areas
- Parks
- Wildlife and/or waterfowl refuges
- Significant historic properties, excluding those properties only eligible for listing on the National Register of Historic Places (NRHP) under Criterion D (these same resources are also considered under Section 106 of the National Historic Preservation Act of 1966 NHPA)

The Land and Water Conservation Fund Act of 1965 is a fund that provides for developing recreational lands through grants to local and state governments. These are known as Section 6(f) properties and are not to be converted to non-recreational uses, unless the Secretary of the Department of the Interior, approves the conversion.

A Level III Cultural Resources Survey was conducted in 2012 and there does not appear to be any recreational facilities surrounding the airport. Therefore, it is not anticipated that there will be any affects to Section 4(f) or 6(f) properties.

### *6.2.6 Farmlands*

The Farmland Protection Policy Act of 1981 (7 CFR 658) requires that federal projects minimize the conversion of farmland to nonagricultural uses. To the extent practicable, state and local farmland policies are to be considered. Specially classified farmlands receive particularly close scrutiny under this act and are addressed in the remainder of this section. The USDA NRCS should be consulted on the effects of future planned projects, especially when purchasing land and/or converting farmland is being considered. According to NRCS, no significant impact on prime or important farmland occurs if the score of the proposed project is less than a threshold of 160 points. A Farmland Impact Rating form can be completed to determine if significant impacts are anticipated.

***Prime Farmland:*** The USDA defines prime farmland as "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses (the land could be cropland, pastureland, rangeland, forest land, or other land, but not urban built-up land or water)" (7 CFR 657). Prime farmland produces the highest yields with the least amount of energy and economic inputs. The USDA NRCS classifies land as prime farmland if it fits specific precipitation, soil temperature, pH, sodium, erosion, and other physical criteria. These lands are considered of the highest quality for agricultural protection.

***Unique Farmland:*** Unique farmland is land other than prime farmland that is used for the protection of specific high-value food and fiber crops. It has the special combination of soil quality, location, growing season, and moisture supply needed to produce sustained high-quality and/or large yields of a specific crop when treated and managed according to modern farming methods.

Farmlands in the study area are dedicated to row crop production, hay, and pasture and are not considered unique farmlands.

### *6.2.7 Hazardous Materials, Solid Waste, and Pollution Prevention*

This section examines waste streams that would be generated by the project, potential hazardous materials generated or encountered, and the potential to interfere with ongoing remediation of existing contaminated sites. The main possibility for pollution and disturbance of hazardous materials would occur during construction. A SWPPP would be prepared for projects that will impact greater than 1 acre of land prior to construction and would address mitigation measures to prevent hazardous materials from entering water systems.

If discovery of hazardous materials or contamination occurs, construction must be stopped and the incident must be reported to the National Response Center at 800-424-8802 and SD DENR at 605-773-3351.

The Solid Waste Disposal Act notes that the term "solid waste" includes garbage, refuse, or sludge from a waste treatment plant, water supply treatment plant, or an air pollution control facility. More detailed information can be found in 42 USC Section 6903(27). Per FAA

guidance, solid waste in this discussion does not include hazardous waste, which is more rigorously regulated.

The construction activities of the proposed developments are not anticipated to cause impacts to hazardous materials, solid waste, and pollution prevention.

### *6.2.8 Historical, Architectural, Archeological, and Cultural Resources*

The American Indian Religious Freedom Act, Antiquities Act of 1906, Archeological and Historic Preservation Act, Archaeological Resources Protection Act, Historic Sites Act of 1935, National Historic Preservation Act, Native American Graves Protection and Repatriation Act, Public Building Cooperative Use act, Executive Order 11593 Protection and Enhancement of the Cultural Environment, Executive Order 13006 Locating Federal Facilities on Historic Properties in Our Nation's Central Cities, Executive Order 13007 Indian Sacred Sites, Executive Order 13175 Consultation and Coordination with Indian Tribal Governments, Executive Memorandum on Tribal Consultation, and DOT Order 5650.1 Protection and Enhancement of the Cultural Environment are the statutes to be considered as part of this section in the environmental review.

The primary statute for consideration is Section 106 of the National Historic Preservation Act, which requires federal agencies to consider the effects of their undertakings on historic properties. A Section 106 evaluation, including field sampling and review, was performed as part of the EA approved in 2014. The determination was "no historic properties affected." The State Historic Preservation Office (SHPO) concurred with this determination. Future projects can reference this Level III survey in future Section 106 evaluations.

### *6.2.9 Land Use*

The Airport and Airway Improvement Act of 1982, Airport Improvement Program (AIP), Airport Safety, Protection of Environment, Criteria for Municipal Solid Waste Landfills, and other applicable State and Local regulations need to be considered when addressing land uses. Specifically, funding under the AIP should not be approved unless the Secretary of Transportation is satisfied that the proposed project is consistent with plans of public agencies and that appropriate actions have been taken with regard to restrictions of land uses in the immediate vicinity of the airport.

The City of Redfield utilizes their engineering consultant to review proposed building permits that may have an effect on the airport, which keeps the airspace within the City Limits protected.

The South Dakota State Codified Law states that approval is required for construction in the State that exceeds 250 feet above ground level or the proposed construction is within 20,000 feet of an airport and exceeds a 100:1 surface ratio from any point on the runway. The law states that the person or organization may provide the commission the FAA determination of no hazard prior to the start of construction in lieu of the application and permit requirement.

Therefore, consultation should still be completed with state, tribal and local land use authorities for a study area that is to be impacted outside of the airport property when changes in land use are planned. There are no land use changes proposed in the ALP that would have a negative impact on the airport.

### *6.2.10 Natural Resources and Energy Supply*

This section in an environmental study should study the impact of a proposed project's consumption of natural resources and energy supplies. Natural resources generally used on airports are water, asphalt, aggregate, wood, etc. and energy supplies may be natural gas for heating and fuel for aircraft. The Energy Independence and Security Act, Energy Policy Act, Executive Order 13423 Strengthening Federal Environmental, Energy, and Transportation Management and Executive Order 13514 Federal Leadership in Environmental, Energy, and Economic Performance are relevant statutes to be considered.

The resources used in construction, such as aggregate base course, asphalt, fill dirt etc., are all in adequate supply in the Redfield area and during the design every opportunity to reuse materials from on site would be explored. Other than the increase in fuel consumption during construction, it is not anticipated that any proposed projects will significantly increase the use of energy supplies at 1D8.

### *6.2.11 Noise and Noise-Compatible Land Use*

The compatibility of existing and planned land uses with the proposed aviation actions is usually determined in relation to the level of aircraft noise. Federal compatible land use guidelines for a variety of land uses are provided in Table 1 of Appendix A of 14 CFR Part 150. For aviation noise analysis, the cumulative noise energy exposure of individuals to noise resulting from aviation activities must be established in terms of Yearly Day-Night Average Sound Level (DNL). For aviation noise analysis, the FAA has determined the cumulative noise energy exposure of individuals to noise resulting from aviation activities must be established in terms of yearly day/night average sound level (DNL). DNL defines the period of noise exposure, while decibels (dB) provide a measure of the magnitude. The measure of DNL dB describes an average yearly day/night noise level. For noise sensitive land uses, such as residences, schools, hospitals, etc., DNL 65 dB is the threshold which defines an impact.

The FAA Order 1050.1F Desk Reference, states, no noise analysis is needed for proposals involving Design Group I and II airplanes (wingspans less than 79 feet) in Approach Categories A through D (landing speed less than 166 knots) operating at airports whose forecast operations in the period covered by the NEPA document do not exceed 90,000 annual propeller operations (247 daily operations) or 700 annual jet operations (2 average daily operations). These numbers of propeller and jet operations result in DNL 60 dB contours less than 1.1 square mile that extend no more than 12,500 feet from start of takeoff roll. The DNL 65 dB contour areas would be 0.5 square mile or less and extend no more than 10,000 feet from start of takeoff roll.

At the current time, 1D8 is not anticipated to have 700 annual jet operations. Therefore a noise analysis is not needed. None of the proposed developments would have an impact on operations at 1D8 and should not require a noise analysis.

### *6.2.12 Socioeconomics, Environmental Justice, and Children's Environmental Health and Safety Risks*

Airport improvement projects have the potential to cause induced or secondary socioeconomic impacts on surrounding communities. Such impacts might include shifts in patterns of population movement and growth, public service and infrastructure demands, changes in business and economic impacts, or any other factors identified by the public.

The Uniform Relocation Assistance and Real Property Acquisitions Policy Act of 1970 should be followed during all land acquisition and relocation processes. It is not anticipated that any of the proposed developments would have induced socioeconomic impacts, however, during an environmental assessment, the economic activity and income, employment, population and housing, public services and social conditions should be studied.

Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. To comply with the regulations of Title VI of the 1964 Civil Rights Act (42 USC 2000d et seq.) and EO 12898, Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations (59 Federal Register [FR] 7629), the potential environmental impacts of each alternative should be studied with respect to the demographic and socioeconomic composition of the study area. It is not anticipated that the proposed developments would have an impact to environmental justice populations.

Pursuant to Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks 62 Federal Register 19885, (April 21, 1997), Federal agencies are directed, as appropriate and consistent with the agency's mission, to make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children. Priority areas of attention are asthma, unintentional injuries, developmental disorders, and cancer.

There are no anticipated environmental consequences that may impact children's health and safety.

### *6.2.13 Visual Effects*

Airport-related lighting facilities and activities could visually affect surrounding residents and other nearby light-sensitive areas such as homes, parks or recreational areas. Some airport projects have visual effects in which airport improvement projects contrast with the existing environment, architecture, history, or others find the proposed action objectionable. Visual effects on resources discussed in other sections of a NEPA document should be discussed in those sections. Those categories may include visual effects on specific resources in the Biological Resources, Coastal Resources, Department of Transportation Act Section 4(f), Historical, Architectural, Archeological, and Cultural Resources, and Wild and Scenic Rivers sections.

No significant impacts are anticipated.

## *6.2.14 Water Resources*

**Wetlands**

Wetlands are identified in the Clean Water Act and the EO 11990, Protection of Wetlands, as important to the nation's environmental health. EO 11900 requires federally funded projects to take action to minimize the destruction, loss or degradation of wetlands and to avoid any impacts on wetlands when possible. Wetlands and other waters of the U.S., including waterways, lakes, natural ponds, and impoundments, are regulated by US ACOE under Section 404 of the Clean Water Act. A permit from US ACOE is required to authorize the discharge of dredged or fill material into waters of the U.S. under US ACOE jurisdiction. The State also has regulatory jurisdiction over all waters within its boundaries.

Wetlands are defined as "those areas that are inundated or saturated by surface or groundwater at frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR 328). Wetlands within the proposed project area were determined in accordance with the 1987 *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, January 1987).

As part of past projects, many of the airfield wetlands have been filled/drained and the impacts have been mitigated off site. There are no anticipated significant impacts to wetlands, however, the wetlands should be evaluated for each project and impacts should be mitigated for as necessary.

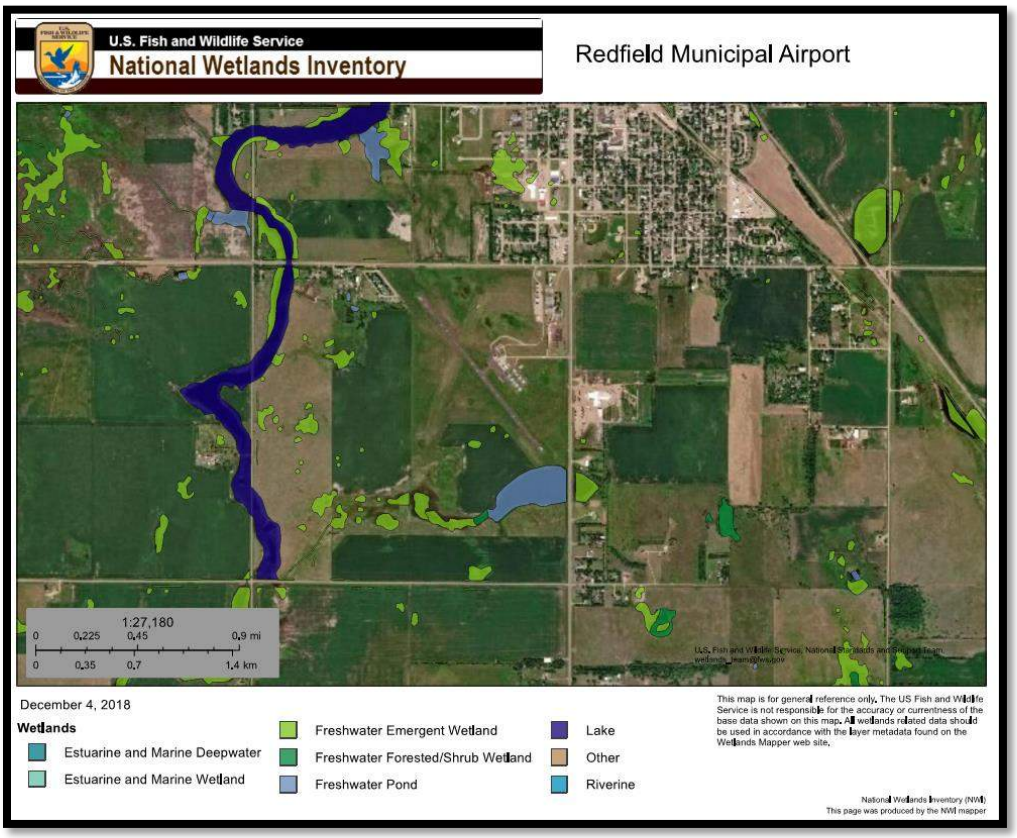


**Figure 13: National Wetland Inventory Map of 1D8**

**Floodplains**
EO 11988, Floodplain Management, directs federal agencies to take action to reduce the risk of flood loss, minimize the impact of floods on human safety, health, and welfare and restore and preserve the natural and beneficial values served by floodplains. It specifies that all improvements should if possible be kept outside of the 100-year floodplain.

According to current FEMA maps, the 100-year floodplain is located west of the existing airport.

**Surface Waters**
Surface waters include streams, rivers, lakes, ponds, estuaries, and oceans. The analysis of surface waters should include surface waters not evaluated in the other sections. The Clean Water Act establishes the basic structure for regulated the discharge of pollutants into waters of the U.S. Section 402 of the Act established the NPDES permit program carried out by the SD DENR. For any projects that disturb greater than 1 acre of land, a SWPPP must be established and an NPDES permit must be applied for by the owner. Following these guidelines with the use of BMPs will ensure that surface waters are not impacted.

**Groundwater**
The Safe Drinking Water Act prevents funding actions that would contaminate an aquifer or its recharge area. The EPA is the oversight agency for groundwater impacts. The construction activities of the proposed developments are not anticipated to cause groundwater quality impacts.

**Wild and Scenic Rivers**
The Wild and Scenic Rivers Act, along with the President's 1979 Environmental Message Directive on Wild and Scenic Rivers designates and protects wild and scenic rivers. The proposed project would have no impact on any wild and scenic rivers or national recreational rivers. The only river in SD with either designation is the Missouri River with only limited sections along the border with Nebraska designated as a national recreational river.

None of the proposed development items will impact wild or scenic rivers.

## *6.2.15 Cumulative Impacts*

The CEQ Regulations define a cumulative impact as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions." In each environmental document the impacts of past, present, and reasonably foreseeable future actions should be considered.

There are no cumulative impacts anticipated at the current time, however, relevant cumulative impacts should be evaluated in each environmental document.

### *6.2.16 Irreversible and Irretrievable Commitment of Resources*

The irreversible and irretrievable commitment of resources should have extra consideration in an environmental review. Examples are conversion of wetlands, farmlands, or wildlife habitat. Each of these situations should be addressed in the individual sections of the environmental document.

There aren't any anticipated irreversible or irretrievable commitments of resources planned that cannot be mitigated.

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# Appendix A – Wind Rose Data

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# Standard Wind Analysis Results for ALL_WEATHER

TITLE: Redfield Municipal Airport - HON Wind Data

| | | | |
|---|---|---|---|
| RUNWAY ORIENTATION: | 170.0 | 350.0 | DEGREE |
| CROSSWIND COMPONENT: | 10.5 | 10.5 | KNOTS |
| TAILWIND COMPONENT: | 60.0 | 60.0 | KNOTS |

WIND COVERAGE: 92.78 %

HOURLY OBSERVATIONS OF WIND SPEED (KNOTS)

| DIRECTION | 0-3 | 4-6 | 7-10 | 11-16 | 17-21 | 22-27 | 28-33 | 34-40 | > 41 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|
| 10° | 141 | 924 | 838 | 1165 | 415 | 121 | 15 | 0 | 0 | 3619 |
| 20° | 129 | 802 | 632 | 791 | 227 | 49 | 5 | 0 | 0 | 2635 |
| 30° | 128 | 723 | 493 | 485 | 112 | 13 | 2 | 1 | 0 | 1957 |
| 40° | 134 | 678 | 415 | 397 | 79 | 5 | 0 | 1 | 0 | 1709 |
| 50° | 150 | 673 | 319 | 247 | 41 | 2 | 0 | 0 | 0 | 1432 |
| 60° | 181 | 654 | 351 | 260 | 44 | 0 | 0 | 0 | 0 | 1490 |
| 70° | 186 | 632 | 366 | 248 | 37 | 0 | 0 | 0 | 0 | 1469 |
| 80° | 191 | 685 | 350 | 262 | 46 | 3 | 0 | 0 | 0 | 1537 |
| 90° | 195 | 817 | 396 | 226 | 53 | 6 | 0 | 0 | 0 | 1693 |
| 100° | 212 | 824 | 428 | 259 | 64 | 19 | 0 | 0 | 0 | 1806 |
| 110° | 208 | 913 | 510 | 374 | 60 | 29 | 0 | 0 | 0 | 2094 |
| 120° | 240 | 1196 | 660 | 558 | 86 | 3 | 0 | 0 | 0 | 2743 |
| 130° | 282 | 1753 | 1056 | 683 | 112 | 6 | 0 | 0 | 0 | 3892 |
| 140° | 331 | 2216 | 1517 | 1184 | 150 | 7 | 0 | 0 | 0 | 5405 |
| 150° | 286 | 2341 | 2060 | 2047 | 368 | 23 | 0 | 0 | 0 | 7125 |
| 160° | 255 | 2108 | 2351 | 3126 | 525 | 26 | 0 | 0 | 0 | 8391 |
| 170° | 275 | 1918 | 1721 | 1918 | 311 | 25 | 0 | 0 | 0 | 6168 |
| 180° | 248 | 1331 | 1111 | 1139 | 183 | 11 | 0 | 0 | 0 | 4023 |
| 190° | 212 | 1095 | 723 | 672 | 109 | 15 | 0 | 0 | 0 | 2826 |
| 200° | 178 | 861 | 468 | 325 | 66 | 4 | 0 | 0 | 0 | 1902 |
| 210° | 139 | 694 | 302 | 172 | 29 | 8 | 0 | 0 | 0 | 1344 |
| 220° | 142 | 580 | 196 | 135 | 17 | 5 | 0 | 1 | 0 | 1076 |
| 230° | 155 | 644 | 175 | 115 | 10 | 3 | 0 | 0 | 0 | 1102 |
| 240° | 166 | 658 | 231 | 82 | 22 | 3 | 1 | 0 | 0 | 1163 |
| 250° | 171 | 551 | 210 | 125 | 18 | 9 | 1 | 0 | 0 | 1085 |
| 260° | 179 | 566 | 275 | 199 | 35 | 5 | 1 | 0 | 0 | 1260 |
| 270° | 200 | 863 | 453 | 244 | 114 | 21 | 3 | 4 | 0 | 1902 |
| 280° | 200 | 1103 | 480 | 411 | 181 | 46 | 8 | 3 | 0 | 2432 |
| 290° | 258 | 1269 | 605 | 735 | 346 | 119 | 22 | 7 | 1 | 3362 |
| 300° | 260 | 1296 | 805 | 1130 | 483 | 199 | 33 | 2 | 2 | 4210 |
| 310° | 284 | 1374 | 952 | 1370 | 699 | 214 | 44 | 5 | 1 | 4943 |
| 320° | 277 | 1395 | 979 | 1650 | 1098 | 402 | 96 | 14 | 3 | 5914 |
| 330° | 238 | 1218 | 977 | 1787 | 1239 | 427 | 119 | 18 | 1 | 6024 |
| 340° | 202 | 1105 | 1030 | 1954 | 1215 | 404 | 70 | 8 | 1 | 5989 |
| 350° | 163 | 1114 | 1128 | 1995 | 931 | 285 | 32 | 7 | 0 | 5655 |
| 360° | 181 | 1043 | 1152 | 2013 | 917 | 210 | 17 | 1 | 1 | 5535 |
| Calm | 10181 | | | | | | | | | 10181 |
| TOTAL | 17558 | 38617 | 26715 | 30483 | 10442 | 2727 | 469 | 72 | 10 | 127093 |

SOURCE: "726540 HURON REGIONAL AIRPORT ANNUAL PERIOD RECORD 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018"

REFERENCE: Appendix 1 of AC 150/5300-13, Airport Design, including Changes 1 through 17.

# Standard Wind Analysis Results for ALL_WEATHER

TITLE: Redfield Municipal Airport - HON Wind Data

| | | | |
|---|---|---|---|
| RUNWAY ORIENTATION: | 170.0 | 350.0 | DEGREE |
| CROSSWIND COMPONENT: | 13.0 | 13.0 | KNOTS |
| TAILWIND COMPONENT: | 60.0 | 60.0 | KNOTS |

WIND COVERAGE: 96.21 %

HOURLY OBSERVATIONS OF WIND SPEED (KNOTS)

| DIRECTION | 0-3 | 4-6 | 7-10 | 11-16 | 17-21 | 22-27 | 28-33 | 34-40 | > 41 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|
| 10° | 141 | 924 | 838 | 1165 | 415 | 121 | 15 | 0 | 0 | 3619 |
| 20° | 129 | 802 | 632 | 791 | 227 | 49 | 5 | 0 | 0 | 2635 |
| 30° | 128 | 723 | 493 | 485 | 112 | 13 | 2 | 1 | 0 | 1957 |
| 40° | 134 | 678 | 415 | 397 | 79 | 5 | 0 | 1 | 0 | 1709 |
| 50° | 150 | 673 | 319 | 247 | 41 | 2 | 0 | 0 | 0 | 1432 |
| 60° | 181 | 654 | 351 | 260 | 44 | 0 | 0 | 0 | 0 | 1490 |
| 70° | 186 | 632 | 366 | 248 | 37 | 0 | 0 | 0 | 0 | 1469 |
| 80° | 191 | 685 | 350 | 262 | 46 | 3 | 0 | 0 | 0 | 1537 |
| 90° | 195 | 817 | 396 | 226 | 53 | 6 | 0 | 0 | 0 | 1693 |
| 100° | 212 | 824 | 428 | 259 | 64 | 19 | 0 | 0 | 0 | 1806 |
| 110° | 208 | 913 | 510 | 374 | 60 | 29 | 0 | 0 | 0 | 2094 |
| 120° | 240 | 1196 | 660 | 558 | 86 | 3 | 0 | 0 | 0 | 2743 |
| 130° | 282 | 1753 | 1056 | 683 | 112 | 6 | 0 | 0 | 0 | 3892 |
| 140° | 331 | 2216 | 1517 | 1184 | 150 | 7 | 0 | 0 | 0 | 5405 |
| 150° | 286 | 2341 | 2060 | 2047 | 368 | 23 | 0 | 0 | 0 | 7125 |
| 160° | 255 | 2108 | 2351 | 3126 | 525 | 26 | 0 | 0 | 0 | 8391 |
| 170° | 275 | 1918 | 1721 | 1918 | 311 | 25 | 0 | 0 | 0 | 6168 |
| 180° | 248 | 1331 | 1111 | 1139 | 183 | 11 | 0 | 0 | 0 | 4023 |
| 190° | 212 | 1095 | 723 | 672 | 109 | 15 | 0 | 0 | 0 | 2826 |
| 200° | 178 | 861 | 468 | 325 | 66 | 4 | 0 | 0 | 0 | 1902 |
| 210° | 139 | 694 | 302 | 172 | 29 | 8 | 0 | 0 | 0 | 1344 |
| 220° | 142 | 580 | 196 | 135 | 17 | 5 | 0 | 1 | 0 | 1076 |
| 230° | 155 | 644 | 175 | 115 | 10 | 3 | 0 | 0 | 0 | 1102 |
| 240° | 166 | 658 | 231 | 82 | 22 | 3 | 1 | 0 | 0 | 1163 |
| 250° | 171 | 551 | 210 | 125 | 18 | 9 | 1 | 0 | 0 | 1085 |
| 260° | 179 | 566 | 275 | 199 | 35 | 5 | 1 | 0 | 0 | 1260 |
| 270° | 200 | 863 | 453 | 244 | 114 | 21 | 3 | 4 | 0 | 1902 |
| 280° | 200 | 1103 | 480 | 411 | 181 | 46 | 8 | 3 | 0 | 2432 |
| 290° | 258 | 1269 | 605 | 735 | 346 | 119 | 22 | 7 | 1 | 3362 |
| 300° | 260 | 1296 | 805 | 1130 | 483 | 199 | 33 | 2 | 2 | 4210 |
| 310° | 284 | 1374 | 952 | 1370 | 699 | 214 | 44 | 5 | 1 | 4943 |
| 320° | 277 | 1395 | 979 | 1650 | 1098 | 402 | 96 | 14 | 3 | 5914 |
| 330° | 238 | 1218 | 977 | 1787 | 1239 | 427 | 119 | 18 | 1 | 6024 |
| 340° | 202 | 1105 | 1030 | 1954 | 1215 | 404 | 70 | 8 | 1 | 5989 |
| 350° | 163 | 1114 | 1128 | 1995 | 931 | 285 | 32 | 7 | 0 | 5655 |
| 360° | 181 | 1043 | 1152 | 2013 | 917 | 210 | 17 | 1 | 1 | 5535 |
| Calm | 10181 | | | | | | | | | 10181 |
| TOTAL | 17558 | 38617 | 26715 | 30483 | 10442 | 2727 | 469 | 72 | 10 | 127093 |

SOURCE: "726540 HURON REGIONAL AIRPORT ANNUAL PERIOD RECORD 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018"

REFERENCE: Appendix 1 of AC 150/5300-13, Airport Design, including Changes 1 through 17.

# Standard Wind Analysis Results for ALL_WEATHER

TITLE: Redfield Municipal Airport - HON Wind Data

| | | | |
|---|---|---|---|
| RUNWAY ORIENTATION: | 110.0 | 290.0 | DEGREE |
| CROSSWIND COMPONENT: | 10.5 | 10.5 | KNOTS |
| TAILWIND COMPONENT: | 60.0 | 60.0 | KNOTS |

WIND COVERAGE: 81.98 %

HOURLY OBSERVATIONS OF WIND SPEED (KNOTS)

| DIRECTION | 0-3 | 4-6 | 7-10 | 11-16 | 17-21 | 22-27 | 28-33 | 34-40 | > 41 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|
| 10° | 141 | 924 | 838 | 1165 | 415 | 121 | 15 | 0 | 0 | 3619 |
| 20° | 129 | 802 | 632 | 791 | 227 | 49 | 5 | 0 | 0 | 2635 |
| 30° | 128 | 723 | 493 | 485 | 112 | 13 | 2 | 1 | 0 | 1957 |
| 40° | 134 | 678 | 415 | 397 | 79 | 5 | 0 | 1 | 0 | 1709 |
| 50° | 150 | 673 | 319 | 247 | 41 | 2 | 0 | 0 | 0 | 1432 |
| 60° | 181 | 654 | 351 | 260 | 44 | 0 | 0 | 0 | 0 | 1490 |
| 70° | 186 | 632 | 366 | 248 | 37 | 0 | 0 | 0 | 0 | 1469 |
| 80° | 191 | 685 | 350 | 262 | 46 | 3 | 0 | 0 | 0 | 1537 |
| 90° | 195 | 817 | 396 | 226 | 53 | 6 | 0 | 0 | 0 | 1693 |
| 100° | 212 | 824 | 428 | 259 | 64 | 19 | 0 | 0 | 0 | 1806 |
| 110° | 208 | 913 | 510 | 374 | 60 | 29 | 0 | 0 | 0 | 2094 |
| 120° | 240 | 1196 | 660 | 558 | 86 | 3 | 0 | 0 | 0 | 2743 |
| 130° | 282 | 1753 | 1056 | 683 | 112 | 6 | 0 | 0 | 0 | 3892 |
| 140° | 331 | 2216 | 1517 | 1184 | 150 | 7 | 0 | 0 | 0 | 5405 |
| 150° | 286 | 2341 | 2060 | 2047 | 368 | 23 | 0 | 0 | 0 | 7125 |
| 160° | 255 | 2108 | 2351 | 3126 | 525 | 26 | 0 | 0 | 0 | 8391 |
| 170° | 275 | 1918 | 1721 | 1918 | 311 | 25 | 0 | 0 | 0 | 6168 |
| 180° | 248 | 1331 | 1111 | 1139 | 183 | 11 | 0 | 0 | 0 | 4023 |
| 190° | 212 | 1095 | 723 | 672 | 109 | 15 | 0 | 0 | 0 | 2826 |
| 200° | 178 | 861 | 468 | 325 | 66 | 4 | 0 | 0 | 0 | 1902 |
| 210° | 139 | 694 | 302 | 172 | 29 | 8 | 0 | 0 | 0 | 1344 |
| 220° | 142 | 580 | 196 | 135 | 17 | 5 | 0 | 1 | 0 | 1076 |
| 230° | 155 | 644 | 175 | 115 | 10 | 3 | 0 | 0 | 0 | 1102 |
| 240° | 166 | 658 | 231 | 82 | 22 | 3 | 1 | 0 | 0 | 1163 |
| 250° | 171 | 551 | 210 | 125 | 18 | 9 | 1 | 0 | 0 | 1085 |
| 260° | 179 | 566 | 275 | 199 | 35 | 5 | 1 | 0 | 0 | 1260 |
| 270° | 200 | 863 | 453 | 244 | 114 | 21 | 3 | 4 | 0 | 1902 |
| 280° | 200 | 1103 | 480 | 411 | 181 | 46 | 8 | 3 | 0 | 2432 |
| 290° | 258 | 1269 | 605 | 735 | 346 | 119 | 22 | 7 | 1 | 3362 |
| 300° | 260 | 1296 | 805 | 1130 | 483 | 199 | 33 | 2 | 2 | 4210 |
| 310° | 284 | 1374 | 952 | 1370 | 699 | 214 | 44 | 5 | 1 | 4943 |
| 320° | 277 | 1395 | 979 | 1650 | 1098 | 402 | 96 | 14 | 3 | 5914 |
| 330° | 238 | 1218 | 977 | 1787 | 1239 | 427 | 119 | 18 | 1 | 6024 |
| 340° | 202 | 1105 | 1030 | 1954 | 1215 | 404 | 70 | 8 | 1 | 5989 |
| 350° | 163 | 1114 | 1128 | 1995 | 931 | 285 | 32 | 7 | 0 | 5655 |
| 360° | 181 | 1043 | 1152 | 2013 | 917 | 210 | 17 | 1 | 1 | 5535 |
| Calm | 10181 | | | | | | | | | 10181 |
| TOTAL | 17558 | 38617 | 26715 | 30483 | 10442 | 2727 | 469 | 72 | 10 | 127093 |

SOURCE: "726540 HURON REGIONAL AIRPORT ANNUAL PERIOD RECORD 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018"

REFERENCE: Appendix 1 of AC 150/5300-13, Airport Design, including Changes 1 through 17.

# Standard Wind Analysis Results for ALL_WEATHER

TITLE: Redfield Municipal Airport - HON Wind Data

| | | | |
|---|---|---|---|
| RUNWAY ORIENTATION: | 110.0 | 290.0 | DEGREE |
| CROSSWIND COMPONENT: | 13.0 | 13.0 | KNOTS |
| TAILWIND COMPONENT: | 60.0 | 60.0 | KNOTS |

WIND COVERAGE: 89.73 %

HOURLY OBSERVATIONS OF WIND SPEED (KNOTS)

| DIRECTION | 0-3 | 4-6 | 7-10 | 11-16 | 17-21 | 22-27 | 28-33 | 34-40 | > 41 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|
| 10° | 141 | 924 | 838 | 1165 | 415 | 121 | 15 | 0 | 0 | 3619 |
| 20° | 129 | 802 | 632 | 791 | 227 | 49 | 5 | 0 | 0 | 2635 |
| 30° | 128 | 723 | 493 | 485 | 112 | 13 | 2 | 1 | 0 | 1957 |
| 40° | 134 | 678 | 415 | 397 | 79 | 5 | 0 | 1 | 0 | 1709 |
| 50° | 150 | 673 | 319 | 247 | 41 | 2 | 0 | 0 | 0 | 1432 |
| 60° | 181 | 654 | 351 | 260 | 44 | 0 | 0 | 0 | 0 | 1490 |
| 70° | 186 | 632 | 366 | 248 | 37 | 0 | 0 | 0 | 0 | 1469 |
| 80° | 191 | 685 | 350 | 262 | 46 | 3 | 0 | 0 | 0 | 1537 |
| 90° | 195 | 817 | 396 | 226 | 53 | 6 | 0 | 0 | 0 | 1693 |
| 100° | 212 | 824 | 428 | 259 | 64 | 19 | 0 | 0 | 0 | 1806 |
| 110° | 208 | 913 | 510 | 374 | 60 | 29 | 0 | 0 | 0 | 2094 |
| 120° | 240 | 1196 | 660 | 558 | 86 | 3 | 0 | 0 | 0 | 2743 |
| 130° | 282 | 1753 | 1056 | 683 | 112 | 6 | 0 | 0 | 0 | 3892 |
| 140° | 331 | 2216 | 1517 | 1184 | 150 | 7 | 0 | 0 | 0 | 5405 |
| 150° | 286 | 2341 | 2060 | 2047 | 368 | 23 | 0 | 0 | 0 | 7125 |
| 160° | 255 | 2108 | 2351 | 3126 | 525 | 26 | 0 | 0 | 0 | 8391 |
| 170° | 275 | 1918 | 1721 | 1918 | 311 | 25 | 0 | 0 | 0 | 6168 |
| 180° | 248 | 1331 | 1111 | 1139 | 183 | 11 | 0 | 0 | 0 | 4023 |
| 190° | 212 | 1095 | 723 | 672 | 109 | 15 | 0 | 0 | 0 | 2826 |
| 200° | 178 | 861 | 468 | 325 | 66 | 4 | 0 | 0 | 0 | 1902 |
| 210° | 139 | 694 | 302 | 172 | 29 | 8 | 0 | 0 | 0 | 1344 |
| 220° | 142 | 580 | 196 | 135 | 17 | 5 | 0 | 1 | 0 | 1076 |
| 230° | 155 | 644 | 175 | 115 | 10 | 3 | 0 | 0 | 0 | 1102 |
| 240° | 166 | 658 | 231 | 82 | 22 | 3 | 1 | 0 | 0 | 1163 |
| 250° | 171 | 551 | 210 | 125 | 18 | 9 | 1 | 0 | 0 | 1085 |
| 260° | 179 | 566 | 275 | 199 | 35 | 5 | 1 | 0 | 0 | 1260 |
| 270° | 200 | 863 | 453 | 244 | 114 | 21 | 3 | 4 | 0 | 1902 |
| 280° | 200 | 1103 | 480 | 411 | 181 | 46 | 8 | 3 | 0 | 2432 |
| 290° | 258 | 1269 | 605 | 735 | 346 | 119 | 22 | 7 | 1 | 3362 |
| 300° | 260 | 1296 | 805 | 1130 | 483 | 199 | 33 | 2 | 2 | 4210 |
| 310° | 284 | 1374 | 952 | 1370 | 699 | 214 | 44 | 5 | 1 | 4943 |
| 320° | 277 | 1395 | 979 | 1650 | 1098 | 402 | 96 | 14 | 3 | 5914 |
| 330° | 238 | 1218 | 977 | 1787 | 1239 | 427 | 119 | 18 | 1 | 6024 |
| 340° | 202 | 1105 | 1030 | 1954 | 1215 | 404 | 70 | 8 | 1 | 5989 |
| 350° | 163 | 1114 | 1128 | 1995 | 931 | 285 | 32 | 7 | 0 | 5655 |
| 360° | 181 | 1043 | 1152 | 2013 | 917 | 210 | 17 | 1 | 1 | 5535 |
| Calm | 10181 | | | | | | | | | 10181 |
| TOTAL | 17558 | 38617 | 26715 | 30483 | 10442 | 2727 | 469 | 72 | 10 | 127093 |

SOURCE: "726540 HURON REGIONAL AIRPORT ANNUAL PERIOD RECORD 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018"

REFERENCE: Appendix 1 of AC 150/5300-13, Airport Design, including Changes 1 through 17.

# Standard Wind Analysis Results for ALL_WEATHER

TITLE: Redfield Municipal Airport - HON Wind Data

| | | | |
|---|---|---|---|
| RUNWAY ORIENTATION: | 140.0 | 320.0 | DEGREE |
| CROSSWIND COMPONENT: | 10.5 | 10.5 | KNOTS |
| TAILWIND COMPONENT: | 60.0 | 60.0 | KNOTS |

WIND COVERAGE: 92.78 %

HOURLY OBSERVATIONS OF WIND SPEED (KNOTS)

| DIRECTION | 0-3 | 4-6 | 7-10 | 11-16 | 17-21 | 22-27 | 28-33 | 34-40 | > 41 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|
| 10° | 141 | 924 | 838 | 1165 | 415 | 121 | 15 | 0 | 0 | 3619 |
| 20° | 129 | 802 | 632 | 791 | 227 | 49 | 5 | 0 | 0 | 2635 |
| 30° | 128 | 723 | 493 | 485 | 112 | 13 | 2 | 1 | 0 | 1957 |
| 40° | 134 | 678 | 415 | 397 | 79 | 5 | 0 | 1 | 0 | 1709 |
| 50° | 150 | 673 | 319 | 247 | 41 | 2 | 0 | 0 | 0 | 1432 |
| 60° | 181 | 654 | 351 | 260 | 44 | 0 | 0 | 0 | 0 | 1490 |
| 70° | 186 | 632 | 366 | 248 | 37 | 0 | 0 | 0 | 0 | 1469 |
| 80° | 191 | 685 | 350 | 262 | 46 | 3 | 0 | 0 | 0 | 1537 |
| 90° | 195 | 817 | 396 | 226 | 53 | 6 | 0 | 0 | 0 | 1693 |
| 100° | 212 | 824 | 428 | 259 | 64 | 19 | 0 | 0 | 0 | 1806 |
| 110° | 208 | 913 | 510 | 374 | 60 | 29 | 0 | 0 | 0 | 2094 |
| 120° | 240 | 1196 | 660 | 558 | 86 | 3 | 0 | 0 | 0 | 2743 |
| 130° | 282 | 1753 | 1056 | 683 | 112 | 6 | 0 | 0 | 0 | 3892 |
| 140° | 331 | 2216 | 1517 | 1184 | 150 | 7 | 0 | 0 | 0 | 5405 |
| 150° | 286 | 2341 | 2060 | 2047 | 368 | 23 | 0 | 0 | 0 | 7125 |
| 160° | 255 | 2108 | 2351 | 3126 | 525 | 26 | 0 | 0 | 0 | 8391 |
| 170° | 275 | 1918 | 1721 | 1918 | 311 | 25 | 0 | 0 | 0 | 6168 |
| 180° | 248 | 1331 | 1111 | 1139 | 183 | 11 | 0 | 0 | 0 | 4023 |
| 190° | 212 | 1095 | 723 | 672 | 109 | 15 | 0 | 0 | 0 | 2826 |
| 200° | 178 | 861 | 468 | 325 | 66 | 4 | 0 | 0 | 0 | 1902 |
| 210° | 139 | 694 | 302 | 172 | 29 | 8 | 0 | 0 | 0 | 1344 |
| 220° | 142 | 580 | 196 | 135 | 17 | 5 | 0 | 1 | 0 | 1076 |
| 230° | 155 | 644 | 175 | 115 | 10 | 3 | 0 | 0 | 0 | 1102 |
| 240° | 166 | 658 | 231 | 82 | 22 | 3 | 1 | 0 | 0 | 1163 |
| 250° | 171 | 551 | 210 | 125 | 18 | 9 | 1 | 0 | 0 | 1085 |
| 260° | 179 | 566 | 275 | 199 | 35 | 5 | 1 | 0 | 0 | 1260 |
| 270° | 200 | 863 | 453 | 244 | 114 | 21 | 3 | 4 | 0 | 1902 |
| 280° | 200 | 1103 | 480 | 411 | 181 | 46 | 8 | 3 | 0 | 2432 |
| 290° | 258 | 1269 | 605 | 735 | 346 | 119 | 22 | 7 | 1 | 3362 |
| 300° | 260 | 1296 | 805 | 1130 | 483 | 199 | 33 | 2 | 2 | 4210 |
| 310° | 284 | 1374 | 952 | 1370 | 699 | 214 | 44 | 5 | 1 | 4943 |
| 320° | 277 | 1395 | 979 | 1650 | 1098 | 402 | 96 | 14 | 3 | 5914 |
| 330° | 238 | 1218 | 977 | 1787 | 1239 | 427 | 119 | 18 | 1 | 6024 |
| 340° | 202 | 1105 | 1030 | 1954 | 1215 | 404 | 70 | 8 | 1 | 5989 |
| 350° | 163 | 1114 | 1128 | 1995 | 931 | 285 | 32 | 7 | 0 | 5655 |
| 360° | 181 | 1043 | 1152 | 2013 | 917 | 210 | 17 | 1 | 1 | 5535 |
| Calm | 10181 | | | | | | | | | 10181 |
| TOTAL | 17558 | 38617 | 26715 | 30483 | 10442 | 2727 | 469 | 72 | 10 | 127093 |

SOURCE: "726540 HURON REGIONAL AIRPORT ANNUAL PERIOD RECORD 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018"

REFERENCE: Appendix 1 of AC 150/5300-13, Airport Design, including Changes 1 through 17.

# Standard Wind Analysis Results for ALL_WEATHER

TITLE: Redfield Municipal Airport - HON Wind Data

| | | | |
|---|---|---|---|
| RUNWAY ORIENTATION: | 140.0 | 320.0 | DEGREE |
| CROSSWIND COMPONENT: | 13.0 | 13.0 | KNOTS |
| TAILWIND COMPONENT: | 60.0 | 60.0 | KNOTS |

WIND COVERAGE: 96.56 %

HOURLY OBSERVATIONS OF WIND SPEED (KNOTS)

| DIRECTION | 0-3 | 4-6 | 7-10 | 11-16 | 17-21 | 22-27 | 28-33 | 34-40 | > 41 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|
| 10° | 141 | 924 | 838 | 1165 | 415 | 121 | 15 | 0 | 0 | 3619 |
| 20° | 129 | 802 | 632 | 791 | 227 | 49 | 5 | 0 | 0 | 2635 |
| 30° | 128 | 723 | 493 | 485 | 112 | 13 | 2 | 1 | 0 | 1957 |
| 40° | 134 | 678 | 415 | 397 | 79 | 5 | 0 | 1 | 0 | 1709 |
| 50° | 150 | 673 | 319 | 247 | 41 | 2 | 0 | 0 | 0 | 1432 |
| 60° | 181 | 654 | 351 | 260 | 44 | 0 | 0 | 0 | 0 | 1490 |
| 70° | 186 | 632 | 366 | 248 | 37 | 0 | 0 | 0 | 0 | 1469 |
| 80° | 191 | 685 | 350 | 262 | 46 | 3 | 0 | 0 | 0 | 1537 |
| 90° | 195 | 817 | 396 | 226 | 53 | 6 | 0 | 0 | 0 | 1693 |
| 100° | 212 | 824 | 428 | 259 | 64 | 19 | 0 | 0 | 0 | 1806 |
| 110° | 208 | 913 | 510 | 374 | 60 | 29 | 0 | 0 | 0 | 2094 |
| 120° | 240 | 1196 | 660 | 558 | 86 | 3 | 0 | 0 | 0 | 2743 |
| 130° | 282 | 1753 | 1056 | 683 | 112 | 6 | 0 | 0 | 0 | 3892 |
| 140° | 331 | 2216 | 1517 | 1184 | 150 | 7 | 0 | 0 | 0 | 5405 |
| 150° | 286 | 2341 | 2060 | 2047 | 368 | 23 | 0 | 0 | 0 | 7125 |
| 160° | 255 | 2108 | 2351 | 3126 | 525 | 26 | 0 | 0 | 0 | 8391 |
| 170° | 275 | 1918 | 1721 | 1918 | 311 | 25 | 0 | 0 | 0 | 6168 |
| 180° | 248 | 1331 | 1111 | 1139 | 183 | 11 | 0 | 0 | 0 | 4023 |
| 190° | 212 | 1095 | 723 | 672 | 109 | 15 | 0 | 0 | 0 | 2826 |
| 200° | 178 | 861 | 468 | 325 | 66 | 4 | 0 | 0 | 0 | 1902 |
| 210° | 139 | 694 | 302 | 172 | 29 | 8 | 0 | 0 | 0 | 1344 |
| 220° | 142 | 580 | 196 | 135 | 17 | 5 | 0 | 1 | 0 | 1076 |
| 230° | 155 | 644 | 175 | 115 | 10 | 3 | 0 | 0 | 0 | 1102 |
| 240° | 166 | 658 | 231 | 82 | 22 | 3 | 1 | 0 | 0 | 1163 |
| 250° | 171 | 551 | 210 | 125 | 18 | 9 | 1 | 0 | 0 | 1085 |
| 260° | 179 | 566 | 275 | 199 | 35 | 5 | 1 | 0 | 0 | 1260 |
| 270° | 200 | 863 | 453 | 244 | 114 | 21 | 3 | 4 | 0 | 1902 |
| 280° | 200 | 1103 | 480 | 411 | 181 | 46 | 8 | 3 | 0 | 2432 |
| 290° | 258 | 1269 | 605 | 735 | 346 | 119 | 22 | 7 | 1 | 3362 |
| 300° | 260 | 1296 | 805 | 1130 | 483 | 199 | 33 | 2 | 2 | 4210 |
| 310° | 284 | 1374 | 952 | 1370 | 699 | 214 | 44 | 5 | 1 | 4943 |
| 320° | 277 | 1395 | 979 | 1650 | 1098 | 402 | 96 | 14 | 3 | 5914 |
| 330° | 238 | 1218 | 977 | 1787 | 1239 | 427 | 119 | 18 | 1 | 6024 |
| 340° | 202 | 1105 | 1030 | 1954 | 1215 | 404 | 70 | 8 | 1 | 5989 |
| 350° | 163 | 1114 | 1128 | 1995 | 931 | 285 | 32 | 7 | 0 | 5655 |
| 360° | 181 | 1043 | 1152 | 2013 | 917 | 210 | 17 | 1 | 1 | 5535 |
| Calm | 10181 | | | | | | | | | 10181 |
| TOTAL | 17558 | 38617 | 26715 | 30483 | 10442 | 2727 | 469 | 72 | 10 | 127093 |

SOURCE: "726540 HURON REGIONAL AIRPORT ANNUAL PERIOD RECORD 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018"

REFERENCE: Appendix 1 of AC 150/5300-13, Airport Design, including Changes 1 through 17.

# Standard Wind Analysis Results for ALL_WEATHER

TITLE: Redfield Municipal Airport - HON Wind Data

| | | | | | |
|---|---|---|---|---|---|
| RUNWAY ORIENTATION: | 110.0 | 290.0 | 170.0 | 350.0 | DEGREE |
| CROSSWIND COMPONENT: | 10.5 | 10.5 | 10.5 | 10.5 | KNOTS |
| TAILWIND COMPONENT: | 60.0 | 60.0 | 60.0 | 60.0 | KNOTS |

WIND COVERAGE: 98.42 %

HOURLY OBSERVATIONS OF WIND SPEED (KNOTS)

| DIRECTION | 0-3 | 4-6 | 7-10 | 11-16 | 17-21 | 22-27 | 28-33 | 34-40 | > 41 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|
| 10° | 141 | 924 | 838 | 1165 | 415 | 121 | 15 | 0 | 0 | 3619 |
| 20° | 129 | 802 | 632 | 791 | 227 | 49 | 5 | 0 | 0 | 2635 |
| 30° | 128 | 723 | 493 | 485 | 112 | 13 | 2 | 1 | 0 | 1957 |
| 40° | 134 | 678 | 415 | 397 | 79 | 5 | 0 | 1 | 0 | 1709 |
| 50° | 150 | 673 | 319 | 247 | 41 | 2 | 0 | 0 | 0 | 1432 |
| 60° | 181 | 654 | 351 | 260 | 44 | 0 | 0 | 0 | 0 | 1490 |
| 70° | 186 | 632 | 366 | 248 | 37 | 0 | 0 | 0 | 0 | 1469 |
| 80° | 191 | 685 | 350 | 262 | 46 | 3 | 0 | 0 | 0 | 1537 |
| 90° | 195 | 817 | 396 | 226 | 53 | 6 | 0 | 0 | 0 | 1693 |
| 100° | 212 | 824 | 428 | 259 | 64 | 19 | 0 | 0 | 0 | 1806 |
| 110° | 208 | 913 | 510 | 374 | 60 | 29 | 0 | 0 | 0 | 2094 |
| 120° | 240 | 1196 | 660 | 558 | 86 | 3 | 0 | 0 | 0 | 2743 |
| 130° | 282 | 1753 | 1056 | 683 | 112 | 6 | 0 | 0 | 0 | 3892 |
| 140° | 331 | 2216 | 1517 | 1184 | 150 | 7 | 0 | 0 | 0 | 5405 |
| 150° | 286 | 2341 | 2060 | 2047 | 368 | 23 | 0 | 0 | 0 | 7125 |
| 160° | 255 | 2108 | 2351 | 3126 | 525 | 26 | 0 | 0 | 0 | 8391 |
| 170° | 275 | 1918 | 1721 | 1918 | 311 | 25 | 0 | 0 | 0 | 6168 |
| 180° | 248 | 1331 | 1111 | 1139 | 183 | 11 | 0 | 0 | 0 | 4023 |
| 190° | 212 | 1095 | 723 | 672 | 109 | 15 | 0 | 0 | 0 | 2826 |
| 200° | 178 | 861 | 468 | 325 | 66 | 4 | 0 | 0 | 0 | 1902 |
| 210° | 139 | 694 | 302 | 172 | 29 | 8 | 0 | 0 | 0 | 1344 |
| 220° | 142 | 580 | 196 | 135 | 17 | 5 | 0 | 1 | 0 | 1076 |
| 230° | 155 | 644 | 175 | 115 | 10 | 3 | 0 | 0 | 0 | 1102 |
| 240° | 166 | 658 | 231 | 82 | 22 | 3 | 1 | 0 | 0 | 1163 |
| 250° | 171 | 551 | 210 | 125 | 18 | 9 | 1 | 0 | 0 | 1085 |
| 260° | 179 | 566 | 275 | 199 | 35 | 5 | 1 | 0 | 0 | 1260 |
| 270° | 200 | 863 | 453 | 244 | 114 | 21 | 3 | 4 | 0 | 1902 |
| 280° | 200 | 1103 | 480 | 411 | 181 | 46 | 8 | 3 | 0 | 2432 |
| 290° | 258 | 1269 | 605 | 735 | 346 | 119 | 22 | 7 | 1 | 3362 |
| 300° | 260 | 1296 | 805 | 1130 | 483 | 199 | 33 | 2 | 2 | 4210 |
| 310° | 284 | 1374 | 952 | 1370 | 699 | 214 | 44 | 5 | 1 | 4943 |
| 320° | 277 | 1395 | 979 | 1650 | 1098 | 402 | 96 | 14 | 3 | 5914 |
| 330° | 238 | 1218 | 977 | 1787 | 1239 | 427 | 119 | 18 | 1 | 6024 |
| 340° | 202 | 1105 | 1030 | 1954 | 1215 | 404 | 70 | 8 | 1 | 5989 |
| 350° | 163 | 1114 | 1128 | 1995 | 931 | 285 | 32 | 7 | 0 | 5655 |
| 360° | 181 | 1043 | 1152 | 2013 | 917 | 210 | 17 | 1 | 1 | 5535 |
| Calm | 10181 | | | | | | | | | 10181 |
| TOTAL | 17558 | 38617 | 26715 | 30483 | 10442 | 2727 | 469 | 72 | 10 | 127093 |

SOURCE: "726540 HURON REGIONAL AIRPORT ANNUAL PERIOD RECORD 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018"

REFERENCE: Appendix 1 of AC 150/5300-13, Airport Design, including Changes 1 through 17.

# Standard Wind Analysis Results for ALL_WEATHER

TITLE: Redfield Municipal Airport - HON Wind Data

| | | | | | |
|---|---|---|---|---|---|
| RUNWAY ORIENTATION: | 110.0 | 290.0 | 170.0 | 350.0 | DEGREE |
| CROSSWIND COMPONENT: | 13.0 | 13.0 | 13.0 | 13.0 | KNOTS |
| TAILWIND COMPONENT: | 60.0 | 60.0 | 60.0 | 60.0 | KNOTS |

WIND COVERAGE: 99.56 %

HOURLY OBSERVATIONS OF WIND SPEED (KNOTS)

| DIRECTION | 0-3 | 4-6 | 7-10 | 11-16 | 17-21 | 22-27 | 28-33 | 34-40 | > 41 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|
| 10° | 141 | 924 | 838 | 1165 | 415 | 121 | 15 | 0 | 0 | 3619 |
| 20° | 129 | 802 | 632 | 791 | 227 | 49 | 5 | 0 | 0 | 2635 |
| 30° | 128 | 723 | 493 | 485 | 112 | 13 | 2 | 1 | 0 | 1957 |
| 40° | 134 | 678 | 415 | 397 | 79 | 5 | 0 | 1 | 0 | 1709 |
| 50° | 150 | 673 | 319 | 247 | 41 | 2 | 0 | 0 | 0 | 1432 |
| 60° | 181 | 654 | 351 | 260 | 44 | 0 | 0 | 0 | 0 | 1490 |
| 70° | 186 | 632 | 366 | 248 | 37 | 0 | 0 | 0 | 0 | 1469 |
| 80° | 191 | 685 | 350 | 262 | 46 | 3 | 0 | 0 | 0 | 1537 |
| 90° | 195 | 817 | 396 | 226 | 53 | 6 | 0 | 0 | 0 | 1693 |
| 100° | 212 | 824 | 428 | 259 | 64 | 19 | 0 | 0 | 0 | 1806 |
| 110° | 208 | 913 | 510 | 374 | 60 | 29 | 0 | 0 | 0 | 2094 |
| 120° | 240 | 1196 | 660 | 558 | 86 | 3 | 0 | 0 | 0 | 2743 |
| 130° | 282 | 1753 | 1056 | 683 | 112 | 6 | 0 | 0 | 0 | 3892 |
| 140° | 331 | 2216 | 1517 | 1184 | 150 | 7 | 0 | 0 | 0 | 5405 |
| 150° | 286 | 2341 | 2060 | 2047 | 368 | 23 | 0 | 0 | 0 | 7125 |
| 160° | 255 | 2108 | 2351 | 3126 | 525 | 26 | 0 | 0 | 0 | 8391 |
| 170° | 275 | 1918 | 1721 | 1918 | 311 | 25 | 0 | 0 | 0 | 6168 |
| 180° | 248 | 1331 | 1111 | 1139 | 183 | 11 | 0 | 0 | 0 | 4023 |
| 190° | 212 | 1095 | 723 | 672 | 109 | 15 | 0 | 0 | 0 | 2826 |
| 200° | 178 | 861 | 468 | 325 | 66 | 4 | 0 | 0 | 0 | 1902 |
| 210° | 139 | 694 | 302 | 172 | 29 | 8 | 0 | 0 | 0 | 1344 |
| 220° | 142 | 580 | 196 | 135 | 17 | 5 | 0 | 1 | 0 | 1076 |
| 230° | 155 | 644 | 175 | 115 | 10 | 3 | 0 | 0 | 0 | 1102 |
| 240° | 166 | 658 | 231 | 82 | 22 | 3 | 1 | 0 | 0 | 1163 |
| 250° | 171 | 551 | 210 | 125 | 18 | 9 | 1 | 0 | 0 | 1085 |
| 260° | 179 | 566 | 275 | 199 | 35 | 5 | 1 | 0 | 0 | 1260 |
| 270° | 200 | 863 | 453 | 244 | 114 | 21 | 3 | 4 | 0 | 1902 |
| 280° | 200 | 1103 | 480 | 411 | 181 | 46 | 8 | 3 | 0 | 2432 |
| 290° | 258 | 1269 | 605 | 735 | 346 | 119 | 22 | 7 | 1 | 3362 |
| 300° | 260 | 1296 | 805 | 1130 | 483 | 199 | 33 | 2 | 2 | 4210 |
| 310° | 284 | 1374 | 952 | 1370 | 699 | 214 | 44 | 5 | 1 | 4943 |
| 320° | 277 | 1395 | 979 | 1650 | 1098 | 402 | 96 | 14 | 3 | 5914 |
| 330° | 238 | 1218 | 977 | 1787 | 1239 | 427 | 119 | 18 | 1 | 6024 |
| 340° | 202 | 1105 | 1030 | 1954 | 1215 | 404 | 70 | 8 | 1 | 5989 |
| 350° | 163 | 1114 | 1128 | 1995 | 931 | 285 | 32 | 7 | 0 | 5655 |
| 360° | 181 | 1043 | 1152 | 2013 | 917 | 210 | 17 | 1 | 1 | 5535 |
| Calm | 10181 | | | | | | | | | 10181 |
| TOTAL | 17558 | 38617 | 26715 | 30483 | 10442 | 2727 | 469 | 72 | 10 | 127093 |

SOURCE: "726540 HURON REGIONAL AIRPORT ANNUAL PERIOD RECORD 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018"

REFERENCE: Appendix 1 of AC 150/5300-13, Airport Design, including Changes 1 through 17.

# Standard Wind Analysis Results for ALL_WEATHER

TITLE: Redfield Municipal Airport - HON Wind Data

| | | | | | |
|---|---|---|---|---|---|
| RUNWAY ORIENTATION: | 170.0 | 350.0 | 140.0 | 320.0 | DEGREE |
| CROSSWIND COMPONENT: | 10.5 | 10.5 | 10.5 | 10.5 | KNOTS |
| TAILWIND COMPONENT: | 60.0 | 60.0 | 60.0 | 60.0 | KNOTS |

WIND COVERAGE: 97.34 %

HOURLY OBSERVATIONS OF WIND SPEED (KNOTS)

| DIRECTION | 0-3 | 4-6 | 7-10 | 11-16 | 17-21 | 22-27 | 28-33 | 34-40 | > 41 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|
| 10° | 141 | 924 | 838 | 1165 | 415 | 121 | 15 | 0 | 0 | 3619 |
| 20° | 129 | 802 | 632 | 791 | 227 | 49 | 5 | 0 | 0 | 2635 |
| 30° | 128 | 723 | 493 | 485 | 112 | 13 | 2 | 1 | 0 | 1957 |
| 40° | 134 | 678 | 415 | 397 | 79 | 5 | 0 | 1 | 0 | 1709 |
| 50° | 150 | 673 | 319 | 247 | 41 | 2 | 0 | 0 | 0 | 1432 |
| 60° | 181 | 654 | 351 | 260 | 44 | 0 | 0 | 0 | 0 | 1490 |
| 70° | 186 | 632 | 366 | 248 | 37 | 0 | 0 | 0 | 0 | 1469 |
| 80° | 191 | 685 | 350 | 262 | 46 | 3 | 0 | 0 | 0 | 1537 |
| 90° | 195 | 817 | 396 | 226 | 53 | 6 | 0 | 0 | 0 | 1693 |
| 100° | 212 | 824 | 428 | 259 | 64 | 19 | 0 | 0 | 0 | 1806 |
| 110° | 208 | 913 | 510 | 374 | 60 | 29 | 0 | 0 | 0 | 2094 |
| 120° | 240 | 1196 | 660 | 558 | 86 | 3 | 0 | 0 | 0 | 2743 |
| 130° | 282 | 1753 | 1056 | 683 | 112 | 6 | 0 | 0 | 0 | 3892 |
| 140° | 331 | 2216 | 1517 | 1184 | 150 | 7 | 0 | 0 | 0 | 5405 |
| 150° | 286 | 2341 | 2060 | 2047 | 368 | 23 | 0 | 0 | 0 | 7125 |
| 160° | 255 | 2108 | 2351 | 3126 | 525 | 26 | 0 | 0 | 0 | 8391 |
| 170° | 275 | 1918 | 1721 | 1918 | 311 | 25 | 0 | 0 | 0 | 6168 |
| 180° | 248 | 1331 | 1111 | 1139 | 183 | 11 | 0 | 0 | 0 | 4023 |
| 190° | 212 | 1095 | 723 | 672 | 109 | 15 | 0 | 0 | 0 | 2826 |
| 200° | 178 | 861 | 468 | 325 | 66 | 4 | 0 | 0 | 0 | 1902 |
| 210° | 139 | 694 | 302 | 172 | 29 | 8 | 0 | 0 | 0 | 1344 |
| 220° | 142 | 580 | 196 | 135 | 17 | 5 | 0 | 1 | 0 | 1076 |
| 230° | 155 | 644 | 175 | 115 | 10 | 3 | 0 | 0 | 0 | 1102 |
| 240° | 166 | 658 | 231 | 82 | 22 | 3 | 1 | 0 | 0 | 1163 |
| 250° | 171 | 551 | 210 | 125 | 18 | 9 | 1 | 0 | 0 | 1085 |
| 260° | 179 | 566 | 275 | 199 | 35 | 5 | 1 | 0 | 0 | 1260 |
| 270° | 200 | 863 | 453 | 244 | 114 | 21 | 3 | 4 | 0 | 1902 |
| 280° | 200 | 1103 | 480 | 411 | 181 | 46 | 8 | 3 | 0 | 2432 |
| 290° | 258 | 1269 | 605 | 735 | 346 | 119 | 22 | 7 | 1 | 3362 |
| 300° | 260 | 1296 | 805 | 1130 | 483 | 199 | 33 | 2 | 2 | 4210 |
| 310° | 284 | 1374 | 952 | 1370 | 699 | 214 | 44 | 5 | 1 | 4943 |
| 320° | 277 | 1395 | 979 | 1650 | 1098 | 402 | 96 | 14 | 3 | 5914 |
| 330° | 238 | 1218 | 977 | 1787 | 1239 | 427 | 119 | 18 | 1 | 6024 |
| 340° | 202 | 1105 | 1030 | 1954 | 1215 | 404 | 70 | 8 | 1 | 5989 |
| 350° | 163 | 1114 | 1128 | 1995 | 931 | 285 | 32 | 7 | 0 | 5655 |
| 360° | 181 | 1043 | 1152 | 2013 | 917 | 210 | 17 | 1 | 1 | 5535 |
| Calm | 10181 | | | | | | | | | 10181 |
| TOTAL | 17558 | 38617 | 26715 | 30483 | 10442 | 2727 | 469 | 72 | 10 | 127093 |

SOURCE: "726540 HURON REGIONAL AIRPORT ANNUAL PERIOD RECORD 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018"

REFERENCE: Appendix 1 of AC 150/5300-13, Airport Design, including Changes 1 through 17.

# Standard Wind Analysis Results for ALL_WEATHER

TITLE: Redfield Municipal Airport - HON Wind Data

| | | | | | |
|---|---|---|---|---|---|
| RUNWAY ORIENTATION: | 170.0 | 350.0 | 140.0 | 320.0 | DEGREE |
| CROSSWIND COMPONENT: | 13.0 | 13.0 | 13.0 | 13.0 | KNOTS |
| TAILWIND COMPONENT: | 60.0 | 60.0 | 60.0 | 60.0 | KNOTS |

WIND COVERAGE: 98.84 %

HOURLY OBSERVATIONS OF WIND SPEED (KNOTS)

| DIRECTION | 0-3 | 4-6 | 7-10 | 11-16 | 17-21 | 22-27 | 28-33 | 34-40 | > 41 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|
| 10° | 141 | 924 | 838 | 1165 | 415 | 121 | 15 | 0 | 0 | 3619 |
| 20° | 129 | 802 | 632 | 791 | 227 | 49 | 5 | 0 | 0 | 2635 |
| 30° | 128 | 723 | 493 | 485 | 112 | 13 | 2 | 1 | 0 | 1957 |
| 40° | 134 | 678 | 415 | 397 | 79 | 5 | 0 | 1 | 0 | 1709 |
| 50° | 150 | 673 | 319 | 247 | 41 | 2 | 0 | 0 | 0 | 1432 |
| 60° | 181 | 654 | 351 | 260 | 44 | 0 | 0 | 0 | 0 | 1490 |
| 70° | 186 | 632 | 366 | 248 | 37 | 0 | 0 | 0 | 0 | 1469 |
| 80° | 191 | 685 | 350 | 262 | 46 | 3 | 0 | 0 | 0 | 1537 |
| 90° | 195 | 817 | 396 | 226 | 53 | 6 | 0 | 0 | 0 | 1693 |
| 100° | 212 | 824 | 428 | 259 | 64 | 19 | 0 | 0 | 0 | 1806 |
| 110° | 208 | 913 | 510 | 374 | 60 | 29 | 0 | 0 | 0 | 2094 |
| 120° | 240 | 1196 | 660 | 558 | 86 | 3 | 0 | 0 | 0 | 2743 |
| 130° | 282 | 1753 | 1056 | 683 | 112 | 6 | 0 | 0 | 0 | 3892 |
| 140° | 331 | 2216 | 1517 | 1184 | 150 | 7 | 0 | 0 | 0 | 5405 |
| 150° | 286 | 2341 | 2060 | 2047 | 368 | 23 | 0 | 0 | 0 | 7125 |
| 160° | 255 | 2108 | 2351 | 3126 | 525 | 26 | 0 | 0 | 0 | 8391 |
| 170° | 275 | 1918 | 1721 | 1918 | 311 | 25 | 0 | 0 | 0 | 6168 |
| 180° | 248 | 1331 | 1111 | 1139 | 183 | 11 | 0 | 0 | 0 | 4023 |
| 190° | 212 | 1095 | 723 | 672 | 109 | 15 | 0 | 0 | 0 | 2826 |
| 200° | 178 | 861 | 468 | 325 | 66 | 4 | 0 | 0 | 0 | 1902 |
| 210° | 139 | 694 | 302 | 172 | 29 | 8 | 0 | 0 | 0 | 1344 |
| 220° | 142 | 580 | 196 | 135 | 17 | 5 | 0 | 1 | 0 | 1076 |
| 230° | 155 | 644 | 175 | 115 | 10 | 3 | 0 | 0 | 0 | 1102 |
| 240° | 166 | 658 | 231 | 82 | 22 | 3 | 1 | 0 | 0 | 1163 |
| 250° | 171 | 551 | 210 | 125 | 18 | 9 | 1 | 0 | 0 | 1085 |
| 260° | 179 | 566 | 275 | 199 | 35 | 5 | 1 | 0 | 0 | 1260 |
| 270° | 200 | 863 | 453 | 244 | 114 | 21 | 3 | 4 | 0 | 1902 |
| 280° | 200 | 1103 | 480 | 411 | 181 | 46 | 8 | 3 | 0 | 2432 |
| 290° | 258 | 1269 | 605 | 735 | 346 | 119 | 22 | 7 | 1 | 3362 |
| 300° | 260 | 1296 | 805 | 1130 | 483 | 199 | 33 | 2 | 2 | 4210 |
| 310° | 284 | 1374 | 952 | 1370 | 699 | 214 | 44 | 5 | 1 | 4943 |
| 320° | 277 | 1395 | 979 | 1650 | 1098 | 402 | 96 | 14 | 3 | 5914 |
| 330° | 238 | 1218 | 977 | 1787 | 1239 | 427 | 119 | 18 | 1 | 6024 |
| 340° | 202 | 1105 | 1030 | 1954 | 1215 | 404 | 70 | 8 | 1 | 5989 |
| 350° | 163 | 1114 | 1128 | 1995 | 931 | 285 | 32 | 7 | 0 | 5655 |
| 360° | 181 | 1043 | 1152 | 2013 | 917 | 210 | 17 | 1 | 1 | 5535 |
| Calm | 10181 | | | | | | | | | 10181 |
| TOTAL | 17558 | 38617 | 26715 | 30483 | 10442 | 2727 | 469 | 72 | 10 | 127093 |

SOURCE: "726540 HURON REGIONAL AIRPORT ANNUAL PERIOD RECORD 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018"

REFERENCE: Appendix 1 of AC 150/5300-13, Airport Design, including Changes 1 through 17.

# Appendix B – Required Runway Length Data

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# Redfield Municipal Airport Current Airfield Users and Critical Aircraft

**Cessna 172/180/182**
Span: 35' 10"
Height: 8'10" to 9'3"
Approach Speed:±60 knots
Aircraft Classification: A-I
Taxiway Design Group: 1A

**Mooney M20J**
Span: 36' 1"
Height: 8'3"
Approach Speed:±60 knots
Aircraft Classification: A-I
Taxiway Design Group: 1A

**Piper Super Cub**
Span: 35' 4"
Height: 6' 8"
Approach Speed: ±48 knots
Aircraft Classification A-I
Taxiway Design Group: 1A

**Aviat A1-A**
Span: 35' 6"
Height: 7' 5"
Approach Speed: ±45 knots
Aircraft Classification A-I
Taxiway Design Group: 1A

**Piper Club/Cherokee/Seminole**
Span: 35' 0" to 36' 2"
Height: 7'4"
Approach Speed:±55 knots
Aircraft Classification: A-I
Taxiway Design Group: 1A

**Bellanca 17-30 Series**
Span: 34'
Height: 7'4"
Approach Speed:±79 knots
Aircraft Classification: A-I
Taxiway Design Group: 1A

**Air Tractor 402 & 502**
Span: 51' – 52'
Height: 9'6" – 10'6"
Approach Speed:74-77 knots
Aircraft Classification: A-II
Taxiway Design Group: 1B

**Air Tractor 602**
Span: 56'
Height: 11'
Approach Speed: 92 knots
Aircraft Classification: B-II (small ≤ 12,500 lbs)
Taxiway Design Group: 1B

**Air Tractor 802**
Span: 59'3"
Height: 11'
Approach Speed: 103 knots
Aircraft Classification: B-II
Taxiway Design Group: 1B

**Air Ambulance providers to the Redfield Municipal Airport**
Avera Care Flight:
- Eurocopter, EC-45 Helicopter
- Beechcraft King Air 200 (fixed wing)
  - Span: 54' 6"
  - Height: 15'
  - Approach Speed: 98 knots
  - Aircraft Classification: B-II (small ≤ 12,500)
  - Taxiway Design Group: 2

Sanford Airmed
- Eurocopter EC-45 Helicopter
- Bell 230 Helicopter
- Beechcraft King Air B200 Fixed Wing
  - Span: 54' 6"
  - Height: 15'
  - Approach Speed: 98 knots
  - Aircraft Classification: B-II (small ≤ 12,500)
  - Taxiway Design Group: 2

| Existing Aircraft Using 8D7 | Aircraft Classification | Approach Speed | Take Off Runway Length at Sea Level | Landing Runway Length at Sea Level | Runway Length Needed at 1D8* |
|---|---|---|---|---|---|
| Cessna 172/180/182 | A-I | ±60 knots | 1,775’ | 1,340’ | 2,256' |
| Cessna Skyhawk | A-I | ±60 knots | 1,525’ | 1,250’ | 1,956' |
| Piper Cub | A-I | ±60 knots | 270’ | 400’ | 606' |
| Piper Malibu | A-I | ±75 knots | 1,530’ | 1,964’ | 2,482' |
| Piper Cherokee | A-I | ±60 knots | 1,620’ | 1,150’ | 2,070' |
| Piper Seminole | A-I | ±60 knots | 2,100’ | 1,490’ | 2,646' |
| Thrush Spray Planes | A-I | ±60 knots | 1,500’ | 550’ | 1,926' |
| Air Tractor 405 & 502 | A-I | ±75 knots | 975’-1,140’ | | 1,296'-1,494' |
| Air Tractor 602 & 802 | B-II | ±100 knots | 1,830’ | | 2,322' |
| Beechcraft King Air B200 Fixed Wing | B-II | ±100 knots | 2,579’ | 2,845’ | 3,540' |

**The runway lengths needed at 1D8 were calculated using the same process as discussed in Section 3.2.2.2. However, this information should NOT be used to replace the preflight responsibilities of the pilot in command and are for informational purposes only.**

**Future/Ultimate Critical Aircraft**

**Cessna Citation CJ1**
Span: 46'-9"
Height: 13'-7"
Aircraft Classification: B-I
Taxiway Design Group: 1A

**Cessna Citation M2**
Span: 42'7"
Height: 13'-11"
Aircraft Classification: B-I
Taxiway Design Group: 1A

**Beech/Beechcraft 390 Premier 1**
Span: 44'-6"
Height: 15'-4"
Aircraft Classification: B-II
Taxiway Design Group: 1A

**Figure 2-1. Small Airplanes with Fewer than 10 Passenger Seats**
(Excludes Pilot and Co-pilot)

# Redfield Municipal Airport Runway Length

**Example:**

Temperature (mean day max hot month): 59° F (15° C)
Airport Elevation: Mean Sea Level

Note: Dashed lines shown in the table are mid values of adjacent solid lines.

Recommended Runway Length:

For 95% = 2,700 feet (823 m)
For 100% = 3,200 feet (975 m)

AVERAGE TEMPERATURE
JULY 87˚

AIRPORT ELEVATION = 1308.5

**95% OF FLEET = 3500’**

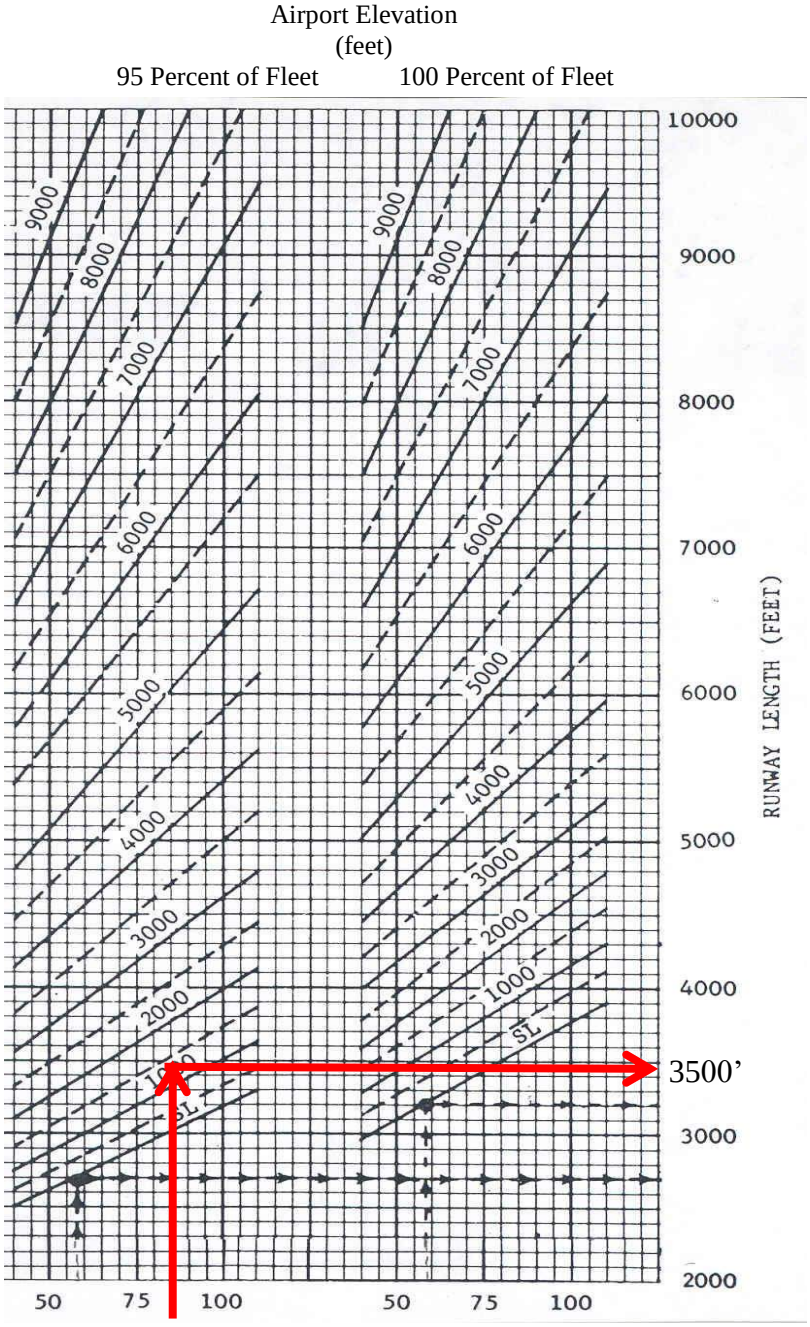
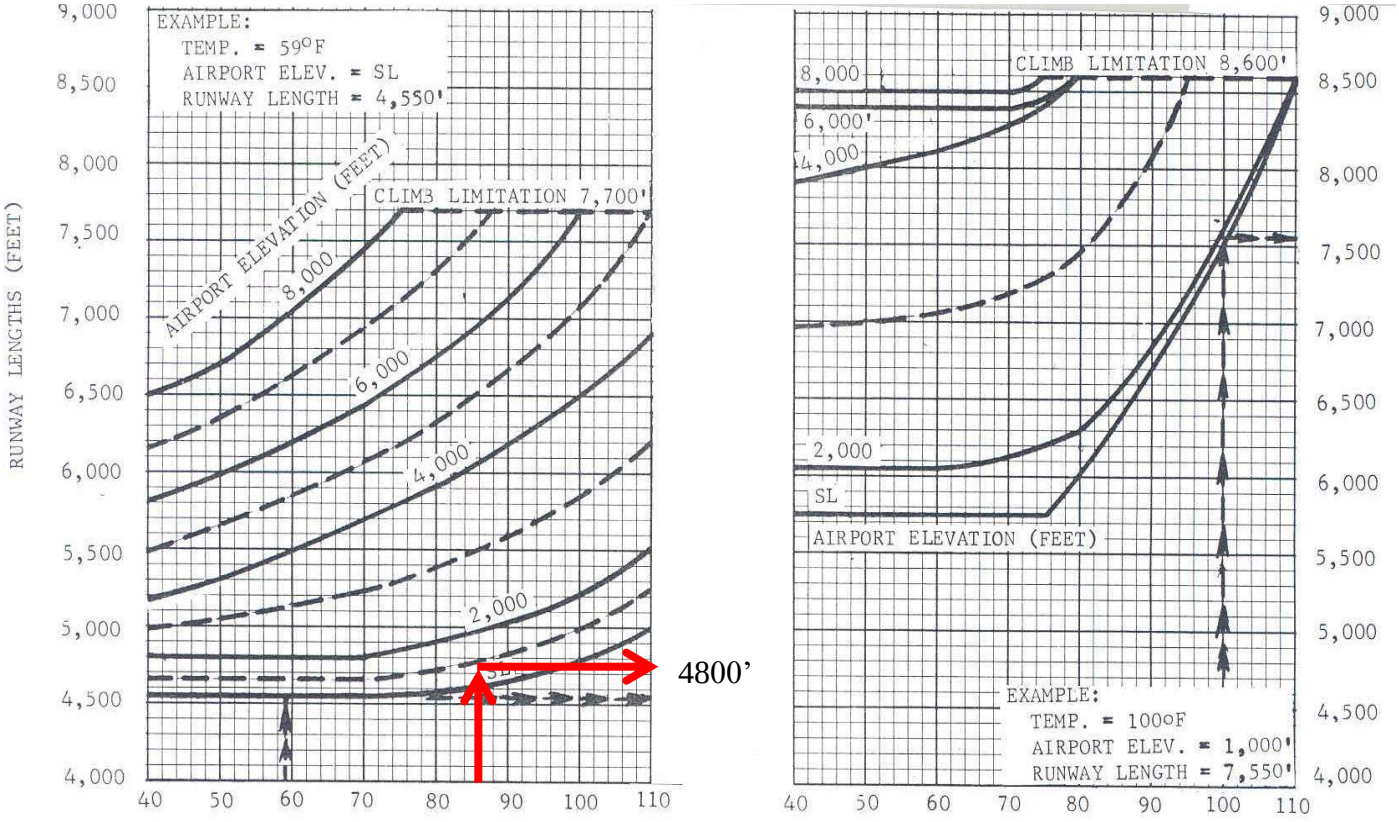


**Figure 3-1. 75 Percent of Fleet at 60 or 90 Percent Useful Load**




**Mean Daily Maximum Temperature of Hottest Month of the Year in Degrees Fahrenheit**

**75 percent of feet at 60 percent useful load** **75 percent of feet at 90 percent useful load**

| Critical Design Aircraft Data Table | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Family | Aircraft Models | Approach Category | Design Group | Takeoff Weight | Wingspan | Approach Speed | Tail Height | Based Aircraft | Annual Itinerant Operations (5010) |
| Existing | Small General Aviation | Cessna 150, Cessna 172, Cessna Skyhawk, Piper Malibu, Piper Club, Piper Cherokee, Piper Seminole, 402, 502, 602 Air Tractor Spray Planes, Thrush Spray Planes, Hawker Beechcraft King Air 200 or similar models | A & B | I & II | 12,500 lbs. or less | 49 - <79 feet | 91-121 Knots | 20 - <30 feet | Single Engine - 9<br>Multi Engine - 1<br>Jet - 0<br>Total - 10<br>Helicopters - 0 | Local 3,400<br>Itnrnt 100 |
| | General Aviation Aircraft (Utility) | 802 Air Tractor Spray Plane | B | II | 12,500 - 16,300 lbs. | 49 - <79 feet | 91-121 Knots | 20 - <30 feet | | Local 100<br>Itnrnt 400 |
| Future | Small General Aviation | Cessna 150, Cessna 172, Cessna Skyhawk, Piper Malibu, Piper Club, Piper Cherokee, Piper Seminole, 402, 502, 602 Air Tractor Spray Planes, Thrush Spray Planes, Hawker Beechcraft King Air 200 or similar models | A & B | I & II | 12,500 lbs. or less | 49 - <79 feet | 91-121 Knots | 20 - <30 feet | Single Engine - 14<br>Multi Engine -1<br>Jet - 0<br>Total - 15<br>Helicopters - 0 | (Projected) Local 3,500<br>(Projected) Itnrnt 200 |
| | General Aviation Aircraft (Utility) | 802 Air Tractor Spray Plane | B | II | 12,500 - 16,300 lbs. | 49 - <79 feet | 91-121 Knots | 20 - <30 feet | | (Projected) Local 150<br>(Projected) Itnrnt 450 |
| Ultimate | Small General Aviation | Cessna 150, Cessna 172, Cessna Skyhawk, Piper Malibu, Piper Club, Piper Cherokee, Piper Seminole, 402, 502, 602 Air Tractor Spray Planes, Thrush Spray Planes, Hawker Beechcraft King Air 200 or similar models | A & B | I & II | 12,500 lbs. or less | 49 - <79 feet | 91-121 Knots | 20 - <30 feet | Single Engine - 15<br>Multi Engine -1<br>Jet - 0<br>Total - 16<br>Helicopters - 0 | (Projected) Local 3,600<br>(Projected) Itnrnt 250 |
| | General Aviation Aircraft (Utility) | 802 Air Tractor Spray Plane | B | II | 12,500 - 16,300 lbs. | 49 - <79 feet | 91-121 Knots | 20 - <30 feet | | (Projected) Local 175<br>(Projected) Itnrnt 475 |
| Ultimate II | Small General Aviation | Cessna 150, Cessna 172, Cessna Skyhawk, Piper Malibu, Piper Club, Piper Cherokee, Piper Seminole, 402, 502, 602 Air Tractor Spray Planes, Thrush Spray Planes, Hawker Beechcraft King Air 200 or similar models | A & B | I & II | 12,500 lbs. or less | 49 - <79 feet | 91-121 Knots | 20 - <30 feet | Single Engine - 15<br>Multi Engine -2<br>Jet - 0<br>Total - 17<br>Helicopters - 0 | (Projected) Local 3,900<br>(Projected) Itnrnt 400 |
| | General Aviation Aircraft (Utility) | 802 Air Tractor Spray Plane | B | II | 12,500 - 16,300 lbs. | 49 - <79 feet | 91-121 Knots | 20 - <30 feet | | (Projected) Local 200<br>(Projected) Itnrnt 500 |
| * Existing Design Aircraft based on existing Based Aircraft, Flight Operations from annual 5010 records, and Conversations with Airport Manager | | | | | | | | | | |

# Appendix C – Pavement Classification Number Technical Supporting Information

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Helms & ASSOCIATES
CIVIL ENGINEERS & LAND SURVEYORS

221 Brown County Hwy 19
P.O. Box 111
Aberdeen, SD 57402

Phone: (605) 225-1212 Fax: (605) 225-3189
Email: operations@helmsengineering.com

# Redfield Municipal Airport
# (1D8)
# Redfield, South Dakota

# Pavement Classification Number (PCN)

| | |
|---|---|
| Runway: | 17/35 |
| PCN Value: | 20 |
| Pavement Type: | F (Flexible) |
| Subgrade Category: | D (CBR ≤ 3) |
| Allowable Tire Pressure: | Y (Pressure limited to 145 psi) |
| Method Used: | T (Technical) |
| Pavement Classification Number (PCN): | 20 / **F** / **D** / **Y** / **T** |

# Technical Supporting Information

The Following information was taken from the FAA's COMFAA 30 Software and/or the XLSM Supporting Spreadsheet.

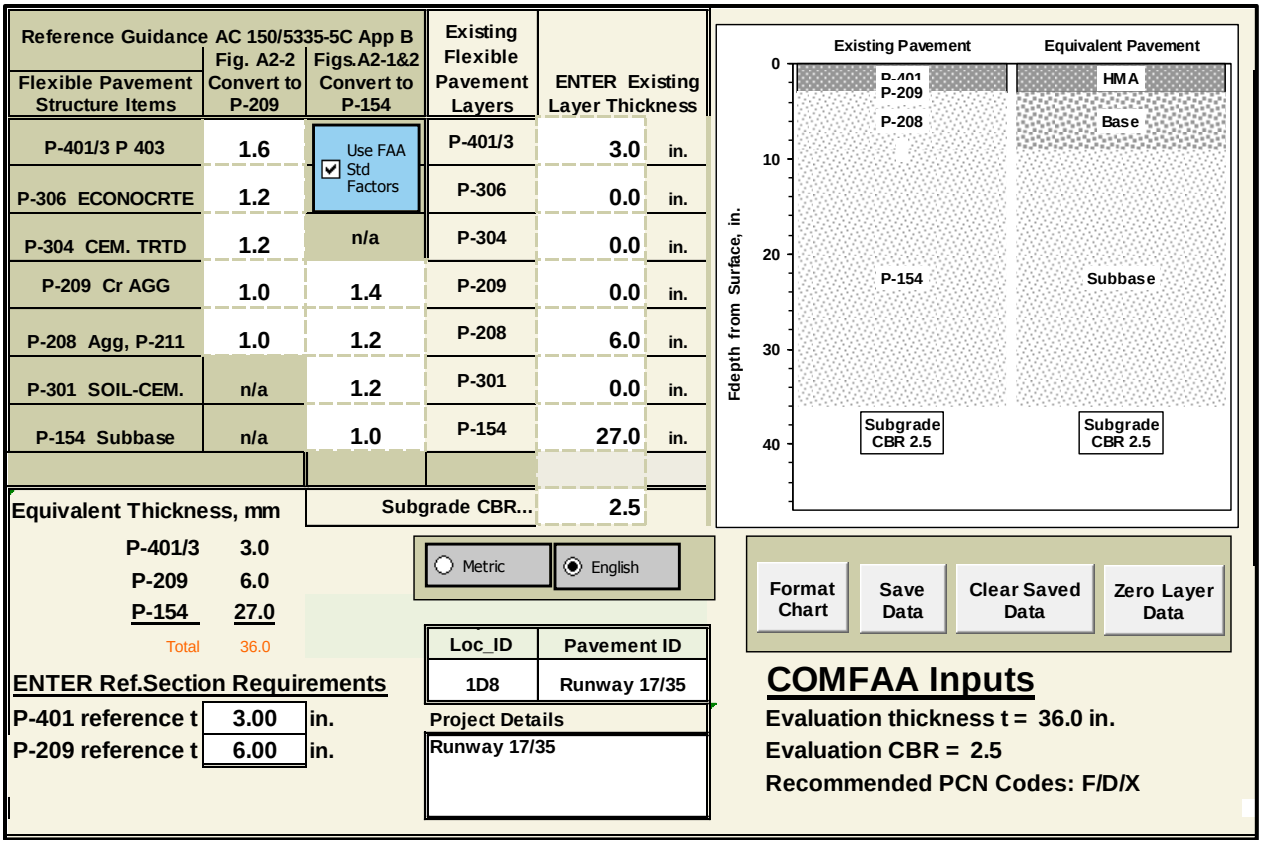



*Figure 1 Equivalent Thickness Conversion for Rigid Pavement (COMFAA Software)*

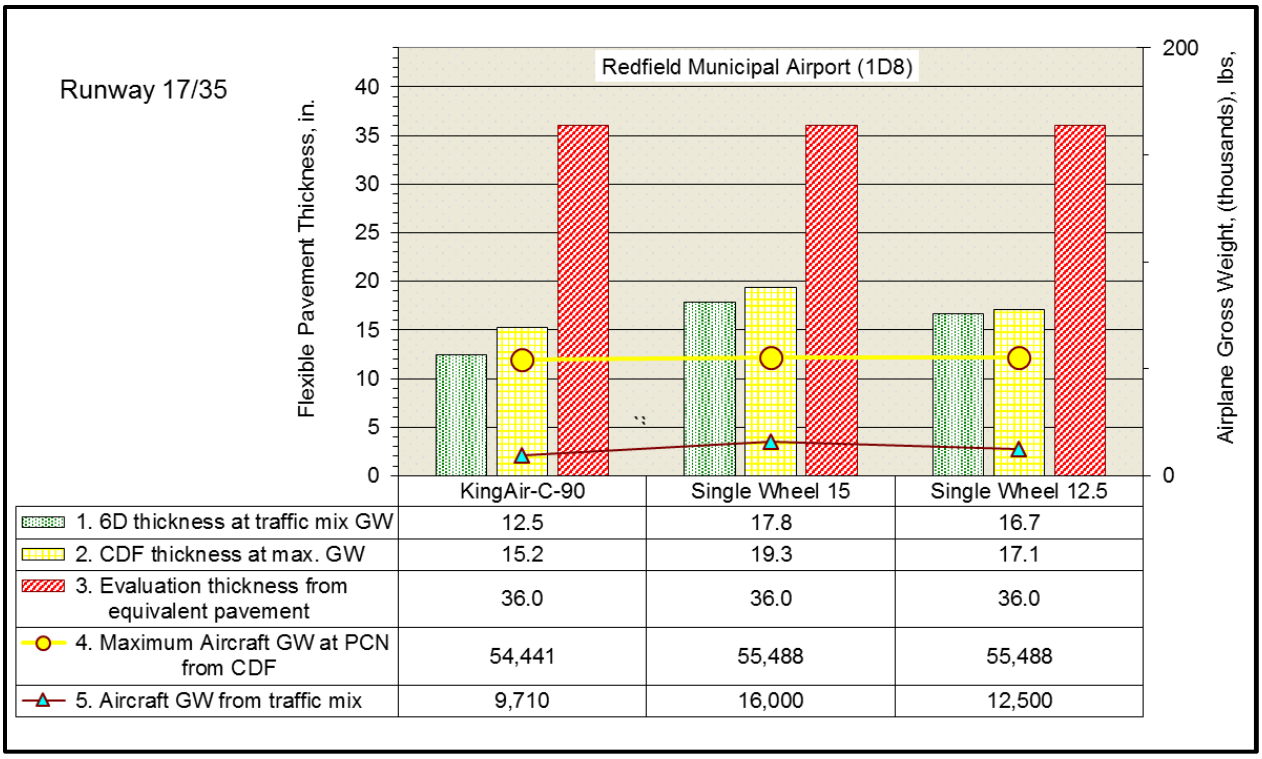
*Table 1 Aircraft Classification Number (ACN) Output from COMFAA Software*

Results Table 3. Flexible ACN at Indicated Gross Weight and Strength

| No. | Aircraft Name | Gross Weight | % GW on Main Gear | Tire Pressure | ACN Thick | ACN on D(3) |
|---|---|---|---|---|---|---|
| 1 | KingAir-C-90 | 9,710 | 95.00 | 58.0 | 12.73 | 3.7 |
| 2 | Single Wheel 15 | 16,000 | 95.00 | 50.0 | 16.18 | 6.0 |
| 3 | Single Wheel 12.5 | 12,500 | 95.00 | 50.0 | 14.30 | 4.7 |

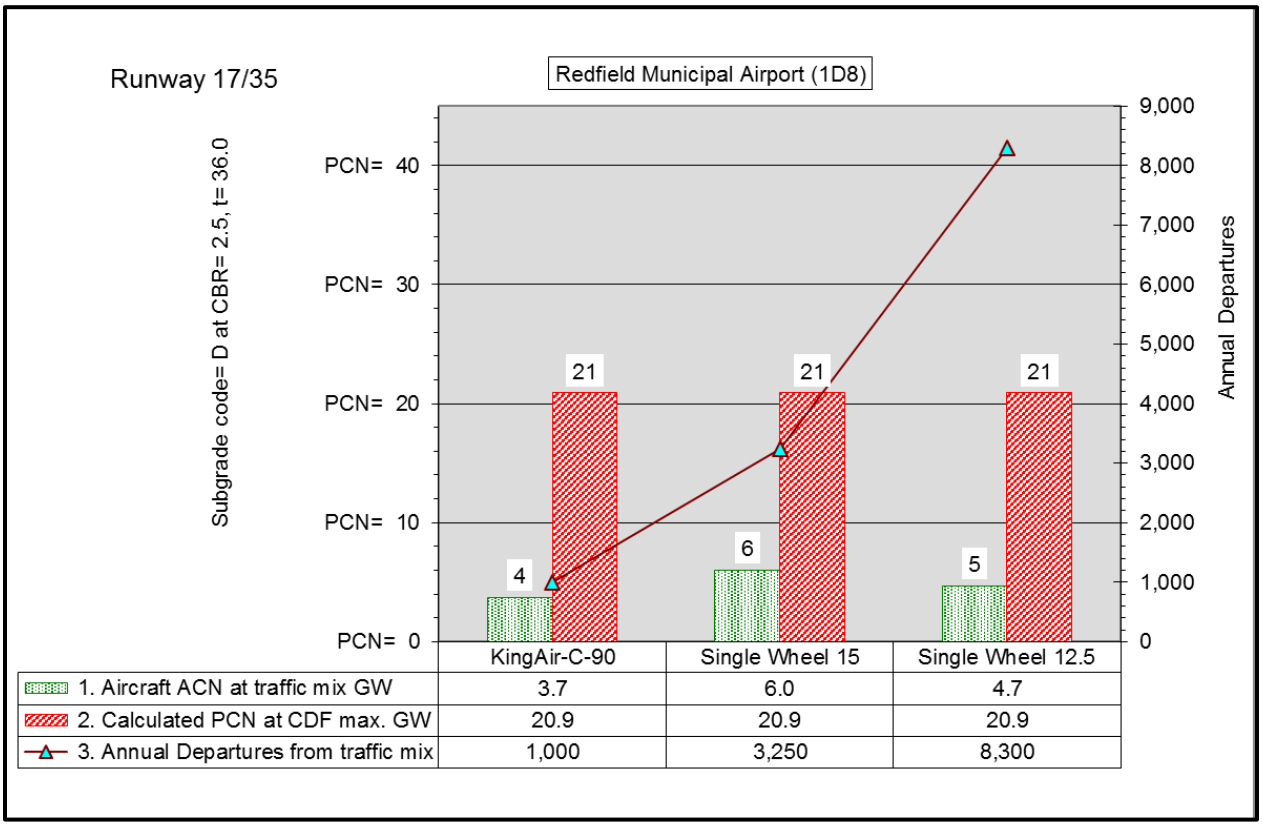
*Table 2 Pavement Classification Number (PCN) Output from COMFAA Software*

```
This file name = PCN Results Flexible 1-9-2019 15;24;39.txt
Library file name = C:\Program Files (x86)\COMFAA 30\Redfield17-35Aircraft.Ext
Units = English

Evaluation pavement type is flexible and design procedure is CBR.
Alpha Values are those approved by the ICAO in 2007.

                                    CBR = 2.50 (Subgrade Category is D(3))
              Evaluation pavement thickness = 36.00 in
         Pass to Traffic Cycle (PtoTC) Ratio = 2.00
           Maximum number of wheels per gear = 1
        Maximum number of gears per aircraft = 2

No aircraft have 4 or more wheels per gear.  The FAA recommends a reference section assuming
3 inches of HMA and 6 inches of crushed aggregate for equivalent thickness calculations.

Results Table 1. Input Traffic Data
                          Gross    Percent    Tire     Annual      20-yr     6D
 No.  Aircraft Name       Weight  Gross Wt   Press     Deps     Coverages  Thick
-------------------------------------------------------------------------------
  1  KingAir-C-90          9,710  95.00      58.0       500       2,080   12.47
  2  Single Wheel 15      16,000  95.00      50.0     1,625       9,320   17.83
  3  Single Wheel 12.5    12,500  95.00      50.0     4,150      21,063   16.65

Results Table 2. PCN Values
                       Critical        Thickness      Maximum      ACN Thick at
                     Aircraft Total     for Total     Allowable    Max. Allowable          PCN on
 No. Aircraft Name     Equiv. Covs.    Equiv. Covs.  Gross Weight   Gross Weight    CDF     D(3)
-------------------------------------------------------------------------------------------------
  1  KingAir-C-90          32,462         15.20         54,441         30.14      0.0000    20.9
  2  Single Wheel 15       32,462         19.33         55,488         30.12      0.0000    20.9
  3  Single Wheel 12.5     32,462         17.09         55,488         30.12      0.0000    20.9
                                                                   Total CDF =    0.0000

Results Table 3. Flexible ACN at Indicated Gross Weight and Strength
 No. Aircraft Name          Gross    % GW on     Tire       ACN       ACN on
                           Weight  Main Gear  Pressure     Thick       D(3)
-------------------------------------------------------------------------
  1 KingAir-C-90            9,710     95.00      58.0     12.73        3.7
  2 Single Wheel 15        16,000     95.00      50.0     16.18        6.0
  3 Single Wheel 12.5      12,500     95.00      50.0     14.30        4.7


Results Table 4. Summary Output for Copy and Paste Into the Support Spread Sheet

Num,Plane,GWin,ACNin,ADout,6Dt,COV20yr,COVtoF,CDFt,GWcdf,PCNcdf,EVALt,SUBcode,KorCBR,PtoTC,FlexOrRig
1,KingAir-C-90,9710.000,3.7,1000,12.47,2.07955E+003,1.01423E+304,15.20,54441.308,20.9,36.0,D,2.50,2.00,F
2,Single Wheel 15,16000.000,6.0,3250,17.83,9.31985E+003,1.01423E+304,19.33,55488.270,20.9,36.0,D,2.50,2.00,F
3,Single Wheel 12.5,12500.000,4.7,8300,16.65,2.10627E+004,1.01423E+304,17.09,55488.272,20.9,36.0,D,2.50,2.00,F
```



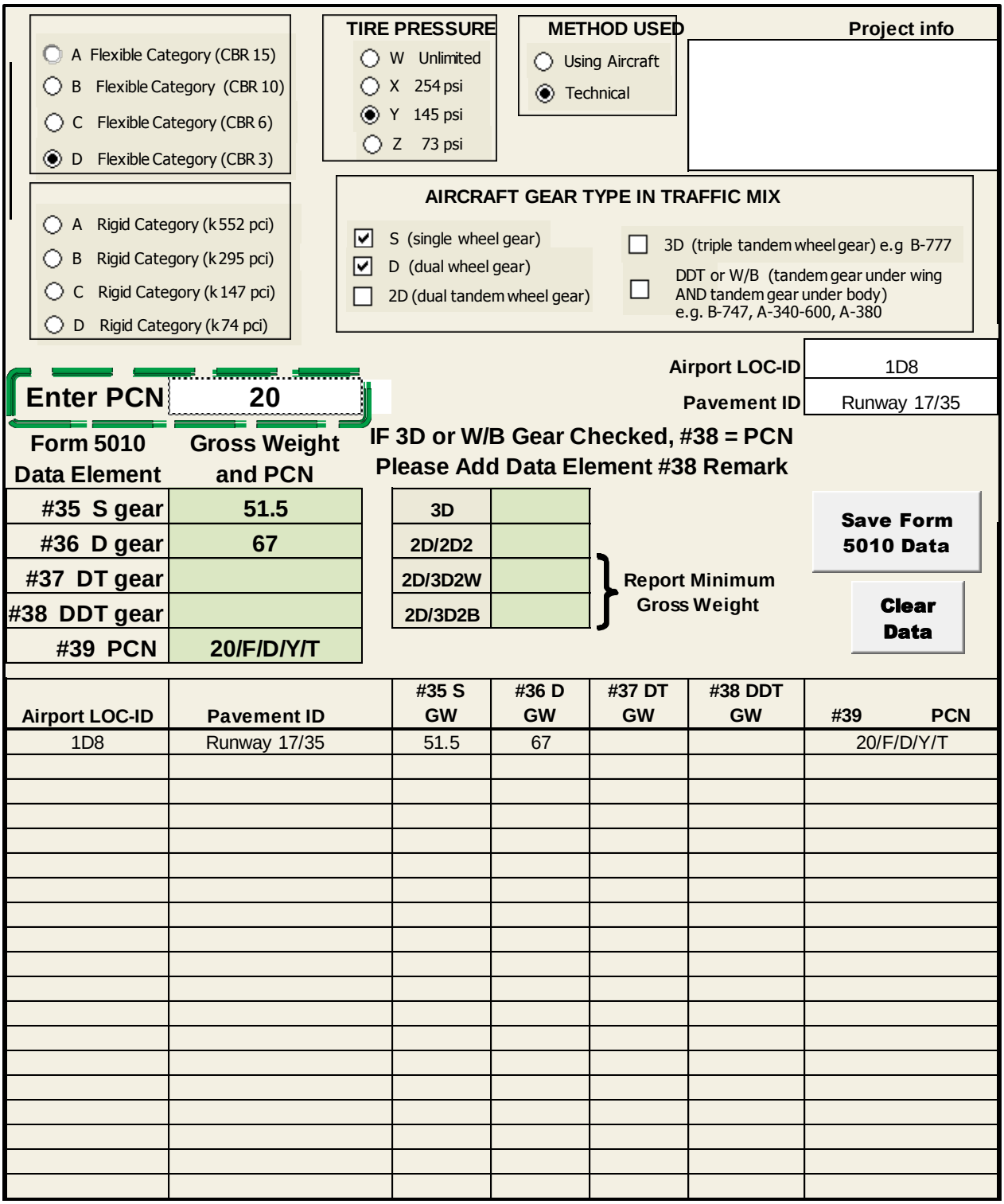

| | KingAir-C-90 | Single Wheel 15 | Single Wheel 12.5 |
|---|---|---|---|
| 1. 6D thickness at traffic mix GW | 12.5 | 17.8 | 16.7 |
| 2. CDF thickness at max. GW | 15.2 | 19.3 | 17.1 |
| 3. Evaluation thickness from equivalent pavement | 36.0 | 36.0 | 36.0 |
| 4. Maximum Aircraft GW at PCN from CDF | 54,441 | 55,488 | 55,488 |
| 5. Aircraft GW from traffic mix | 9,710 | 16,000 | 12,500 |

*Figure 2 Gross Weight and Thickness Charts for Aircraft Traffic Mix (COMFAA Spreadsheet)*




| | KingAir-C-90 | Single Wheel 15 | Single Wheel 12.5 |
|---|---|---|---|
| 1. Aircraft ACN at traffic mix GW | 3.7 | 6.0 | 4.7 |
| 2. Calculated PCN at CDF max. GW | 20.9 | 20.9 | 20.9 |
| 3. Annual Departures from traffic mix | 1,000 | 3,250 | 8,300 |

*Figure 3 ACN at CDF Max for Aircraft Traffic Mix (COMFAA Spreadsheet)*




| Airport LOC-ID | Pavement ID | #35 S GW | #36 D GW | #37 DT GW | #38 DDT GW | #39 PCN |
|---|---|---|---|---|---|---|
| 1D8 | Runway 17/35 | 51.5 | 67 | | | 20/F/D/Y/T |
| | | | | | | |
| | | | | | | |
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*Figure 4 5010 Reporting Information (COMFAA Spreadsheet)*

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# Appendix D – City of Redfield Zoning Maps and Applicable Ordinances

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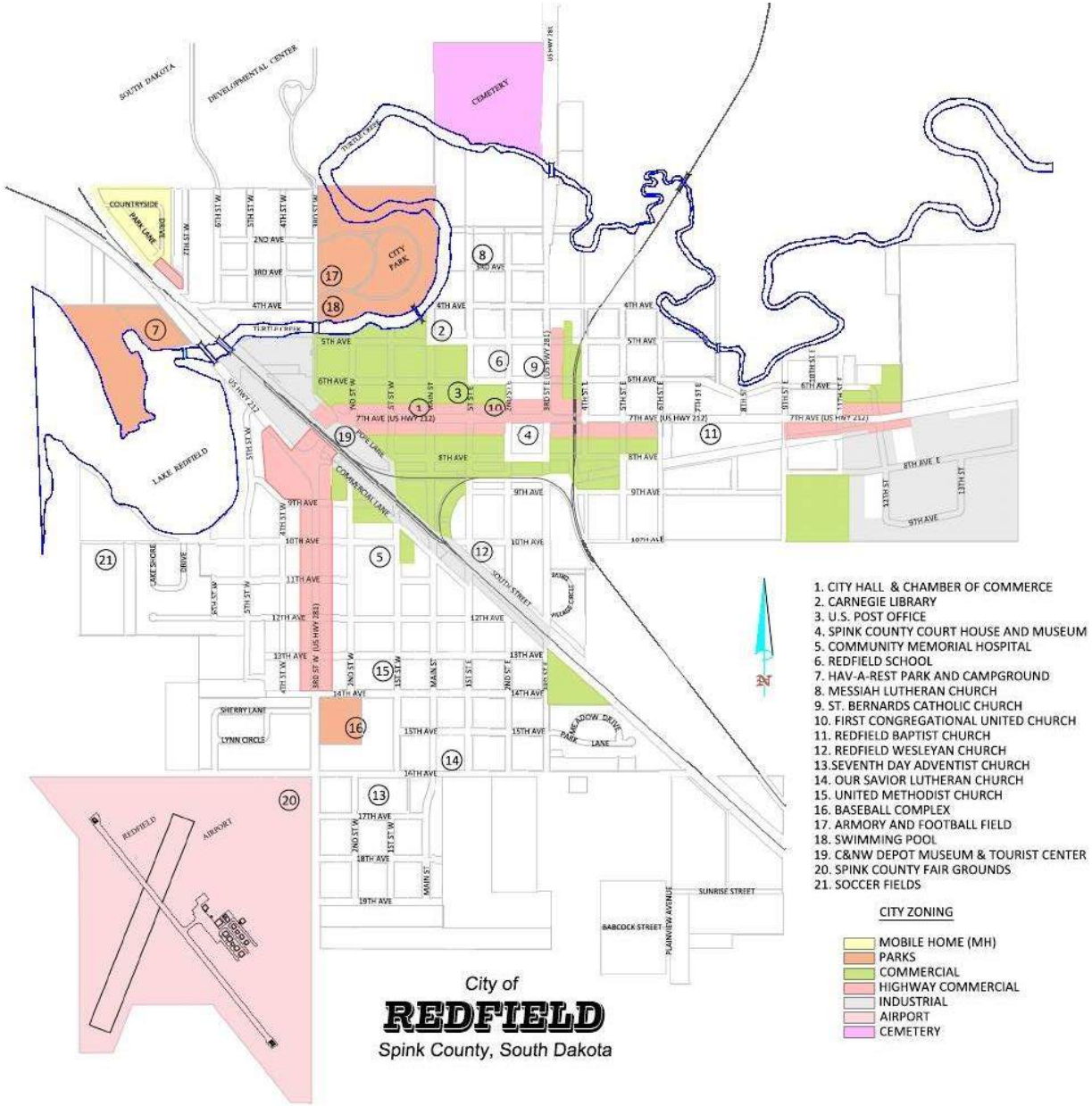
SOUTH DAKOTA DEVELOPMENTAL CENTER
CEMETERY
US HWY 281
COUNTRYSIDE PARK LANE
CITY PARK
2ND AVE
3RD AVE
4TH AVE
5TH AVE
6TH AVE
7TH AVE (US HWY 212)
8TH AVE
9TH AVE
10TH AVE
11TH AVE
12TH AVE
13TH AVE
14TH AVE
15TH AVE
16TH AVE
17TH AVE
18TH AVE
19TH AVE
US HWY 212
LAKE REDFIELD
TURTLE CREEK
COMMERCIAL LANE
SOUTH STREET
MAIN ST
1ST ST
2ND ST
3RD ST (US HWY 281)
4TH ST
5TH ST
6TH ST
7TH ST
8TH ST
9TH ST
10TH ST
11TH ST
12TH ST
13TH ST
LAKE SHORE DRIVE
SHERRY LANE
LYNN CIRCLE
MEADOW DRIVE
PARK LANE
PICARD CIRCLE
SUNRISE STREET
BABCOCK STREET
PLAINVIEW AVENUE
REDFIELD AIRPORT
1. CITY HALL & CHAMBER OF COMMERCE
2. CARNEGIE LIBRARY
3. U.S. POST OFFICE
4. SPINK COUNTY COURT HOUSE AND MUSEUM
5. COMMUNITY MEMORIAL HOSPITAL
6. REDFIELD SCHOOL
7. HAV-A-REST PARK AND CAMPGROUND
8. MESSIAH LUTHERAN CHURCH
9. ST. BERNARDS CATHOLIC CHURCH
10. FIRST CONGREGATIONAL UNITED CHURCH
11. REDFIELD BAPTIST CHURCH
12. REDFIELD WESLEYAN CHURCH
13. SEVENTH DAY ADVENTIST CHURCH
14. OUR SAVIOR LUTHERAN CHURCH
15. UNITED METHODIST CHURCH
16. BASEBALL COMPLEX
17. ARMORY AND FOOTBALL FIELD
18. SWIMMING POOL
19. C&NW DEPOT MUSEUM & TOURIST CENTER
20. SPINK COUNTY FAIR GROUNDS
21. SOCCER FIELDS
CITY ZONING
MOBILE HOME (MH)
PARKS
COMMERCIAL
HIGHWAY COMMERCIAL
INDUSTRIAL
AIRPORT
CEMETERY
City of
REDFIELD
Spink County, South Dakota

- **Chapter 17.28 - RESIDENTIAL DISTRICTS**
- **17.28.010 - Intent.**

The intent of residential districts (R) is to provide for residential uses of varying types and other compatible uses in a pleasant and stable environment.

(Ord. 1-76 (part): prior code § 14.0701)

- **17.28.020 - Permitted uses.**

The following principal uses and structures shall be permitted in residential districts: single-family dwellings.

(Ord. 1-76 (part): prior code § 14.0702)

- **17.28.030 - Accessory uses.**

Accessory uses and structures customarily incidental to permitted principal uses and on the same parcel shall be permitted in the residential districts with the following conditions.

(Ord. 1-76 (part): prior code § 14.0703)

(Ord. No. 04-2015, 11-16-2015)

- **17.28.031 - Definitions.**

The following words, terms and phrases, when used in this section, and all sections pertaining to accessory buildings or structures, shall have the meanings ascribed to them in this subsection, except where the context clearly indicates a different meaning:

Detached Residential Accessory Building. A one-story accessory building primarily used or intended for the storage of automobiles and other miscellaneous equipment. No door or other access opening shall exceed fourteen feet in height.

Permit Required. All accessory buildings and structures require either a certificate of zoning compliance or a building permit as determined by the city of Redfield.

Principal Structure Necessary. No accessory buildings or structures shall be constructed nor accessory use located on a lot until a building permit has been issued for the principal structure to which it is an accessory.

Proximity to Principal Structure. Accessory buildings shall maintain a six-foot setback from the principal structure. An accessory building or structure will be considered as an integral part of the principal building if it is located six feet or less from the principal structure.

Storage or Tool Shed. A one-story accessory building of less than sixty square feet gross area with a maximum roof height of twelve feet.

(Ord. No. 04-2015, 11-16-2015)

- **17.28.032 - Pole construction buildings.**

Pole construction buildings may be built to a maximum of one hundred twenty square feet, any such structure larger than one hundred twenty square feet shall not be permitted in districts zoned R or R-MH. A land owner may apply for a conditional use permit if the parcel of land on which it is desired to place a pole construction building abuts land which is zoned C, HC, or I.

(Ord. No. 04-2015, 11-16-2015)

- **17.28.033 - Structure location.**

No detached garages or other accessory building shall be located nearer the front lot line than the principal building on that lot, unless, by resolution of the city council, an exception is made to permit such to occur.

(Ord. No. 04-2015, 11-16-2015)

- **17.28.034 - Openings and doors.**

Garage doors and other openings shall not exceed fourteen feet in height for all accessory buildings or structures.

(Ord. No. 04-2015, 11-16-2015)

- **17.28.035 - Attached structures.**

An accessory structure shall be considered attached, and an integral part of, the principal structure when it is connected by an enclosed passageway. All attached accessory structures shall be subject to the following requirements:

a.

An attached structure must not exceed the footprint size of the principal building;

b.

An attached structure shall meet the required yard setbacks for a principal structure as established herein; and

c.

An attached structure shall not exceed the height of the principal building to which it is attached.

(Ord. No. 04-2015, 11-16-2015)

- **17.28.036 - Detached structures.**

Detached accessory buildings and structures shall adhere to the following requirements:

a.

Detached accessory structures shall be located to the side or rear of the principal building and are not permitted within the required front yard or within a side yard abutting a street;

b.

Detached accessory structures shall not exceed one thousand square feet at ground floor level and shall not exceed a height of twenty-two feet or the height of the principal structure. Building projections or features,

such as chimneys, cupolas, and similar decorations are permitted so long as said feature does not exceed twenty-five feet in height.

c. No more than thirty percent of the rear yard area may be covered by an accessory structure.

(Ord. No. 04-2015, 11-16-2015)

- **17.28.040 - Conditional uses.**

After notice and appropriate safeguards, the planning commission may permit as conditional uses:

A. Home occupations and professional offices;

B. Multiple-family dwellings;

C. Churches, synagogues and temples;

D. Colleges and universities;

E. Nursery, primary, intermediate and secondary schools;

F. Public recreational and park facilities;

G. Medical and other health facilities;

H. Golf courses and country clubs;

I. Cemeteries;

J. Governmental services;

K. Convalescent, nursing and rest homes;

L. Utility substation.

(Ord. 1-76 (part): prior code § 14.0704)

- **17.28.050 - Prohibited uses.**

Any uses more appropriate in another zone or zones shall be prohibited, including, but not limited to:

A. Commercial uses;

B. Industrial uses;

C. Mineral extractive operations;

D. Abandoned automobiles;

E. Automobile wrecking;

F. Truck or equipment terminal;

G. Kennel;

H. Sign, off-site;

I. Mobile homes.

(Ord. 1-76 (part): prior code § 14.0705)

- **17.28.060 - Minimum lot area.**

The minimum lot area shall be seven thousand square feet for single and multifamily dwellings. The minimum lot area per dwelling unit in a multifamily dwelling shall be three thousand five hundred square feet; provided, that for efficiency units the minimum lot area per dwelling unit shall be two thousand square feet.

(Ord. 1-76 (part): prior code § 14.0706)

- **17.28.070 - Minimum lot width.**

The minimum lot width shall be fifty feet.

(Ord. 1-76 (part): prior code § 14.0707)

- **17.28.080 - Minimum front yard requirements.**

There shall be a front yard of not less than a depth of twenty feet.

(Ord. 1-76 (part): prior code § 14.0708)

- **17.28.090 - Minimum side yard requirements.**

There shall be not less than seven feet for each side yard.

(Ord. 1-76 (part): prior code § 14.0709)

- **17.28.100 - Minimum rear yard requirements.**

  There shall be a rear yard of not less than a depth of twenty-five feet.

  (Ord. 1-76 (part): prior code § 14.0710)

- **17.28.110 - Maximum lot coverage.**

  The maximum lot coverage for all buildings shall not be more than forty percent of the total lot area.

  (Ord. 1-76 (part): prior code § 14.0711)

- **17.28.115 - Minimum width for residential dwellings.**

  The minimum width of a residential dwelling shall be at least twenty feet.

  (Ord. 6-06)

- **17.28.120 - Maximum height.**

  The height of all buildings and structures shall not exceed thirty-five feet.

  (Ord. 1-76 (part): prior code § 14.0712)

- **17.28.130 - Minimum floor area.**

  There shall be a floor area of not less than nine hundred square feet for dwellings.

  (Ord. 1-76 (part): prior code § 14.0713)

- **17.28.140 - Off-street parking.**

  Off-street parking requirements in residential districts shall be as follows:

  A.

  Single-family dwellings: one space for each dwelling unit. Each parking space shall be not less than two hundred square feet in area exclusive of adequate access drives and maneuvering space. Such space shall be provided with vehicular access to a street or alley;

  B.

  Churches: one space for each five persons of seating capacity;

  C.

  Places of public assembly, including private clubs and lodges, auditoriums, dance halls, pool rooms, theaters, stadiums, gymnasiums, amusement parks, community centers, and all similar places of public

assembly: one space for each one hundred square feet of floor or ground area used for amusement or assembly, but not containing fixed seats;

D. Hospitals: one space for each four patients' beds, plus one space for each staff or visiting doctor, plus one space for each four employees;

E. Sanitariums, rest and convalescent homes, homes for the aged, and similar institutions: one space for each six patients' beds, plus one space for each staff or visiting doctor, plus one space for each four employees;

F. Medical offices and clinics: four spaces for each doctor practicing at the clinic plus one space for each employee;

G. Senior high school and colleges, both public and private: one space for each five students for which the school was designed, plus one space for each classroom and administrative office.

(Ord. 1-76 (part): prior code § 14.0714)

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# Appendix E – Public Meetings Presentations and Public Surveys Received

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# First Public Open House
# 9/25/2018

**The following information is included:**

- **Presentation given at the meeting**
- **Airport User Survey handed out at the meeting**
- **Attendance Sheet**

# REDFIELD MUNICIPAL AIRPORT

Master Plan & Airport Layout Plan

Public Open House – 9/25/2018

## INTRODUCTIONS

**City of Redfield**

Jayme Akin, Mayor

Darrel Ronnfeldt, Council Member

Jessi Lewis, Council Member

Adam Hansen, Finance Officer

**Helms and Associates**

Bob Babcock, P.E., President

Corey Helms, Director of Project Development

Craig Harrison, Civil Designer

Brooke B. Edgar, P.E.

**SDDOT**

Jon Becker

**FAA**

Brian Schuck, Program Manager

## AGENDA

- Master Plan Process
  - Introduction
  - Goals
  - Study Tasks
- Existing Conditions
- Aviation Forecasts
- Remaining Tasks
- User Surveys
- Improvement Projects – Short Term

## INTRODUCTION

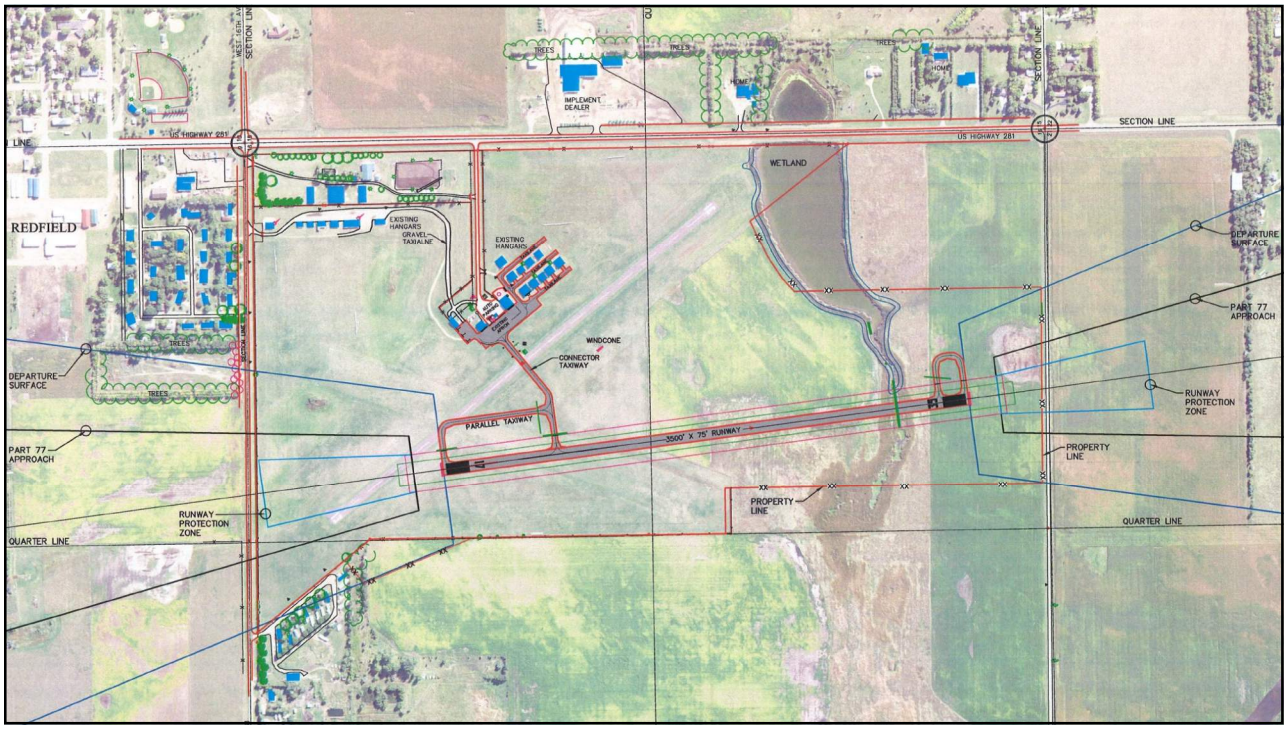
- "An airport master plan is a comprehensive study of an airport and usually describes the short-, medium-, and long-term development to meet future aviation demand." – FAA Advisory Circular 150/5070-6B *Airport Master Plans*
- *Plans vary depending on size and complexity of the airport.*

## GOALS

- Approach Survey for GPS Approach Development
- Apron and Hangar Area Congestion
  - Ag Operator Separation
  - Additional Apron Area and Tie-Downs
  - Additional Hangar Areas
- Planning for Compliance
- Crosswind Turf Runway

## MASTER PLAN TASKS

- Inventory
- Forecasts
- Facility Requirements
- Alternatives
- Implementation and Funding Scenarios
- Environmental Overview




## SHORT TERM – IMPROVEMENT PROJECTS

- 10' Wildlife Fence
- Certified Weather – AWOS III

Helms & ASSOCIATES
CIVIL ENGINEERS & LAND SURVEYORS

## USER SURVEY

- Please take one home, complete the survey, and return to City Hall.

## QUESTIONS/COMMENTS

AIRPORT USER SURVEY – REDFIELD MUNICIPAL AIRPORT

The Redfield Municipal Airport has begun Master Plan update for the airport, which includes updating the current Airport Layout Plan (ALP). This study will be completed through the analysis of the existing, future and ultimate usage and needs anticipated at the airport. The City of Redfield is conducting a User Survey for planning purposes and justification for future projects. As you are receiving this survey, you have been identified as a current user or potential future user of the airport.

The Redfield Municipal Airport (1D8) currently has Runway 17-35 (3,500'x 75') with 10 based aircraft, and 4,000 annual operations according to the most recent master record (5010) form.

The purpose of this survey is to identify aircraft or the aircraft in your current or planned fleet, the runway length and airport facility requirements of that fleet, and your forecasted levels of activity at 1D8. Detailed documentation on your usage will allow the City of Redfield to justify future improvements at the airport such as additional apron areas, hangar taxiways, a cross wind runway, etc. Please indicate any airport improvements you desire or require to operate safely from 1D8.

Your detailed input is very important to the accuracy and viability of this study. We request you complete the survey and return it to the following by **October 15, 2018.**

Adam Hansen, Airport Manager
626 N. Main Street
Redfield, SD 57469
605-472-4550
Email: alhansen@redfield-sd.com

1. Do you or your business currently use the Redfield Municipal Airport?

   Yes _____ No _____

   How do you or your business currently use the Redfield Municipal Airport? Please indicate all that apply:

   Recreational (percentage of operations at Redfield) _____ %
   Business (percentage of operations at Redfield) _____ %
   Use Redfield Municipal Airport on a transient basis – Aircraft is based elsewhere (please indicate airport)

   Yes _____ No _____

   Where is/are your aircraft based? _____

   Please explain your business/personal air transportation needs:

   Current: _____

   _____

   Future: _____

   _____

2. Please complete the following table about your aircraft operations to and from Redfield Municipal Airport. Given the existing conditions at the airport, what types of aircraft and number of operations do you or your business utilize on an annual basis?

   NOTE: If your firm or company attracts aviation activity to Redfield, please indicate those estimated operations as well.

| Aircraft Name, Model | Runway | Number of Annual Operations | | Projected Number of Annual Operations | |
|---|---|---|---|---|---|
| | | 2012 | 2017 | 2019 | 2024 |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

3. What are your runway length requirements (accelerate/stop distance requirements, insurance requirements, company policy, ect.) of your aircraft on an 85 degree day, 1307' MSL at your required takeoff weight?

| Aircraft Name, Model | Takeoff Weight Requirement | Runway Length Requirements (feet) |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

   Please indicate the basis of your runway length requirements (i.e. pilots operating handbook, company policy, insurance requirement):

   _____

4. Why do you or your company utilize or benefit from general aviation at the Redfield Municipal Airport (i.e. close to clients, fly to/from business, etc.)? If you do not utilize Redfield Municipal Airport and fly to an alternative airport, please indicate why.

   _____

   _____

   _____

5. Is the current runway a limiting factor to your operations?

Yes _____ No _____

If yes, please explain:

_____

_____

6. Are there any other airport facilities that prevent you from operating to/from Redfield Municipal Airport (i.e. hangar availability, fuel, ect.)?

Yes _____ No _____

If yes, please explain:

_____

_____

7. What percentage of your flights are within a 20 mile radius of Redfield Municipal Airport?

_____ %

8. Please rank the adequacy of the facilities at the Redfield Municipal Airport.

| | Excellent | Good | Fair | Poor | N/A |
|---|---|---|---|---|---|
| GA Terminal Building | | | | | |
| Hangar Facilities | | | | | |
| Aircraft Parking | | | | | |
| Aircraft Fueling | | | | | |
| Auto Parking | | | | | |

Comments:

_____

_____

9. Please rate the overall impression of the Redfield Municipal Airport.

| | Extremely Satisfied | Satisfied | Neutral | Dissatisfied | Extremely Dissatisfied |
|---|---|---|---|---|---|
| Impression | | | | | |

10. What do you like most about the Redfield Municipal Airport:

11. What do you like least about the Redfield Municipal Airport:

12. Please provide any additional comments about the long-term development of the Redfield Municipal Airport:

13. Please provide the following information pertaining to the individual who completed this survey.

Name:

Company/Affiliation:

Address:

Phone:

Email:

14. May we contact you with any specific questions about this user survey?

Yes _____ No _____

Please attach any additional comments you may have to this survey.

***The Redfield Municipal Airport and the City of Redfield thank you for completing this user survey.***

# OPEN HOUSE SIGN-IN SHEET

| | | | |
|---|---|---|---|
| **Project:** | Redfield Master Plan | **Meeting Date/Time:** | September 25, 2018 5:30-7:00 P.M. |
| **Facilitator:** | Helms and Associates | **Place/Room:** | City Hall<br>Redfield, South Dakota |

| Name | Company/Representing | Phone | E-Mail |
|---|---|---|---|
| Brooke Edgar | Helms & Associates | (605) 225-1212 – O | brookee@helmsengineering.com |
| Bob Babcock | Helms & Associates | (605) 225-1212 – O | bobb@helmsengineering.com |
| Corey Helms | Helms & Associates | (605) 225-1212 – O | coreyh@helmsengineering.com |
| Craig Harrison | Helms & Associates | (605) 225-1212 – O | craigh@helmsengineering.com |
| Adam L Hansen | City of Redfield | 605-472-4550-O | alhansen@redfield-sd.com |
| Bill Stemper | KRAN airport | 605-460-3424 | |
| Jon Becker | SDDOT | 605 773-4162 | Jon.becker@state.sd.us |
| CRAIG BAIR | AGTEGRA | 605-850-4729 | CRAIG.BAIR@AGTEGRA.COM |
| Tom Schultz | Airport user | 605-596-4229 | tdschultz@venturecomm.net |
| Darrel E. Jensen | Airport User | 605-450-0603 | |
| Duane Ottem | | 605-472-3387 | |
| Perry Schmidt | Redfield Township | 605-460-2608 | pschmidt2@nvc.net |
| Armon Zene | Airport | 605-460 2760 | armonzene@yahoo.com |
| Jayme Akin | City of Redfield | 605-240-2001 | jayme_akin@hotmail.com |

| Name | Company/Representing | Phone | E-Mail |
|---|---|---|---|
| JASON KRAFT | SHERIFF'S OFFICE | | |
| Jake [illegible] | User | | |
| Dan Appel | Pilot | 605-450-0223 | appel@appeloil.com |
| Jake Appel | Pilot | 605-450-0605 | jacob.appel@hotmail.com |
| Dave [illegible] | Redfield Township | | |
| Ken [illegible] | Pilot | | |
| Rex Spear | user | 290 4432 | Rex Spear 54@gmail.com |
| Heath Rietschmar | Agtegra | 605-933-0399 | heath.Rietschmar@agtegra.com |
| Rick Spear | self | 460-1233 | flybay69@yahoo. |
| Allan Avery | self | 460-0070 | NA |
| Elmer Burggraff | Self | 460-0828 | |
| Randy Tolvstad | | 228-6485 | |
| Jane Burggraff | | 460-1888 | |
| Adam Nichols | | | |
| Jessi Lewis | City of Redfield | | |
| | | | |

# Second Public Open House
# 6/27/2019

**The following information is included:**

- **Presentation given at the meeting**
- **Attendance Sheet**

# REDFIELD MUNICIPAL AIRPORT

Master Plan & Airport Layout Plan

Public Open House – 6/27/2019

Redfield South Dakota

Helms & ASSOCIATES

CIVIL ENGINEERS & LAND SURVEYORS

# INTRODUCTIONS

**City of Redfield**

Jayme Akin, Mayor

Darrel Ronnfeldt, Council Member

Jessi Lewis, Council Member

Adam Hansen, Finance Officer

**Helms and Associates**

Bob Babcock, P.E., President

Corey Helms, Director of Project Development

Craig Harrison, Civil Designer

Brooke B. Edgar, P.E.

**SDDOT**

Jon Becker

Brad Remmich

**FAA**

Brian Schuck, Program Manager

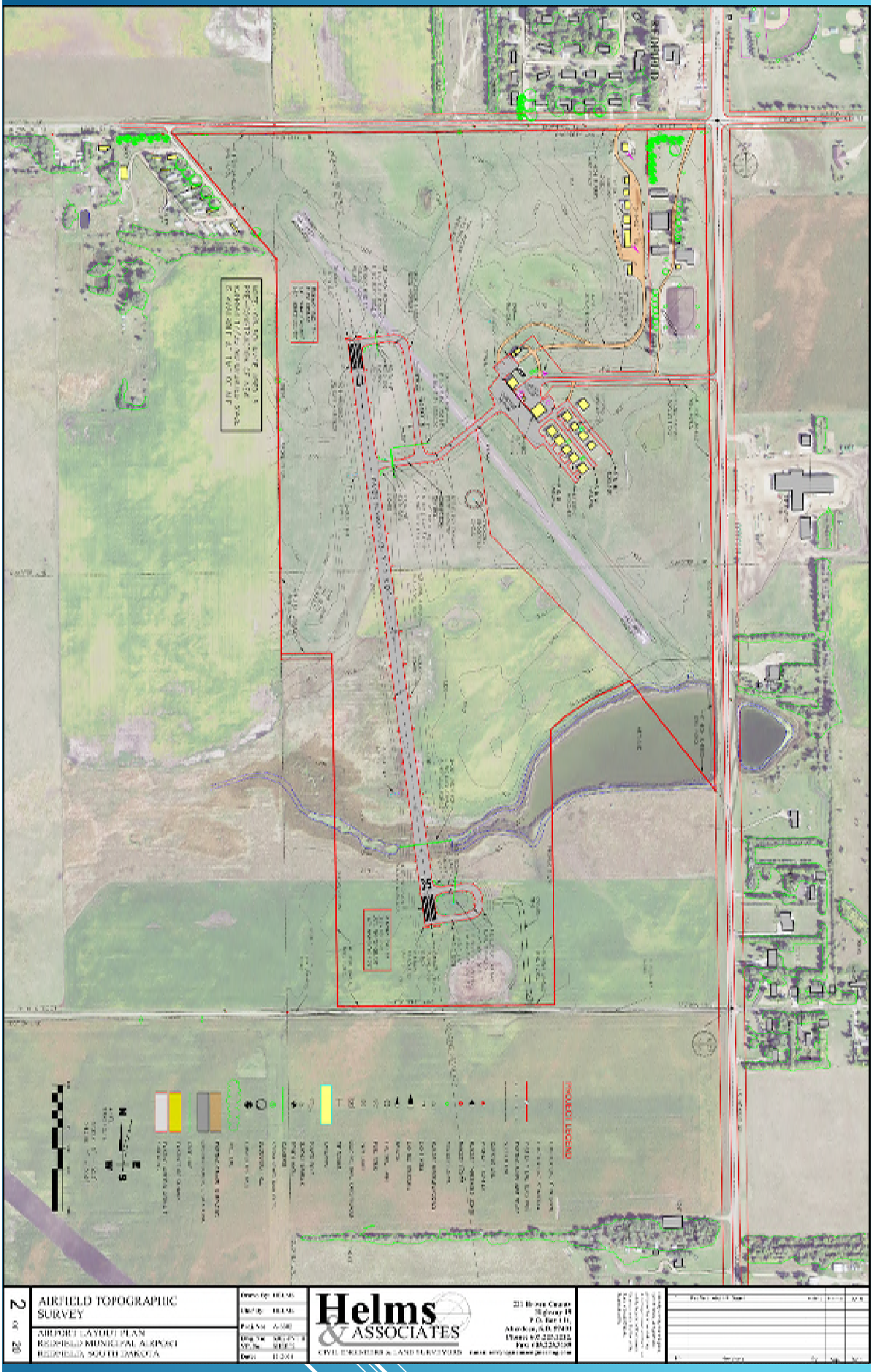
Sandy DePottey, Program Manager

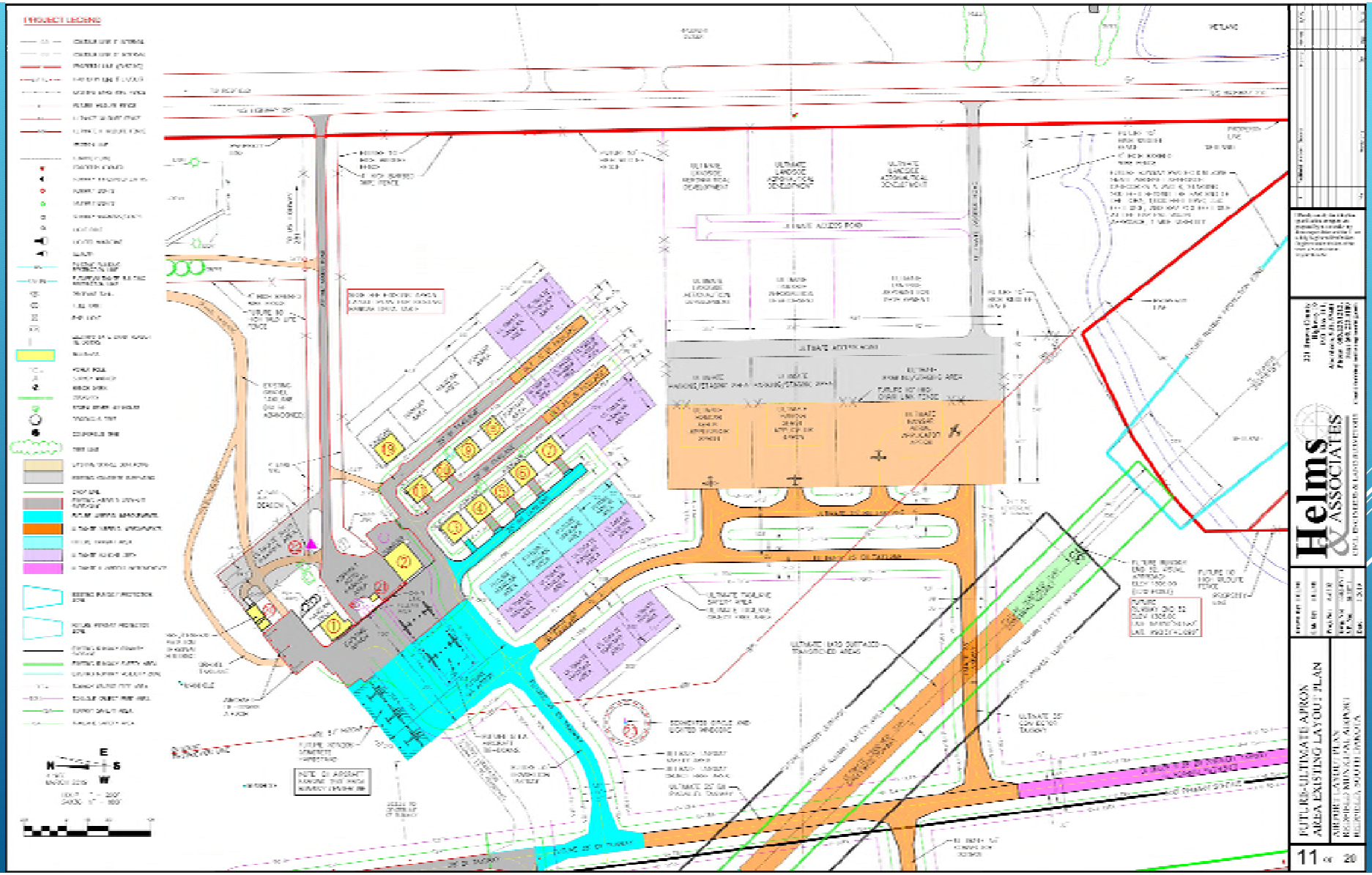
# AGENDA

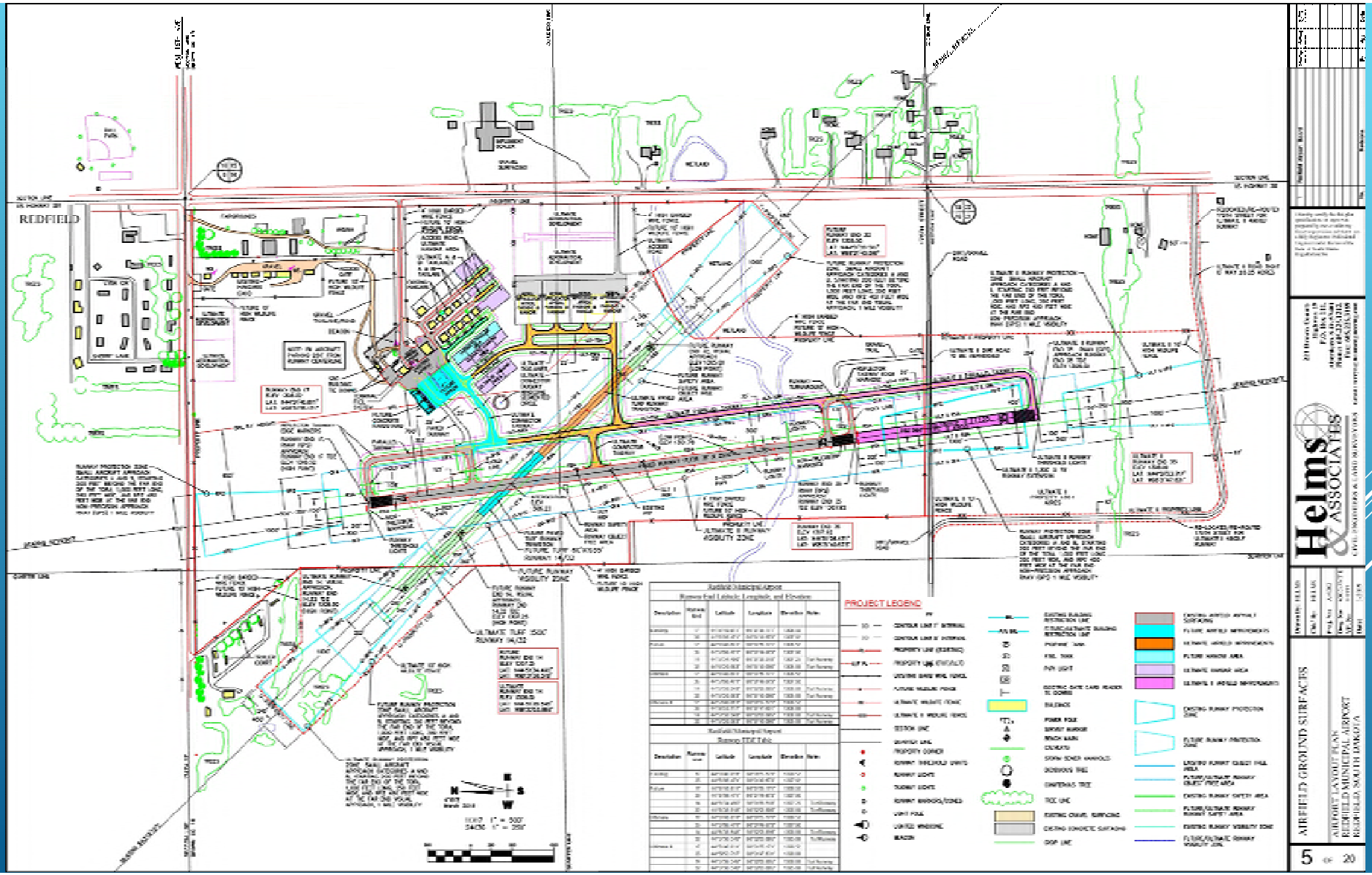
- Existing Conditions
- Proposed Updates to Airport Layout Plan (ALP)
- Improvement Projects – Short Term

# GOALS

- Approach Survey for GPS Approach Development
- Apron and Hangar Area Congestion
  - Ag Operator Separation
  - Additional Apron Area and Tie-Downs
  - Additional Hangar Areas
- Crosswind Turf Runway


AIRFIELD TOPOGRAPHIC SURVEY
AIRPORT LAYOUT PLAN
REDFIELD MUNICIPAL AIRPORT
REDFIELD, SOUTH DAKOTA
Helms & ASSOCIATES
CIVIL ENGINEERS and LAND SURVEYORS


PROJECT LEGEND
FUTURE/ULTIMATE APRON
AREA EXISTING LAYOUT PLAN
AIRPORT LAYOUT PLANS
RICHMOND MUNICIPAL AIRPORT
RICHMOND, SOUTH DAKOTA
Helms & ASSOCIATES
11 of 20


REDFIELD
PROJECT LEGEND
Helms & ASSOCIATES
AIRFIELD GROUNDS SURFACES
AIRPORT LAYOUT PLAN
REDFIELD MUNICIPAL AIRPORT
REDFIELD, SOUTH DAKOTA
5

# SHORT TERM – IMPROVEMENT PROJECTS

- 10’ Wildlife Fence
- Certified Weather – AWOS III

# QUESTIONS/COMMENTS

# OPEN HOUSE SIGN-IN SHEET

| | | | |
|---|---|---|---|
| **Project:** | Redfield Master Plan | **Meeting Date/Time:** | June 27, 2019 5:30-7:00 P.M. |
| **Facilitator:** | Helms and Associates | **Place/Room:** | City Hall<br>Redfield, South Dakota |

| Name | Company/Representing | Phone | E-Mail |
|---|---|---|---|
| Brooke Edgar | Helms & Associates | (605) 225-1212 – O | brookee@helmsengineering.com |
| Bob Babcock | Helms & Associates | (605) 225-1212 – O | bobb@helmsengineering.com |
| Corey Helms | Helms & Associates | (605) 225-1212 – O | coreyh@helmsengineering.com |
| Craig Harrison | Helms & Associates | (605) 225-1212 – O | craigh@helmsengineering.com |
| Adam Hansen | City of Redfield | 605-472-4550 | clhansen@redfield-sd.com |
| Jon Becker | SDDOT | 605 727-4162 | Jon.becker@state.sd.us |
| Perry Schmidt | Redfield Twp | 605-460-2600 | pschmidt2@nvc.net |
| Frank Kramer | Spink Co Sheriff | 605-472-4555 | 5719@midconetwork.com |
| Josh Appel | | 605-460-0936 | jda.7399@yahoo.com |
| Tom Schultz | Pilot | 605-450-0383 | tdschultz@ventirecomm.net |
| Jessi Lewis | City of Redfield | 605-460-1750 | jlewis@redfieldenergy.com |
| Shiloh Appel | Redfield Press | 605-472-0822 | sappel@redfieldpress.com |
| Jake Appel | Pilot | 605-450-0605 | jacob.appel@hotmail.com |
| Dan Appel | Pilot | 605-450-0223 | appel@appeloil.com |

| Name | Company/Representing | Phone | E-Mail |
|---|---|---|---|
| Jayne Akin | City | 472-4550 | mayor redfield-sd.com |
| Bob Babcock | Helms & Assoc. | 225-1212 | bobb@helmsengineering.com |
| Ray Splan | self | 460 4832 Cell | |
| Daniel Johnson | Redfield | 605-450-0602 | |
| Rick Avery | ~~Redfield~~ USDA SELF | 460-8000 | |
| Darrell Ronnfeldt | Redfield | | |
| Zick Spear | Self | 460 1233 | |
| Randy Tolvstad | Self | | |
| Wade Schulte | Wilbur Ellis | 450-4120 | |
| Nick Pierson | Self | 605 881 7555 | |
| Bill Nelson | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

# Third Public Open House
# 10/23/2019

**A third public open house was held at the request of commenters.**

**The following information is included:**

- **Presentation given at the meeting**
- **Attendance Sheet**

# REDFIELD MUNICIPAL AIRPORT

Master Plan & Airport Layout Plan

Public Open House – 10/23/2019

## INTRODUCTIONS

**City of Redfield**

Jayme Akin, Mayor

Darrel Ronnfeldt, Council Member

Jessi Lewis, Council Member

Adam Hansen, Finance Officer

**Helms and Associates**

Bob Babcock, P.E., President

Corey Helms, Director of Project Development

Craig Harrison, Civil Designer

Brooke B. Edgar, P.E.

**SDDOT**

Jon Becker

Brad Remmich

**FAA**

Brian Schuck, Program Manager

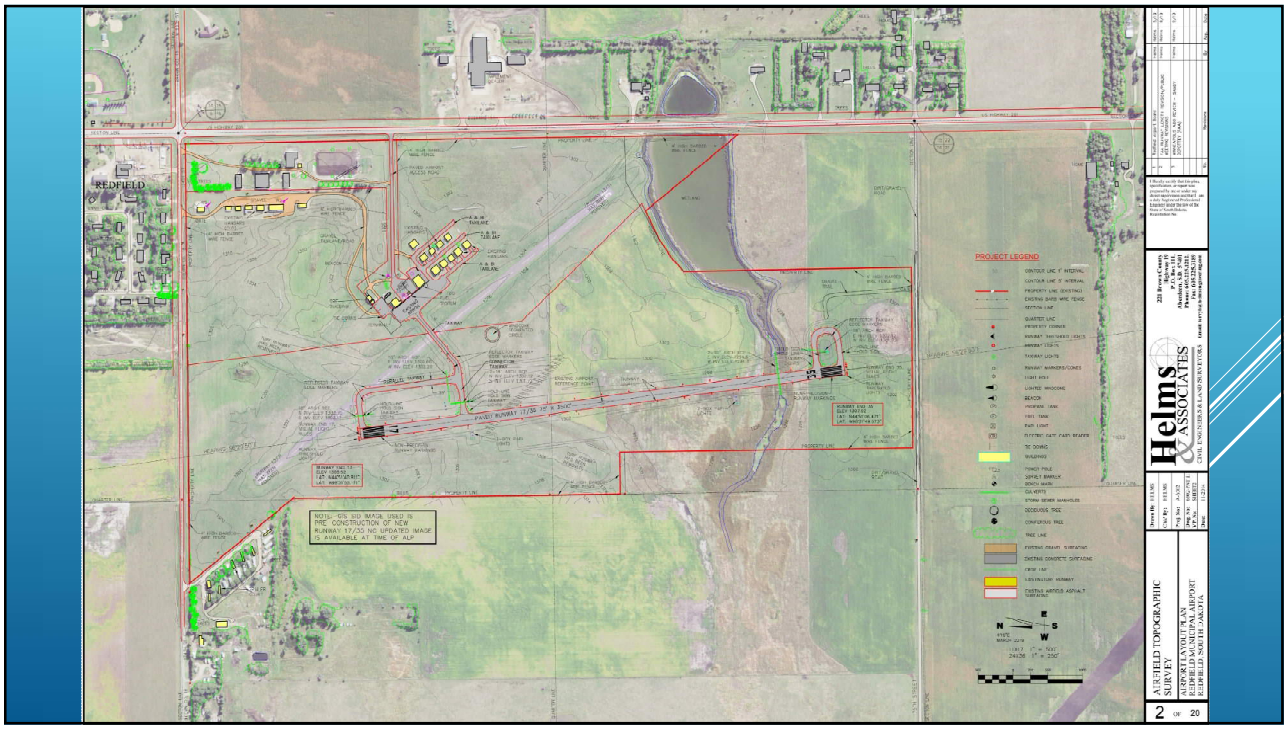
Sandy DePottey, Planner

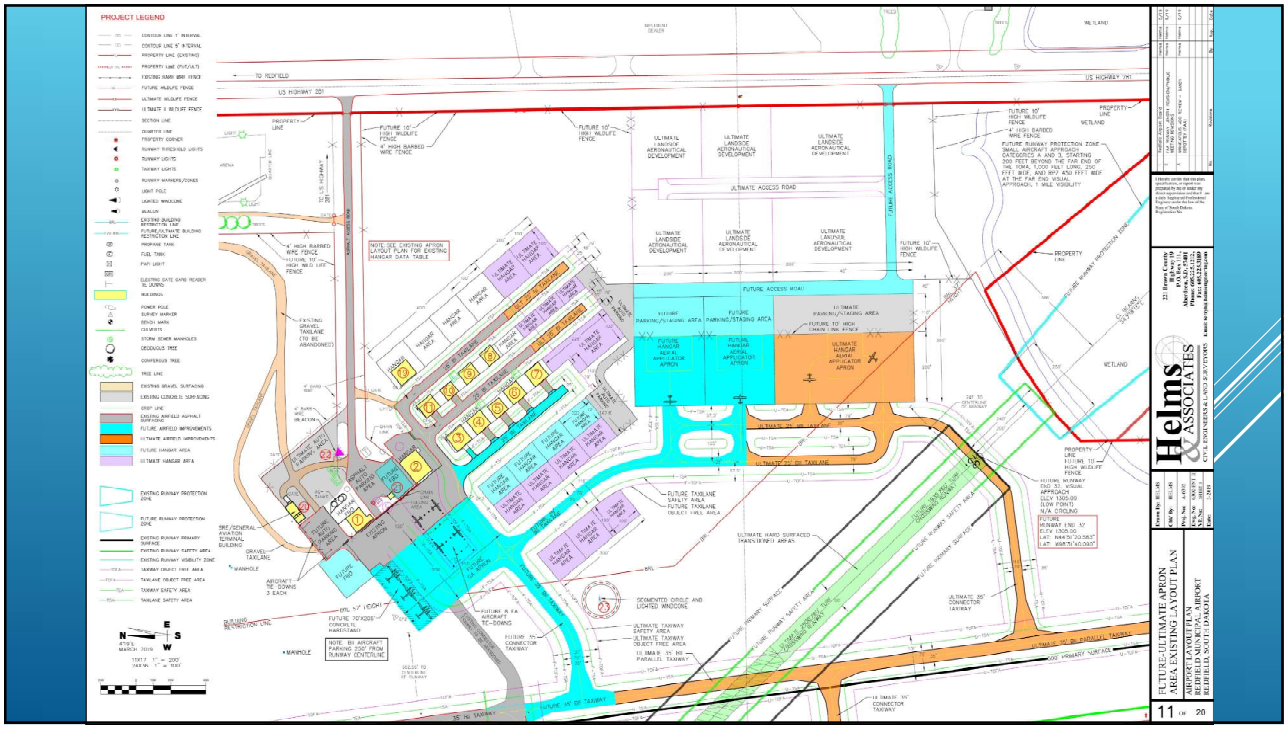
## AGENDA

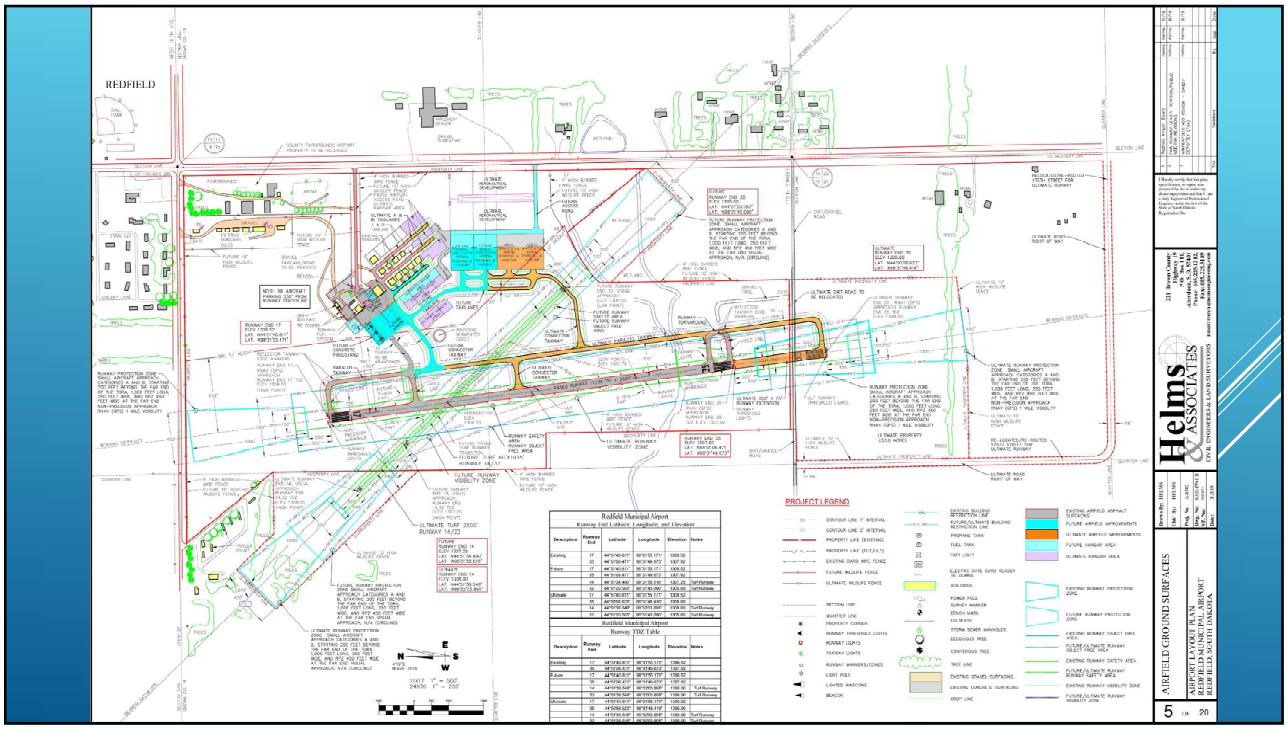
- Existing Conditions
- Proposed Updates to Airport Layout Plan (ALP)
- Improvement Projects – Short Term

## GOALS

- Approach Survey for GPS Approach Development – in process
- Apron and Hangar Area Congestion
  - Ag Operator Separation
  - Additional Apron Area and Tie-Downs
  - Additional Hangar Areas
- Crosswind Turf Runway


REDFIELD
PROJECT LEGEND
NOTE: GIS BID IMAGE USED IS PRE CONSTRUCTION OF NEW RUNWAY 17/35 NO UPDATED IMAGE IS AVAILABLE AT TIME OF ALP
Helms & ASSOCIATES
AIRFIELD TOPOGRAPHIC SURVEY
AIRPORT LAYOUT PLAN
REDFIELD MUNICIPAL AIRPORT
REDFIELD, SOUTH DAKOTA
2 OF 20


PROJECT LEGEND
US HIGHWAY 281
US HIGHWAY 212
TO REDFIELD
ULTIMATE ACCESS ROAD
ULTIMATE TAXIWAY SAFETY AREA
ULTIMATE TAXIWAY OBJECT FREE AREA
ULTIMATE HARD SURFACED TAXIWAY
ULTIMATE 35' CONNECTOR TAXIWAY
ULTIMATE 50' PARALLEL TAXIWAY
FUTURE RUNWAY PROTECTION ZONE
FUTURE RUNWAY SAFETY AREA
FUTURE RUNWAY OBJECT FREE AREA
FUTURE RUNWAY PRIMARY SURFACE
FUTURE RUNWAY END 35 VISUAL APPROACH
FUTURE RUNWAY END 17 VISUAL APPROACH
ULTIMATE LANDSIDE AERONAUTICAL DEVELOPMENT
ULTIMATE AIRSIDE AERONAUTICAL DEVELOPMENT
ULTIMATE HANGAR/TIEDOWN APRON
FUTURE HANGAR/TIEDOWN APRON
FUTURE PARKING/STAGING AREA
ULTIMATE PARKING/STAGING AREA
FUTURE TAXILANE
ULTIMATE TAXILANE
FUTURE TAXILANE SAFETY AREA
FUTURE TAXILANE OBJECT FREE AREA
FUTURE 10' HIGH WILDLIFE FENCE
ULTIMATE 10' HIGH WILDLIFE FENCE
4' HIGH BARBED WIRE FENCE
DRAINAGE DITCH
WETLAND
PROPERTY LINE
NOTE: SEE EXISTING AIRPORT LAYOUT PLAN FOR EXISTING RUNWAY DATA TABLE
NOTE: 80 AIRCRAFT PARKING DOC FROM RUNWAY CENTERLINE
Helms & ASSOCIATES
FUTURE/ULTIMATE APRON AREA/EXISTING LAYOUT PLAN
AIRPORT LAYOUT PLAN
REDFIELD MUNICIPAL AIRPORT
REDFIELD, SOUTH DAKOTA
11 OF 20




# SHORT TERM – IMPROVEMENT PROJECTS

Redfield South Dakota

- 10’ Wildlife Fence
- Certified Weather – AWOS III or AWOS AV

Helms & ASSOCIATES
CIVIL ENGINEERS & LAND SURVEYORS

## QUESTIONS/COMMENTS

- Please submit all written comments to the City of Redfield by November 23, 2019.

City of Redfield
626 N. Main St.
Redfield, SD 57469
-OR-
alhansen@redfield-sd.com

Helms & ASSOCIATES
CIVIL ENGINEERS & LAND SURVEYORS

# OPEN HOUSE SIGN-IN SHEET

| | | | |
|---|---|---|---|
| **Project:** | Redfield Master Plan | **Meeting Date/Time:** | October 23, 5:00-7:00 P.M. |
| **Facilitator:** | Helms and Associates | **Place/Room:** | City Hall<br>Redfield, South Dakota |

| Name | Company/Representing | Phone | E-Mail |
|---|---|---|---|
| Brooke Edgar | Helms & Associates | (605) 225-1212 – O | brookee@helmsengineering.com |
| Bob Babcock | Helms & Associates | (605) 225-1212 – O | bobb@helmsengineering.com |
| Corey Helms | Helms & Associates | (605) 225-1212 – O | coreyh@helmsengineering.com |
| Craig Harrison | Helms & Associates | (605) 225-1212 – O | craigh@helmsengineering.com |
| Alan Hansen | City | 605-472-4550 | alhans@redfield.sd.us |
| Allan Avery | | 605-460-0070 | none |
| Tom Schultz | Private | 605-450-0385 | tdschultz@venturecomm.net |
| Deb Schultz | Private | 605-450-0721 | |
| Lynn Nelson | | 605-848-1559 | |
| Mike Nilson | | 605-880-3852 | |
| Stan Schultz | | 605-450-0644 | |
| Kari Schultz | | 605-450-0086 | Kari.281transport@gmail.com |
| Randy Talvstad | | 605-887-3208 | |
| Anthony Ehlich | | | |

| Name | Company/Representing | Phone | E-Mail |
|---|---|---|---|
| Zach Spear | | 460-1233 | |
| Wade Schultz | Wilbur-Ellis | | |
| Josh Appel | Appel oil | 460-0936 | Jla.7399@yahoo |
| Jake Appel | Appel oil | 450-0605 | jacob.appel@hotmail.com |
| Bill Stemper | Farm | 4603424 | |
| Darrell Rompfeldt | City | 450-0003 | |
| Dan Appel | Appel Oil Co | 450 0223 | appel@appeloil.com |
| Fred Kuhn | Spink Co Sheriff | 472-4595 | 5719@m.dcoxnetwork.com |
| Jim Cl | Redfield | 290-2001 | |
| Jeff Daniel | | | |
| Tim Woodring | | | |
| Jake Watz | | | |
| Sherry Balcom | | | |
| Ra Spear | | 290 4832 | |
| Jessi Lewis | | | |
| Craig Jorgensen | | | |

| Name | Company/Representing | Phone | E-Mail |
|---|---|---|---|
| Jon Becker | State of SD | | |
| Shiloh Appel | Redfield Press | | |
| Rick Avery | Self | | |
| Shelly Wolf | Redfield P. | | |
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# Airport User Surveys Received

RECEIVED
OCT 4 REC'D

AIRPORT USER SURVEY – REDFIELD MUNICIPAL AIRPORT

The Redfield Municipal Airport has begun Master Plan update for the airport, which includes updating the current Airport Layout Plan (ALP). This study will be completed through the analysis of the existing, future and ultimate usage and needs anticipated at the airport. The City of Redfield is conducting a User Survey for planning purposes and justification for future projects. As you are receiving this survey, you have been identified as a current user or potential future user of the airport.

The Redfield Municipal Airport (1D8) currently has Runway 17-35 (3,500'x 75') with 10 based aircraft, and 4,000 annual operations according to the most recent master record (5010) form.

The purpose of this survey is to identify aircraft or the aircraft in your current or planned fleet, the runway length and airport facility requirements of that fleet, and your forecasted levels of activity at 1D8. Detailed documentation on your usage will allow the City of Redfield to justify future improvements at the airport such as additional apron areas, hangar taxiways, a cross wind runway, etc. Please indicate any airport improvements you desire or require to operate safely from 1D8.

Your detailed input is very important to the accuracy and viability of this study. We request you complete the survey and return it to the following by **October 15, 2018.**

Adam Hansen, Airport Manager
626 N. Main Street
Redfield, SD 57469
605-472-4550
Email: alhansen@redfield-sd.com

1. Do you or your business currently use the Redfield Municipal Airport?

Yes X No _____

How do you or your business currently use the Redfield Municipal Airport? Please indicate all that apply:

Recreational (percentage of operations at Redfield) 90 %
Business (percentage of operations at Redfield) 10 %
Use Redfield Municipal Airport on a transient basis – Aircraft is based elsewhere (please indicate airport)

Yes _____ No X

Where is/are your aircraft based? 108

Please explain your business/personal air transportation needs:

Current: Local personal, Parts & Repair Runs

Future: More long Distance travel possible Freight Travel

2. Please complete the following table about your aircraft operations to and from Redfield Municipal Airport. Given the existing conditions at the airport, what types of aircraft and number of operations do you or your business utilize on an annual basis?

   NOTE: If your firm or company attracts aviation activity to Redfield, please indicate those estimated operations as well.

| Aircraft Name, Model | Runway | Number of Annual Operations | | Projected Number of Annual Operations | |
|---|---|---|---|---|---|
| | | 2012 | 2017 | 2019 | 2024 |
| Husky A1A | 13-31 & 1-19 | | 100 | 100 | 100 |
| Cessna 172 | 13-31 | | 50 | 50 | 50 |
| | | | | | |
| | | | | | |

3. What are your runway length requirements (accelerate/stop distance requirements, insurance requirements, company policy, ect.) of your aircraft on an 85 degree day, 1307' MSL at your required takeoff weight?

| Aircraft Name, Model | Takeoff Weight Requirement | Runway Length Requirements (feet) |
|---|---|---|
| Husky A1A | 2000 lb | 700' |
| Cessna 172 | 2100 lb | 1100' |
| | | |
| | | |

   Please indicate the basis of your runway length requirements (i.e. pilots operating handbook, company policy, insurance requirement):

   POH

4. Why do you or your company utilize or benefit from general aviation at the Redfield Municipal Airport (i.e. close to clients, fly to/from business, etc.)? If you do not utilize Redfield Municipal Airport and fly to an alternative airport, please indicate why.

   Personal travel to Family
   Parts & Repair for Business

**Please Return by October 15**

5. Is the current runway a limiting factor to your operations?

Yes X No ____

If yes, please explain:

Winds Sometimes Exceed X/C component

6. Are there any other airport facilities that prevent you from operating to/from Redfield Municipal Airport (i.e. hangar availability, fuel, ect.)?

Yes ____ No X

If yes, please explain:

7. What percentage of your flights are within a 20 mile radius of Redfield Municipal Airport?

30 %

8. Please rank the adequacy of the facilities at the Redfield Municipal Airport.

| | Excellent | Good | Fair | Poor | N/A |
|---|---|---|---|---|---|
| GA Terminal Building | | X | | | |
| Hangar Facilities | | | X | | |
| Aircraft Parking | | | | X | |
| Aircraft Fueling | | | | X | |
| Auto Parking | | | X | | |

Comments:

9. Please rate the overall impression of the Redfield Municipal Airport.

| | Extremely Satisfied | Satisfied | Neutral | Dissatisfied | Extremely Dissatisfied |
|---|---|---|---|---|---|
| Impression | | | X | | |

**Please Return by October 15**

10. What do you like most about the Redfield Municipal Airport:

Location

11. What do you like least about the Redfield Municipal Airport:

X/ wind coverage
Congestion with Ag planes

12. Please provide any additional comments about the long-term development of the Redfield Municipal Airport:

13. Please provide the following information pertaining to the individual who completed this survey.

Name: Dan Appel
Company/Affiliation: Appel Oil Company
Address: 17486 375th Ave
Redfield S.D. 57469
Phone: 605-450-0223
Email: appel@appeloil.com

14. May we contact you with any specific questions about this user survey?

Yes X No ____

Please attach any additional comments you may have to this survey.

***The Redfield Municipal Airport and the City of Redfield thank you for completing this user survey.***

**Please Return by October 15**

RECEIVED
OCT 4 REC'D
By

AIRPORT USER SURVEY – REDFIELD MUNICIPAL AIRPORT

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The Redfield Municipal Airport (1D8) currently has Runway 17-35 (3,500'x 75') with 10 based aircraft, and 4,000 annual operations according to the most recent master record (5010) form.

The purpose of this survey is to identify aircraft or the aircraft in your current or planned fleet, the runway length and airport facility requirements of that fleet, and your forecasted levels of activity at 1D8. Detailed documentation on your usage will allow the City of Redfield to justify future improvements at the airport such as additional apron areas, hangar taxiways, a cross wind runway, etc. Please indicate any airport improvements you desire or require to operate safely from 1D8.

Your detailed input is very important to the accuracy and viability of this study. We request you complete the survey and return it to the following by **October 15, 2018.**

Adam Hansen, Airport Manager
626 N. Main Street
Redfield, SD 57469
605-472-4550
Email: alhansen@redfield-sd.com

1. Do you or your business currently use the Redfield Municipal Airport?

   Yes X No _____

   How do you or your business currently use the Redfield Municipal Airport? Please indicate all that apply:

   Recreational (percentage of operations at Redfield) 90 %
   Business (percentage of operations at Redfield) 10 %
   Use Redfield Municipal Airport on a transient basis – Aircraft is based elsewhere (please indicate airport)
   Yes _____ No X
   Where is/are your aircraft based? 1D8

   Please explain your business/personal air transportation needs:

   Current: Part runs – Personal/Recreation

   Future: _____

2. Please complete the following table about your aircraft operations to and from Redfield Municipal Airport. Given the existing conditions at the airport, what types of aircraft and number of operations do you or your business utilize on an annual basis?

   NOTE: If your firm or company attracts aviation activity to Redfield, please indicate those estimated operations as well.

| Aircraft Name, Model | Runway | Number of Annual Operations | | Projected Number of Annual Operations | |
|---|---|---|---|---|---|
| | | 2012 | 2017 | 2019 | 2024 |
| C-172 | 13.31 1-19 | | 50 | 60 | 100 |
| Husky A1A | 13.31 1-19 | | 50 | 100 | 100 |
| | | | | | |
| | | | | | |

3. What are your runway length requirements (accelerate/stop distance requirements, insurance requirements, company policy, ect.) of your aircraft on an 85 degree day, 1307' MSL at your required takeoff weight?

| Aircraft Name, Model | Takeoff Weight Requirement | Runway Length Requirements (feet) |
|---|---|---|
| Husky A1A | 2000 | 700 |
| Cessna 172 | 2100 | 1100 |
| | | |
| | | |

   Please indicate the basis of your runway length requirements (i.e. pilots operating handbook, company policy, insurance requirement):

   POH

4. Why do you or your company utilize or benefit from general aviation at the Redfield Municipal Airport (i.e. close to clients, fly to/from business, etc.)? If you do not utilize Redfield Municipal Airport and fly to an alternative airport, please indicate why.

   Recreation / Personal transport

**Please Return by October 15**

5. Is the current runway a limiting factor to your operations?

Yes X No ____

If yes, please explain:

Not in line with Prevailing winds.

6. Are there any other airport facilities that prevent you from operating to/from Redfield Municipal Airport (i.e. hangar availability, fuel, ect.)?

Yes ____ No X

If yes, please explain:

7. What percentage of your flights are within a 20 mile radius of Redfield Municipal Airport?

20 %

8. Please rank the adequacy of the facilities at the Redfield Municipal Airport.

| | Excellent | Good | Fair | Poor | N/A |
|---|---|---|---|---|---|
| GA Terminal Building | | | | | |
| Hangar Facilities | | | X | | |
| Aircraft Parking | | | | X | |
| Aircraft Fueling | | | | X | |
| Auto Parking | | | X | | |

Comments:

9. Please rate the overall impression of the Redfield Municipal Airport.

| | Extremely Satisfied | Satisfied | Neutral | Dissatisfied | Extremely Dissatisfied |
|---|---|---|---|---|---|
| Impression | | | X | | |

**Please Return by October 15**

10. What do you like most about the Redfield Municipal Airport:

That we have one

11. What do you like least about the Redfield Municipal Airport:

Have to back Taxi on the runway. No X/wind Coverage in Strong wind for light aircraft. No grass Runway

12. Please provide any additional comments about the long-term development of the Redfield Municipal Airport:

Need grass X-wind runway for light aircraft. Need more than 3 parking spots for visiting aircraft. Should be able to pump more than 12 gal of gas on 1 C/C Transaction. Should be a parallel Taxi way the entire length of the runway to prevent aircraft from Backtaxi on runway with incoming traffic in patterns.

13. Please provide the following information pertaining to the individual who completed this survey.

Name: Josh Appel

Company/Affiliation: Appel Oil

Address: 38502 175th St
Redfield, SD 57469

Phone: 605-460-0936

Email: ida.7399@Yahoo.com

14. May we contact you with any specific questions about this user survey?

Yes X No ____

Please attach any additional comments you may have to this survey.

***The Redfield Municipal Airport and the City of Redfield thank you for completing this user survey.***

RECEIVED
OCT 4 REC'D
By

AIRPORT USER SURVEY – REDFIELD MUNICIPAL AIRPORT

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The purpose of this survey is to identify aircraft or the aircraft in your current or planned fleet, the runway length and airport facility requirements of that fleet, and your forecasted levels of activity at 1D8. Detailed documentation on your usage will allow the City of Redfield to justify future improvements at the airport such as additional apron areas, hangar taxiways, a cross wind runway, etc. Please indicate any airport improvements you desire or require to operate safely from 1D8.

Your detailed input is very important to the accuracy and viability of this study. We request you complete the survey and return it to the following by **October 15, 2018.**

Adam Hansen, Airport Manager
626 N. Main Street
Redfield, SD 57469
605-472-4550
Email: alhansen@redfield-sd.com

1. Do you or your business currently use the Redfield Municipal Airport?

   Yes ✓ No _____

   How do you or your business currently use the Redfield Municipal Airport? Please indicate all that apply:

   Recreational (percentage of operations at Redfield) 100 %
   Business (percentage of operations at Redfield) _____ %
   Use Redfield Municipal Airport on a transient basis – Aircraft is based elsewhere (please indicate airport)

   Yes _____ No _____

   Where is/are your aircraft based? 108

   Please explain your business/personal air transportation needs:

   Current: Recreational

   Future: _____

**Please Return by October 15**

2. Please complete the following table about your aircraft operations to and from Redfield Municipal Airport. Given the existing conditions at the airport, what types of aircraft and number of operations do you or your business utilize on an annual basis?

   NOTE: If your firm or company attracts aviation activity to Redfield, please indicate those estimated operations as well.

| Aircraft Name, Model | Runway | Number of Annual Operations | | Projected Number of Annual Operations | |
|---|---|---|---|---|---|
| | | 2012 | 2017 | 2019 | 2024 |
| Cessna 172 | 13-31 | | 100 | 100 | 100 |
| | | | | | |
| | | | | | |
| | | | | | |

3. What are your runway length requirements (accelerate/stop distance requirements, insurance requirements, company policy, ect.) of your aircraft on an 85 degree day, 1307' MSL at your required takeoff weight?

| Aircraft Name, Model | Takeoff Weight Requirement | Runway Length Requirements (feet) |
|---|---|---|
| Cessna 172 | 2000 | 1200 |
| | | |
| | | |
| | | |

   Please indicate the basis of your runway length requirements (i.e. pilots operating handbook, company policy, insurance requirement):

   POH

4. Why do you or your company utilize or benefit from general aviation at the Redfield Municipal Airport (i.e. close to clients, fly to/from business, etc.)? If you do not utilize Redfield Municipal Airport and fly to an alternative airport, please indicate why.

   Travel

5. Is the current runway a limiting factor to your operations?

Yes X No _____

If yes, please explain:

Wind Coverage

6. Are there any other airport facilities that prevent you from operating to/from Redfield Municipal Airport (i.e. hangar availability, fuel, ect.)?

Yes X No _____

If yes, please explain:

hangar availability

7. What percentage of your flights are within a 20 mile radius of Redfield Municipal Airport?

50 %

8. Please rank the adequacy of the facilities at the Redfield Municipal Airport.

| | Excellent | Good | Fair | Poor | N/A |
|---|---|---|---|---|---|
| GA Terminal Building | | | | | ✓ |
| Hangar Facilities | | | | ✓ | |
| Aircraft Parking | | | ✓ | | |
| Aircraft Fueling | | | ✓ | | |
| Auto Parking | | ✓ | | | |

Comments:

9. Please rate the overall impression of the Redfield Municipal Airport.

| | Extremely Satisfied | Satisfied | Neutral | Dissatisfied | Extremely Dissatisfied |
|---|---|---|---|---|---|
| Impression | | | ~ | | |

**Please Return by October 15**

10. What do you like most about the Redfield Municipal Airport:

Close to home

11. What do you like least about the Redfield Municipal Airport:

new runway direction

12. Please provide any additional comments about the long-term development of the Redfield Municipal Airport:

13. Please provide the following information pertaining to the individual who completed this survey.

Name: Jacob Appel

Company/Affiliation: Pilot

Address: 1524 E 3rd St
Redfield, SD

Phone: (605)450-0605

Email: jacob.appel@hotmail.com

14. May we contact you with any specific questions about this user survey?

Yes ✓ No _____

Please attach any additional comments you may have to this survey.

***The Redfield Municipal Airport and the City of Redfield thank you for completing this user survey.***

**Please Return by October 15**

AIRPORT USER SURVEY – REDFIELD MUNICIPAL AIRPORT

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Your detailed input is very important to the accuracy and viability of this study. We request you complete the survey and return it to the following by **October 15, 2018.**

Adam Hansen, Airport Manager
626 N. Main Street
Redfield, SD 57469
605-472-4550
Email: alhansen@redfield-sd.com

1. Do you or your business currently use the Redfield Municipal Airport?

   Yes X No _____

   How do you or your business currently use the Redfield Municipal Airport? Please indicate all that apply:

   Recreational (percentage of operations at Redfield) _____ %
   Business (percentage of operations at Redfield) 100 %
   Use Redfield Municipal Airport on a transient basis – Aircraft is based elsewhere (please indicate airport)

   Yes _____ No _____

   Where is/are your aircraft based? Huron

   Please explain your business/personal air transportation needs:

   Current: Agricultural

   Future: AG

**Please Return by October 15**

2. Please complete the following table about your aircraft operations to and from Redfield Municipal Airport. Given the existing conditions at the airport, what types of aircraft and number of operations do you or your business utilize on an annual basis?

   NOTE: If your firm or company attracts aviation activity to Redfield, please indicate those estimated operations as well.

| Aircraft Name, Model | Runway | Number of Annual Operations | | Projected Number of Annual Operations | |
|---|---|---|---|---|---|
| | | 2012 | 2017 | 2019 | 2024 |
| Agtegra Aircraft 402, 502, 602, 802 | | | | | |
| | | | | | |

3. What are your runway length requirements (accelerate/stop distance requirements, insurance requirements, company policy, ect.) of your aircraft on an 85 degree day, 1307' MSL at your required takeoff weight?

| Aircraft Name, Model | Takeoff Weight Requirement | Runway Length Requirements (feet) |
|---|---|---|
| 402, 502, 602, 802 | 13,900 | 3500 |
| | | |
| | | |
| | | |

   Please indicate the basis of your runway length requirements (i.e. pilots operating handbook, company policy, insurance requirement):

   Agricultural, > 3000' takeoff, < 2500 Landing

4. Why do you or your company utilize or benefit from general aviation at the Redfield Municipal Airport (i.e. close to clients, fly to/from business, etc.)? If you do not utilize Redfield Municipal Airport and fly to an alternative airport, please indicate why.

   Fits our trade area well, centralized

5. Is the current runway a limiting factor to your operations?

Yes X No ____

If yes, please explain: Hot days our aircraft will need to down-load

6. Are there any other airport facilities that prevent you from operating to/from Redfield Municipal Airport (i.e. hangar availability, fuel, ect.)?

Yes X No ____

If yes, please explain: when multiple ag-planes running, the current ramp area is not big enough, also GA planes have trouble accessing the tie downs

7. What percentage of your flights are within a 20 mile radius of Redfield Municipal Airport?

70 %

8. Please rank the adequacy of the facilities at the Redfield Municipal Airport.

| | Excellent | Good | Fair | Poor | N/A |
|---|---|---|---|---|---|
| GA Terminal Building | X | | | | |
| Hangar Facilities | | | X | | |
| Aircraft Parking | | | | X | |
| Aircraft Fueling | | | X | | |
| Auto Parking | | | | | X |

Comments:

9. Please rate the overall impression of the Redfield Municipal Airport.

| | Extremely Satisfied | Satisfied | Neutral | Dissatisfied | Extremely Dissatisfied |
|---|---|---|---|---|---|
| Impression | | X | | | |

10. What do you like most about the Redfield Municipal Airport:

Location

11. What do you like least about the Redfield Municipal Airport:

Ramp - when using it for AG

12. Please provide any additional comments about the long-term development of the Redfield Municipal Airport:

seperate Ag Area we need trucks to be able to access this area also.

13. Please provide the following information pertaining to the individual who completed this survey.


Name: Tom Perrenoud

Company/Affiliation: Agtegra

Address: 110 15th St NW
Huron, SD 57350

Phone: 605-350-2726

Email: thomas.perrenoud@agtegra.com


14. May we contact you with any specific questions about this user survey?

Yes X No ____

Please attach any additional comments you may have to this survey.

***The Redfield Municipal Airport and the City of Redfield thank you for completing this user survey.***

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Your detailed input is very important to the accuracy and viability of this study. We request you complete the survey and return it to the following by **October 15, 2018.**

Adam Hansen, Airport Manager
626 N. Main Street
Redfield, SD 57469
605-472-4550
Email: alhansen@redfield-sd.com

1. Do you or your business currently use the Redfield Municipal Airport?

   Yes X No ____

   How do you or your business currently use the Redfield Municipal Airport? Please indicate all that apply:

   Recreational (percentage of operations at Redfield) ____ %
   Business (percentage of operations at Redfield) 100 %
   Use Redfield Municipal Airport on a transient basis – Aircraft is based elsewhere (please indicate airport)
   Yes X No ____
   Where is/are your aircraft based? Huron, Highmore, Clark Mitchell

   Please explain your business/personal air transportation needs:

   Current: Ag Aircraft Loading w/ quick access to a Runway
   Future: ____

2. Please complete the following table about your aircraft operations to and from Redfield Municipal Airport. Given the existing conditions at the airport, what types of aircraft and number of operations do you or your business utilize on an annual basis?

   NOTE: If your firm or company attracts aviation activity to Redfield, please indicate those estimated operations as well.

| Aircraft Name, Model | Runway | Number of Annual Operations | | Projected Number of Annual Operations | |
|---|---|---|---|---|---|
| | | 2012 | 2017 | 2019 | 2024 |
| AT802 | Any | 0 | 200 | 250 | 300 |
| AT602 | | 0 | 150 | 200 | 250 |
| AT502 | | 0 | 100 | 150 | 200 |
| AT402 | | 0 | 0 | 100 | 150 |

3. What are your runway length requirements (accelerate/stop distance requirements, insurance requirements, company policy, ect.) of your aircraft on an 85 degree day, 1307' MSL at your required takeoff weight?

| Aircraft Name, Model | Takeoff Weight Requirement | Runway Length Requirements (feet) |
|---|---|---|
| AT802 | 16,000 lbs | 3200 |
| | | |
| | | |
| | | |

Please indicate the basis of your runway length requirements (i.e. pilots operating handbook, company policy, insurance requirement):

Require enough to TO w/Full Load

4. Why do you or your company utilize or benefit from general aviation at the Redfield Municipal Airport (i.e. close to clients, fly to/from business, etc.)? If you do not utilize Redfield Municipal Airport and fly to an alternative airport, please indicate why.

We service Farmers in the local Area. The Ability to operate closer to their fields allows us to keep the cost down for our customers

5. Is the current runway a limiting factor to your operations?

Yes _____ No X

If yes, please explain:

_____

_____

6. Are there any other airport facilities that prevent you from operating to/from Redfield Municipal Airport (i.e. hangar availability, fuel, ect.)?

Yes _____ No X

If yes, please explain:

_____

_____

7. What percentage of your flights are within a 20 mile radius of Redfield Municipal Airport?

90 %

8. Please rank the adequacy of the facilities at the Redfield Municipal Airport.

| | Excellent | Good | Fair | Poor | N/A |
|---|---|---|---|---|---|
| GA Terminal Building | X | | | | |
| Hangar Facilities | | | | X | |
| Aircraft Parking | | | | X | |
| Aircraft Fueling | | | | X | |
| Auto Parking | | X | | | |

Comments:

_____

_____

9. Please rate the overall impression of the Redfield Municipal Airport.

| | Extremely Satisfied | Satisfied | Neutral | Dissatisfied | Extremely Dissatisfied |
|---|---|---|---|---|---|
| Impression | | X | | | |

**Please Return by October 15**

10. What do you like most about the Redfield Municipal Airport:
Great Runway & Low Traffic

11. What do you like least about the Redfield Municipal Airport:
Ability to expand Ag-operations

12. Please provide any additional comments about the long-term development of the Redfield Municipal Airport:
We would like to build a facility that could store our aircraft & build a suitable load pad for Ag Operations wich would include fuel storage.

13. Please provide the following information pertaining to the individual who completed this survey.


Name: Heath Kretschmar
Company/Affiliation: Agtegra
Address: 575 2/5th St SE
Huron, SD 57350
Phone: 605-933-0399
Email: heath.kretschmar@agtegra.com


14. May we contact you with any specific questions about this user survey?
Yes X No ____

Please attach any additional comments you may have to this survey.

***The Redfield Municipal Airport and the City of Redfield thank you for completing this user survey.***

Please Keep in mind when planning, that we would prefer to operate without causing inconvenience to other pilots or citizens of Redfield. We would also like to have quick access to runway & buildings.

**Please Return by October 15**

AIRPORT USER SURVEY – REDFIELD MUNICIPAL AIRPORT

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The Redfield Municipal Airport (1D8) currently has Runway 17-35 (3,500'x 75') with 10 based aircraft, and 4,000 annual operations according to the most recent master record (5010) form.

The purpose of this survey is to identify aircraft or the aircraft in your current or planned fleet, the runway length and airport facility requirements of that fleet, and your forecasted levels of activity at 1D8. Detailed documentation on your usage will allow the City of Redfield to justify future improvements at the airport such as additional apron areas, hangar taxiways, a cross wind runway, etc. Please indicate any airport improvements you desire or require to operate safely from 1D8.

Your detailed input is very important to the accuracy and viability of this study. We request you complete the survey and return it to the following by **October 15, 2018.**

Adam Hansen, Airport Manager
626 N. Main Street
Redfield, SD 57469
605-472-4550
Email: alhansen@redfield-sd.com

1. Do you or your business currently use the Redfield Municipal Airport?

   Yes X No ____

   How do you or your business currently use the Redfield Municipal Airport? Please indicate all that apply:

   Recreational (percentage of operations at Redfield) ____ %
   Business (percentage of operations at Redfield) 100 %
   Use Redfield Municipal Airport on a transient basis – Aircraft is based elsewhere (please indicate airport)

   Yes X No ____

   Where is/are your aircraft based? Huron, SD

   Please explain your business/personal air transportation needs:

   Current: Agricultural Aviation

   Future: Agricultural Aviation

2. Please complete the following table about your aircraft operations to and from Redfield Municipal Airport. Given the existing conditions at the airport, what types of aircraft and number of operations do you or your business utilize on an annual basis?

   NOTE: If your firm or company attracts aviation activity to Redfield, please indicate those estimated operations as well.

| Aircraft Name, Model | Runway | Number of Annual Operations | | Projected Number of Annual Operations | |
|---|---|---|---|---|---|
| | | 2012 | 2017 | 2019 | 2024 |
| AT 402, 502, 602, 802 | All | | 1 | 1 | 1 |
| | | | ↑ Agriculture | ↗ | → |
| | | | | | |
| | | | | | |

3. What are your runway length requirements (accelerate/stop distance requirements, insurance requirements, company policy, ect.) of your aircraft on an 85 degree day, 1307' MSL at your required takeoff weight?

| Aircraft Name, Model | Takeoff Weight Requirement | Runway Length Requirements (feet) |
|---|---|---|
| AT 402, 502, 602, 802 | 13,000 | 3500 |
| | | |
| | | |
| | | |

Please indicate the basis of your runway length requirements (i.e. pilots operating handbook, company policy, insurance requirement):

Agricultural, >3000' T/O, <2500 Landing

4. Why do you or your company utilize or benefit from general aviation at the Redfield Municipal Airport (i.e. close to clients, fly to/from business, etc.)? If you do not utilize Redfield Municipal Airport and fly to an alternative airport, please indicate why.

Centrally located to service customers in surrounding area

5. Is the current runway a limiting factor to your operations?

Yes _____ No X

If yes, please explain:

_____

_____

6. Are there any other airport facilities that prevent you from operating to/from Redfield Municipal Airport (i.e. hangar availability, fuel, ect.)?

Yes _____ No X

If yes, please explain:

_____

_____

7. What percentage of your flights are within a 20 mile radius of Redfield Municipal Airport?

80 %

8. Please rank the adequacy of the facilities at the Redfield Municipal Airport.

| | Excellent | Good | Fair | Poor | N/A |
|---|---|---|---|---|---|
| GA Terminal Building | X | | | | |
| Hangar Facilities | | | X | | |
| Aircraft Parking | | | X | | |
| Aircraft Fueling | | | X | | |
| Auto Parking | | | | X | |

Comments:

_____

_____

9. Please rate the overall impression of the Redfield Municipal Airport.

| | Extremely Satisfied | Satisfied | Neutral | Dissatisfied | Extremely Dissatisfied |
|---|---|---|---|---|---|
| Impression | | | X | | |

**Please Return by October 15**

10. What do you like most about the Redfield Municipal Airport:

Location and accomodation by airport staff

11. What do you like least about the Redfield Municipal Airport:

No specified ag aviation area

12. Please provide any additional comments about the long-term development of the Redfield Municipal Airport:

Would like to see a Ag aviation specific area set up to handle ag operations well.

13. Please provide the following information pertaining to the individual who completed this survey.

Name: Brodie Glanzer

Company/Affiliation: Agtegra Co-op

Address: 110 15th St SW
Huron, SD 57350

Phone: 605-352-7327

Email:

14. May we contact you with any specific questions about this user survey?

Yes X No ____

Please attach any additional comments you may have to this survey.

***The Redfield Municipal Airport and the City of Redfield thank you for completing this user survey.***

RECEIVED
OCT 1 REC'D
By

AIRPORT USER SURVEY – REDFIELD MUNICIPAL AIRPORT

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The purpose of this survey is to identify aircraft or the aircraft in your current or planned fleet, the runway length and airport facility requirements of that fleet, and your forecasted levels of activity at 1D8. Detailed documentation on your usage will allow the City of Redfield to justify future improvements at the airport such as additional apron areas, hangar taxiways, a cross wind runway, etc. Please indicate any airport improvements you desire or require to operate safely from 1D8.

Your detailed input is very important to the accuracy and viability of this study. We request you complete the survey and return it to the following by **October 15, 2018.**

Adam Hansen, Airport Manager
626 N. Main Street
Redfield, SD 57469
605-472-4550
Email: alhansen@redfield-sd.com

1. Do you or your business currently use the Redfield Municipal Airport?

   Yes _____ No _____

   How do you or your business currently use the Redfield Municipal Airport? Please indicate all that apply:

   Recreational (percentage of operations at Redfield) _____ %
   Business (percentage of operations at Redfield) _____ %
   Use Redfield Municipal Airport on a transient basis – Aircraft is based elsewhere (please indicate airport)

   Yes _____ No _____

   Where is/are your aircraft based? _____

   Please explain your business/personal air transportation needs:

   Current: _____

   _____

   Future: _____

   _____

**Please Return by October 15**

2. Please complete the following table about your aircraft operations to and from Redfield Municipal Airport. Given the existing conditions at the airport, what types of aircraft and number of operations do you or your business utilize on an annual basis?

   NOTE: If your firm or company attracts aviation activity to Redfield, please indicate those estimated operations as well.

| Aircraft Name, Model | Runway | Number of Annual Operations | | Projected Number of Annual Operations | |
|---|---|---|---|---|---|
| | | 2012 | 2017 | 2019 | 2024 |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

3. What are your runway length requirements (accelerate/stop distance requirements, insurance requirements, company policy, ect.) of your aircraft on an 85 degree day, 1307' MSL at your required takeoff weight?

| Aircraft Name, Model | Takeoff Weight Requirement | Runway Length Requirements (feet) |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

   Please indicate the basis of your runway length requirements (i.e. pilots operating handbook, company policy, insurance requirement):

   _____

4. Why do you or your company utilize or benefit from general aviation at the Redfield Municipal Airport (i.e. close to clients, fly to/from business, etc.)? If you do not utilize Redfield Municipal Airport and fly to an alternative airport, please indicate why.

   _____

   _____

   _____

**Please Return by October 15**

5. Is the current runway a limiting factor to your operations?

Yes _____ No _____

If yes, please explain:

_____

_____

6. Are there any other airport facilities that prevent you from operating to/from Redfield Municipal Airport (i.e. hangar availability, fuel, ect.)?

Yes _____ No _____

If yes, please explain:

_____

_____

7. What percentage of your flights are within a 20 mile radius of Redfield Municipal Airport?

_____ %

8. Please rank the adequacy of the facilities at the Redfield Municipal Airport.

| | Excellent | Good | Fair | Poor | N/A |
|---|---|---|---|---|---|
| GA Terminal Building | | | | | |
| Hangar Facilities | | | | | |
| Aircraft Parking | | | | | |
| Aircraft Fueling | | | | | |
| Auto Parking | | | | | |

Comments:

_____

_____

9. Please rate the overall impression of the Redfield Municipal Airport.

| | Extremely Satisfied | Satisfied | Neutral | Dissatisfied | Extremely Dissatisfied |
|---|---|---|---|---|---|
| Impression | | | | | |

**Please Return by October 15**

10. What do you like most about the Redfield Municipal Airport:

11. What do you like least about the Redfield Municipal Airport:
the possibility of it closing 175th Street!

12. Please provide any additional comments about the long-term development of the Redfield Municipal Airport:
We are not in favor of 175th Street closing + therefore using 384th Ave as our route to town! Without 384th Ave having many improvements to it... several months of the year (winter) it is impossible for travel much less an ambulance if we or Adam + Mallory McMahon's need one!! Don't need a medical jet if can't get to the airport!

13. Please provide the following information pertaining to the individual who completed this survey.

Name: Elmer + Jane Shuggrue

Company/Affiliation:

Address: 38341 195th St.
Redfield, SD 57469

Phone: 460-0828 460-1888

Email:

14. May we contact you with any specific questions about this user survey?
Yes X No ____

Please attach any additional comments you may have to this survey.
We want to be informed of any future discussion on this Master Plan / Expansion!

***The Redfield Municipal Airport and the City of Redfield thank you for completing this user survey.***

**Please Return by October 15**

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JAN - 2 REC'D
By

# AIRPORT USER SURVEY – REDFIELD MUNICIPAL AIRPORT

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The Redfield Municipal Airport (1D8) currently has Runway 17-35 (3,500'x 75') with 10 based aircraft, and 4,000 annual operations according to the most recent master record (5010) form.

The purpose of this survey is to identify aircraft or the aircraft in your current or planned fleet, the runway length and airport facility requirements of that fleet, and your forecasted levels of activity at 1D8. Detailed documentation on your usage will allow the City of Redfield to justify future improvements at the airport such as additional apron areas, hangar taxiways, a cross wind runway, etc. Please indicate any airport improvements you desire or require to operate safely from 1D8.

Your detailed input is very important to the accuracy and viability of this study. We request you complete the survey and return it to the following by **October 15, 2018.**

Adam Hansen, Airport Manager
626 N. Main Street
Redfield, SD 57469
605-472-4550
Email: alhansen@redfield-sd.com

1. Do you or your business currently use the Redfield Municipal Airport?

   Yes ✓ No _____

   How do you or your business currently use the Redfield Municipal Airport? Please indicate all that apply:

   Recreational (percentage of operations at Redfield) _____ %
   Business (percentage of operations at Redfield) _____ %
   Use Redfield Municipal Airport on a transient basis – Aircraft is based elsewhere (please indicate airport)

   Yes _____ No X

   Where is/are your aircraft based? _____

   Please explain your business/personal air transportation needs:

   Current: Recreational – 100%

   Future: // //

2. Please complete the following table about your aircraft operations to and from Redfield Municipal Airport. Given the existing conditions at the airport, what types of aircraft and number of operations do you or your business utilize on an annual basis?

   NOTE: If your firm or company attracts aviation activity to Redfield, please indicate those estimated operations as well.

| Aircraft Name, Model | Runway | Number of Annual Operations | | Projected Number of Annual Operations | |
|---|---|---|---|---|---|
| | | 2012 | 2017 | 2019 | 2024 |
| Cessna 175 | Both | ? | ? | | |
| Piper Seneca | | ? | ? | | |
| | | | | | |
| | | | | | |

3. What are your runway length requirements (accelerate/stop distance requirements, insurance requirements, company policy, ect.) of your aircraft on an 85 degree day, 1307' MSL at your required takeoff weight?

| Aircraft Name, Model | Takeoff Weight Requirement | Runway Length Requirements (feet) |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

   Please indicate the basis of your runway length requirements (i.e. pilots operating handbook, company policy, insurance requirement):

4. Why do you or your company utilize or benefit from general aviation at the Redfield Municipal Airport (i.e. close to clients, fly to/from business, etc.)? If you do not utilize Redfield Municipal Airport and fly to an alternative airport, please indicate why.

5. Is the current runway a limiting factor to your operations?

Yes _____ No ✓

If yes, please explain:

_____

_____

6. Are there any other airport facilities that prevent you from operating to/from Redfield Municipal Airport (i.e. hangar availability, fuel, ect.)?

Yes _____ No ✓

If yes, please explain:

_____

_____

7. What percentage of your flights are within a 20 mile radius of Redfield Municipal Airport?

90 %

8. Please rank the adequacy of the facilities at the Redfield Municipal Airport.

| | Excellent | Good | Fair | Poor | N/A |
|---|---|---|---|---|---|
| GA Terminal Building | ✓ | | | | |
| Hangar Facilities | ✓ | | | | |
| Aircraft Parking | ✓ | | | | |
| Aircraft Fueling | Needed To improve & Maybe You Have | | | | |
| Auto Parking | ✓ | | | | |

Comments:

_____

_____

9. Please rate the overall impression of the Redfield Municipal Airport.

| | Extremely Satisfied | Satisfied | Neutral | Dissatisfied | Extremely Dissatisfied |
|---|---|---|---|---|---|
| Impression | ✓ | | | | |

**Please Return by October 15**

10. What do you like most about the Redfield Municipal Airport: Close easy to get to

11. What do you like least about the Redfield Municipal Airport:

12. Please provide any additional comments about the long-term development of the Redfield Municipal Airport:

Should be good for long time

13. Please provide the following information pertaining to the individual who completed this survey.

Name: Paul E Johnson

Company/Affiliation:

Address: 1524 E 2nd St Box 350 Redfield

Phone: Cell 605 450 0602 — Home 472-2782

Email: ?

14. May we contact you with any specific questions about this user survey?

Yes ✓ No _____

Please attach any additional comments you may have to this survey.

***The Redfield Municipal Airport and the City of Redfield thank you for completing this user survey.***

**Please Return by October 15**

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AUG 13 2019
BY:_____

AIRPORT USER SURVEY – REDFIELD MUNICIPAL AIRPORT

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The purpose of this survey is to identify aircraft or the aircraft in your current or planned fleet, the runway length and airport facility requirements of that fleet, and your forecasted levels of activity at 1D8. Detailed documentation on your usage will allow the City of Redfield to justify future improvements at the airport such as additional apron areas, hangar taxiways, a cross wind runway, etc. Please indicate any airport improvements you desire or require to operate safely from 1D8.

Your detailed input is very important to the accuracy and viability of this study. We request you complete the survey and return it to the following by **October 15, 2018.**

Adam Hansen, Airport Manager
626 N. Main Street
Redfield, SD 57469
605-472-4550
Email: alhansen@redfield-sd.com

1. Do you or your business currently use the Redfield Municipal Airport?

Yes _____ No N. A.

How do you or your business currently use the Redfield Municipal Airport? Please indicate all that apply:

Recreational (percentage of operations at Redfield) _____ %
Business (percentage of operations at Redfield) _____ %
Use Redfield Municipal Airport on a transient basis – Aircraft is based elsewhere (please indicate airport)

Where is/are your aircraft based? N. A. Yes _____ No _____

Please explain your business/personal air transportation needs:

Current: Family members fly in for visits

Future: fly in for visits

**Please Return by October 15**

2. Please complete the following table about your aircraft operations to and from Redfield Municipal Airport. Given the existing conditions at the airport, what types of aircraft and number of operations do you or your business utilize on an annual basis?

   NOTE: If your firm or company attracts aviation activity to Redfield, please indicate those estimated operations as well.

| Aircraft Name, Model | Runway | Number of Annual Operations | | Projected Number of Annual Operations | |
|---|---|---|---|---|---|
| | | 2012 | 2017 | 2019 | 2024 |
| | | | | | |
| N.A. | | | | | |
| | | | | | |
| | | | | | |

3. What are your runway length requirements (accelerate/stop distance requirements, insurance requirements, company policy, ect.) of your aircraft on an 85 degree day, 1307' MSL at your required takeoff weight?

| Aircraft Name, Model | Takeoff Weight Requirement | Runway Length Requirements (feet) |
|---|---|---|
| | | |
| N.A. | | |
| | | |
| | | |

   Please indicate the basis of your runway length requirements (i.e. pilots operating handbook, company policy, insurance requirement):

   N.A.

4. Why do you or your company utilize or benefit from general aviation at the Redfield Municipal Airport (i.e. close to clients, fly to/from business, etc.)? If you do not utilize Redfield Municipal Airport and fly to an alternative airport, please indicate why.

   N.A.

**Please Return by October 15**

5. Is the current runway a limiting factor to your operations?

Yes _____ No N.A.

If yes, please explain:

_____

_____

6. Are there any other airport facilities that prevent you from operating to/from Redfield Municipal Airport (i.e. hangar availability, fuel, ect.)?

Yes _____ No N.A.

If yes, please explain:

_____

_____

7. What percentage of your flights are within a 20 mile radius of Redfield Municipal Airport?

N.A. %

8. Please rank the adequacy of the facilities at the Redfield Municipal Airport.

| | Excellent | Good | Fair | Poor | N/A |
|---|---|---|---|---|---|
| GA Terminal Building | | | | | |
| Hangar Facilities | | | N/A | | |
| Aircraft Parking | | | | | |
| Aircraft Fueling | | | | | |
| Auto Parking | | ✓ | | | |

Comments: I am not a pilot - I have concerns for my visitor who fly in.

9. Please rate the overall impression of the Redfield Municipal Airport.

| | Extremely Satisfied | Satisfied | Neutral | Dissatisfied | Extremely Dissatisfied |
|---|---|---|---|---|---|
| Impression | | ✓ | | | |

**Please Return by October 15**

10. What do you like most about the Redfield Municipal Airport:

Close to town

11. What do you like least about the Redfield Municipal Airport:

Noise of the planes - flying over so closley

12. Please provide any additional comments about the long-term development of the Redfield Municipal Airport:

Need a long run-way 3500 ft.
Need for Cross-wind location
Need for extended time for discussion of rules & needs
Allow all input from individuals

13. Please provide the following information pertaining to the individual who completed this survey.

Name: Judy Brandvor Woehl
Company/Affiliation: None
Address: 38546-175th St.
Redfield
Phone: 460-0357
Email: —

14. May we contact you with any specific questions about this user survey?

Yes ✓ No ____

Please attach any additional comments you may have to this survey.

***The Redfield Municipal Airport and the City of Redfield thank you for completing this user survey.***

RECEIVED
SEP 12 2019
BY:_____

AIRPORT USER SURVEY – REDFIELD MUNICIPAL AIRPORT

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Your detailed input is very important to the accuracy and viability of this study. We request you complete the survey and return it to the following by **October 15, 2018.**

Adam Hansen, Airport Manager
626 N. Main Street
Redfield, SD 57469
605-472-4550
Email: alhansen@redfield-sd.com

1. Do you or your business currently use the Redfield Municipal Airport?

   Yes _____ No X

   How do you or your business currently use the Redfield Municipal Airport? Please indicate all that apply:

   Recreational (percentage of operations at Redfield) 0 %
   Business (percentage of operations at Redfield) 0 %
   Use Redfield Municipal Airport on a transient basis – Aircraft is based elsewhere (please indicate airport)

   Yes _____ No X

   Where is/are your aircraft based? _____

   Please explain your business/personal air transportation needs:

   Current: Back of Sheet →

   Future: _____

I was not Notified at all about the Extension of the runway. that may be beinging built through my Parents pasture ~~pasture~~ - Land wich is owned by BoB & Sherry Baloun. It will be way to close to the house and will Not be safe for anybody or any animals. that are anyware near the property. besides being un safe it will be way to noisy. I do not no if this project ~~fo~~ follows the mandated guidlines but it needs to be talked about by the Land owners.

RBaloun

9-9-19

2. Please complete the following table about your aircraft operations to and from Redfield Municipal Airport. Given the existing conditions at the airport, what types of aircraft and number of operations do you or your business utilize on an annual basis?

   NOTE: If your firm or company attracts aviation activity to Redfield, please indicate those estimated operations as well.

| Aircraft Name, Model | Runway | Number of Annual Operations | | Projected Number of Annual Operations | |
|---|---|---|---|---|---|
| | | 2012 | 2017 | 2019 | 2024 |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

3. What are your runway length requirements (accelerate/stop distance requirements, insurance requirements, company policy, ect.) of your aircraft on an 85 degree day, 1307' MSL at your required takeoff weight?

| Aircraft Name, Model | Takeoff Weight Requirement | Runway Length Requirements (feet) |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

Please indicate the basis of your runway length requirements (i.e. pilots operating handbook, company policy, insurance requirement):

Does not need to be Longer or bigger

4. Why do you or your company utilize or benefit from general aviation at the Redfield Municipal Airport (i.e. close to clients, fly to/from business, etc.)? If you do not utilize Redfield Municipal Airport and fly to an alternative airport, please indicate why.

NO USe

10. What do you like most about the Redfield Municipal Airport:

11. What do you like least about the Redfield Municipal Airport:

12. Please provide any additional comments about the long-term development of the Redfield Municipal Airport:

I have never been notified about any of the changes already done or plans to be doing more. I am not in favor of the runway being extended, which would be thru or over my pasture. The noise would be unbearable. Its already loud to load the way it is, It is not safe for cattle + etc. in the pasture, right know when coming & going you feel like they could hit the house. There needs to be meetings with Land owners to discuss this project.

13. Please provide the following information pertaining to the individual who completed this survey.

Name: Sherry Balcom

Company/Affiliation:

Address: 38423 174th St.
Redf. SD

Phone: 605-450-1447

Email:

14. May we contact you with any specific questions about this user survey?

Yes X No

Please attach any additional comments you may have to this survey.

***The Redfield Municipal Airport and the City of Redfield thank you for completing this user survey.***

# Appendix F – Public Comment/Inquiries Received and Responses

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| Comment / Inquiries | Response |
|---|---|
| Inquiry submitted via email July 13, 2019, pertaining to Appendix B of the Preliminary Master Plan – Required Runway Length, specifically notation of "take off and landing distances at sea level" as opposed to "runway length" | Detail provided within Appendix B of the preliminary master plan was provided informational purposes only. |
| Inquiry submitted via email July 13, 2019, pertaining to planes and owners using the Redfield Airport | A variety of the aircraft known to be present were listed in Appendix B to give a feel for the types of aircraft at Redfield |
| Inquiry submitted via email July 13, 2019, questioning why take off and landing distances were not listed for ambulance provider planes | Inquiry Noted. Information was inadvertently missed and will be included in final version |
| Inquiry submitted via email July 13, 2019, confirming use of AC 150/5325-4B in calculating runway length within the Preliminary Master Plan | Yes, AC 150-5325-4B was used to calculate the required minimum runway length. Additionally, charts are included in Section 3.2.2 and Appendix B of the Master Plan |
| Inquiry submitted via email July 14, 2019, regarding whether the land around "1D8 Redfield, ½ mile in distance on all 4 sides" would be described as "flat land" | Flat land is considered a relative term and is not technical. The elevations vary by up to approximately 30 feet within the ½ mile radius of the airport. |
| Inquiry submitted via email July 14, 2019, regarding the "elevation heights and direction sloping of each of the 4 sides beside our 1D8 Airport Redfield SD" | The Airport Layout Plan (ALP) includes the following documentation which addresses this matter of concern:<br><br>Sheet 7: Plan and Profile of Departure Surface for Runway 17/35<br><br>Sheet 8-9: Airfield airspace plan that identifies the Part 77 Approach, Departure, Horizontal, and Conical Surfaces<br><br>Sheet 10: Identifies the structure on airport property and their clearance to the Part 77 Transitional Surface<br><br>Sheet 12-17: Show the plan and profile for Runway 17/35 and 14/32<br><br>Sheets provided identify the elevation heights and direction of sloping off the ends of the runways. The Horizontal, Conical, and Transitional surfaces are the relevant surfaces |

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| | for viewing of the sloping on the "sides" of the runways.<br><br>Also available, Figure 9 in the Master Plan provides a 3D Diagram of the Part 77 Surfaces |
| Comments submitted via email August 23, 2019, pertaining to transparency concerns of the FAA Master Plan | Comments Noted. The FAA has been made aware of such concerns and continues to monitor the Master Plan effort to ensure it is done in accordance with FAA guidelines. |
| Comments and Inquiries submitted via email September 1, 2019, pertaining to the inclusion of "landing and take off characteristics of our planes at sea level" and further noting Redfield is located at 1300 feet above sea level | |
| 1. Inquiry over relevance | 1. Detail was provided for informational purposes only. Section 3.2.2.2 of the Master Plan provides recommendations on how to convert small aircraft recommended runway lengths from sea level to the actual airport elevation. The information provided is helpful in determining an ultimate length for the crosswind, since based on FAA guidance, justification will not support over 1,100 feet. |
| 2. Inquiry as to the objective for providing this information | 2. Actual Runway lengths are discussed in the Master Plan. The intention was for informational purposes. |
| 3. Inquiry as to actual runway length | 3. Runway length is based on critical design aircraft for the runway. The revised draft will discuss the methods used to determine the runway length in greater detail for the public to follow the methods identified in the Advisory Circular. The primary runway length requirement is 3,500 feet for small airplanes with approach speeds of 50 knots or more with a maximum certificated takeoff weight of 12,500 pounds or less. The crosswind runway length requirement is 1,100 feet for small airplanes with approach speeds of 30 knots or more but less than 50 knots. |
| 4. Inquiry as to whether the actual runway length requirement is in the master plan | 4. Yes |
| 5. Inquiry as to why a questionnaire was sent out asking pilots runway length requirements | 5. Information was requested in accordance with Section 91.3 of 14 CFR Part 91 – General Operating and Flight Rules. Further, |

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| | Section 91.103 Preflight Action specifies pilot familiarity with various flight information. Thus, it is anticipated that pilots are knowledgeable of the runway lengths requirements for the aircraft they use. |
| 6. Inquiry as to whether all pilots are educated on how to calculate runway length requirements for constructing a runway | 6. Pilots do not need to be educated on how to calculate runway length requirements for constructing a runway; however, as noted above, the Code of Federal Regulations clarifies what is expected of pilots. According to the FAA AC 150/5070-6B, Airport Master Plan, the intention of the Master Plan is a "comprehensive study of an airport and usually describes the short, medium, and long-term development plans to meet future aviation demand." Further, the "goal of the master plan is to provide the framework needed to guide future airport development that will cost-effectively satisfy aviation demand, while considering potential environmental and socioeconomic impacts." |
| 7. Inquiry as to statements "there are no planes in the north hangers" | 7. The SDDOT and FAA Registry database provide no hanger leasee in the north hanger area currently has a registered aircraft in South Dakota. Confirmation has been noted that an airport user owned one of the hangars in that area and swapped ownership with a hanger owner in the new area around 2015. |
| Inquiry submitted via email November 6, 2019, pertaining to airport hanger use | Recommendations pertaining to aeronautical use of hangers and hanger leases are included within Section 4.2.2 of the Master Plan. |
| Inquiry submitted via email November 8, 2019, pertaining to wildlife surrounding the airport | A revised Wildlife Hazard Site Visit is planned to occur in the future. The species located on or near the airport will be documented by a qualified airport wildlife biologist at such time. |
| Comments submitted November 19, 2019, | |
| 1. Pertaining to Page 1 of the Executive Summary, did not see Alternative Development, Alternative Implementation, and Environmental Considerations included within the master plan | 1. Comment Noted. Chapter 4 of the Master Plan, Alternatives, includes said information. |
| 2. Pertaining to Page 5 of the Executive Summary, Section 1.1.1, review of mandated | 2. Comment Noted. The FAA reviews the number of based aircraft on a bi-annual basis |

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| criteria for 1D8 Grant Funding including based aircraft | |
| 3. Noted that "our based aircraft A, B1 do not have the Federally mandated 95% Wind Coverage" | 3. Comment Noted. See Section 3.2.2.2 for discussion of the crosswind runway |
| 4. Pertaining to Page 13, Preliminary Master Plan – table 4 standard for Runway 17/35. Noted Runway Design Code (RDC) of 12500 lbs clearly A, B1 aircraft are not in this heavy class | 4. Comment Noted. The symbol "<" within the RDC means "less than". |
| 5. Pertaining to Page 13, Preliminary Master Plan – "table 4 lists "Both A and B aircraft in the AAC, clearly A and B1 aircraft are not appropriate with only a single Runway heading for wind coverage" | 5. Comment Noted. Aircraft Approach Category (AAC) information is correct as listed. |
| 6. Pertaining to Airplane Design Group (ADG) "wingspan of 49 feet but less than 79 feet and tail height 20 feet but less than 30 feet. Clearly A and B1 aircraft have shorter wingspan and lower tails. They also clearly are not appropriate for this category of aircraft" | 6. Comment Noted. This section identifies the critical design aircraft. |
| 7. Noted Preliminary Master Plan did not list alternatives in runway location outside the 14/32 runway option – concerns regarding the 95% wind coverage and criteria to meet the needs of the aircraft utilizing the 1D8 airport | 7. Comments Noted. An additional turf cross wind runway alternative is identified in Section 3.2.1 of the Master Plan. |
| 8. Pertaining to Page 29, 3.1 Design Standards and Critical Aircraft Preliminary Master Plan, in Appendix B for existing based aircraft – Critical Design Aircraft Data Table, "B1 aircraft are clearly misrepresented in the B2 categories Wingspan 49- <79, Approach Speed 91<121 knots, Tail Height 20-<30 feet, all clearly misrepresenting the B1 based aircraft" | 8. Comment Noted. The B1 aircraft are identified for future / ultimate use at the airport in Appendix B. |
| 9. Pertaining to Page 29, 3.2 Runway & Taxiway Analysis and 3.2.1 Wind Coverage, Table 9, Page 30, Windrose Data at surrounding airports, "these studies at these different airports represent Runway location/ options that don't exist": Aberdeen SD, Huron SD, Watertown SD…"Runways 9/27, 11/29, 14/32 are runways at local surrounding airports that don't exist. This is clearly misrepresenting runways used in conjunction | 9. Comment Noted. Comparing the same runway orientations at several airports is relevant for Redfield as wind coverage has been a topic of conversation for years. Nothing is misrepresented. The comparison is made to show that the wind coverages are similar at each of those airports. |

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| with the 17/35. The runway option not being presented and considered is the 13/31."<br><br>The 13/31 is the Primary Runway of choice from Pilots and Airports Users all across SD not just the four town previously listed. Comment further demands stopping the tactic of "phony crap" in regards to wind coverage and "fictitious Runway orientations" and misrepresentations of what is "actually used at nearly every airport in our State including previously at our Airport 1D8." | The wind coverages are shown for 11/29 and 14/32. It could be assumed that the wind coverage would be similar to 13/31. However, 13/31 wind coverage has been added to Table 9. |
| 10. Pertaining to Page 32, Preliminary Master Plan 3.2.2, comment notes the five steps to determine runway length at 1D8 are not being used or considered | 10. Comment Noted. The steps are being used and considered. |
| 11. Pertaining to Page 34, Preliminary Master Plan 3.2.2, "using 30 knots but less than 50 knots landing speed does not represent the majority of based aircraft at 1D8 or the majority of GA transient aircraft utilizing 1D8." | 11. Comment Noted. Following the AC, the next shortest turf runway would be 1.2 x 3,500 feet = 4,200. This is not feasible for 1D8. |
| 12. Comment disagreeing with use of "slow speeds" and associated runway length for class A aircraft. Noting the majority of GA aircraft at 1D8 Redfield SD are B1.<br>* additional comment of same scope submitted via email on December 2, 2019 | 12. Comment Noted. The majority of aircraft at 1D8 are A1 aircraft. The turf crosswind runway is proposed for small aircraft using the airport and to meet the needs of the A1 aircraft with approach speeds less than 50 knots. |
| 13. Comment noting the runway length and needs at 1D8 is 3400 feet in a 13/31 configuration which is currently available and used in the last Runway Realignment Project | 13. Comment Noted. The minimum runway length for any runway for small aircraft with approach speeds of 50 knots or more is 3,500 feet. Using the previous 3,300 foot Runway 13/31 for a crosswind runway would limit future expansion at the airport. This would be difficult to achieve minimum runway lengths as the previous runway ends are near paved roads and RPZs must be clear of roadways unless an RPZ analysis is approved by the FAA. |
| 14. Comment that not using the 13/31 runway location is misrepresenting the needs of the pilots and airport users at 1D8 Redfield SD | 14. Comment Noted. Using the previous runway would limit future expansion at the airport. Several wind coverages were reviewed during the ALP / Master Plan process. Many options for reference were included in the Master Plan. The Runway |

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| | 13/31 wind coverage is shown in the Master Plan. |
| 15. Inquiry why weren't the Runway Length recommendations being presented and or followed as described in AC 150/5325-4B for our B1 based aircraft in the cross wind runway 14/32 being presented | 15. Runway length requirements for B1 aircraft are met with the current Runway 17/35. |
| 16.Inquiry as to the reason the Sponsor is proposing to wait 10-20 years for the based aircraft federally mandated 95% wind coverage needs to be addressed | 16. Timelines are estimated. It is important to note the ALP approvals, Environmental Studies, land acquisition, and design projects take time. |
| 17. Inquiry as to identifying the "FAA AIP Rule, Regulation, AC, etc… that requires 23523 Operations before a crosswind runway is justified as stated in the preliminary master plan" | 17. FAA AC 150/5325-4B identifies the 500 operation threshold. The math identifies how the City of Redfield can justify receiving AIP funding for turf crosswind runway. |
| Inquiry submitted via email December 2, 2019, as to which persons reviewed the preliminary master plan prior to presentation to the public | The Preliminary and Final Master Plans have been reviewed by the City of Redfield. |
| Inquiry as to the City of Redfield monitoring the safety needs at the 1D8 airport | The City of Redfield has and will continue to work to make 1D8 a safe airport. |

*Summaries included herein pertain to those inquiries and comments which related to the FAA Master Plan. Comments were retained for record keeping purposes and are available for inspection at the City of Redfield Finance Office.